Butterflies
of North East England

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Butterflies of North East England

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Northumbrian Water, as a leading environmental company in the North East, is really pleased to be able to support the publication of this atlas. We see butterflies as one of the key indicators of a healthy environment and, apart from being a keen corporate member of Butterfly Conservation, we actively manage our own landholdings to benefit butterflies based on over a decade of recording species using our sites.

The North East England branch of Butterfly Conservation seeks to increase our knowledge of the region's butterflies and moths, to assist in their conservation and to encourage the study of these fascinating insects. www.northeast-butterflies.org.uk

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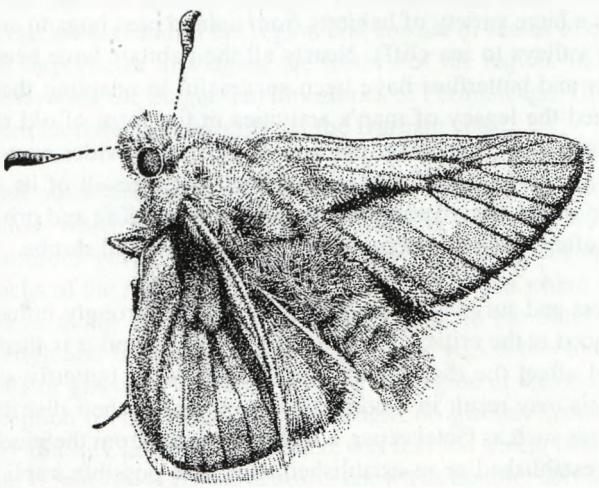
FOREWORD

Dr Sam Ellis, Head of Regions, Butterfly Conservation

It is nearly thirty years since the publication of Tom Dunn and Jim Parrack's landmark two-volume work *The Moths and Butterflies of Northumberland and Durham,* the first to include distribution maps of the region's butterflies and moths. A lot has happened in the world of butterfly recording since then and many more people are now actively involved in recording and monitoring. The result of all the extra recording effort in this region is the publication of this new atlas, *Butterflies of North East England*. This is a very welcome addition to the family of expertly produced county and regional butterfly atlases.

For each of the region's resident or common migrant butterflies, the atlas describes their distribution, habitat, life cycle, recording history and current status, as well as providing a glimpse into the future for that species. The text is backed up by detailed distribution maps, flight period and regional transect abundance graphs; these are the outcome of all that extra recording effort in the last decade or so. The text is illustrated by photographs and some very fine line drawings of each species. Each of the 15 contributors has carefully researched their species and the historical accounts of their status are absolutely fascinating.

Butterflies are amongst our most threatened wildlife and accurate distribution maps are an essential first step when planning conservation strategies. Likewise, establishing suitable monitoring systems such as butterfly transects is an essential tool to enable us to assess the success of conservation action on the ground. This atlas describes some of the efforts to conserve the most threatened species already undertaken in the region, but more importantly the recording and monitoring data will help to inform future conservation efforts for many years to come.



Large Skipper by T Coult

INTRODUCTION

Dave Stebbings, Conservation Officer, North East Branch of Butterfly Conservation

The last published works covering all the butterflies of Northumberland and Durham were *The Moths and Butterflies of Northumberland and Durham* (Dunn and Parrack 1986) and *An Atlas of the Butterflies of Northumberland and Durham* (Cook 1990). There have been some dramatic changes since these works were published. We have seen some new species of butterflies become resident in the region, although thankfully we have not lost any species since then. Distribution patterns have changed and loss of habitat has reduced the range of some species. This atlas is intended to bring up to date our knowledge of the 33 species of resident and migratory butterflies regularly found in the North East. For each species this includes an account of its distribution, habitat requirements, historical information, current status and future outlook. There are separate sections for extinct species (where we have historic records of their former presence in the region) and for vagrant species which appear occasionally.

The area covered by this atlas is the administrative counties of Northumberland, Tyne and Wear, Durham and Teesside. This corresponds to the Watsonian vice counties of Durham (66), South Northumberland (67) and North Northumberland (68), plus that part of southwest County Durham south of the River Tees. The latest species information is based on records in the North East of England Branch of Butterfly Conservation's records database. Our knowledge of the distribution and abundance of North East butterflies has increased since 1986 thanks to the establishment of a formal method of reporting sightings. This has been done by establishing county recorders and having a computerised records database into which reported sightings are entered. The records are received from butterfly recorders around the North East and we are grateful to the many dedicated volunteers who record and report butterfly sightings each year. There has been a huge increase in the number of local people reporting butterfly sightings since 2000 and more people are now recording butterflies than ever before.

The North East has a huge variety of habitats from upland peat bogs to coastal sand dunes, and from wooded river valleys to sea cliffs. Nearly all the habitats have been modified or created by human activities and butterflies have been successful in adapting their life cycles to these environments. Indeed the legacy of man's activities in the form of old railway lines, quarries and old collieries converted into nature reserves and parks provides some of the best places to see butterflies, and the North East has many such sites as a result of its industrial past. Today people are more conscious of gardening for the benefit of wildlife and private gardens and local authority parks are often planted with insect-friendly flowers and shrubs.

The breeding success and survival of butterflies tend to be strongly influenced by the weather conditions experienced at the critical stages of the life cycle and it is therefore very likely that climate change will affect the distribution and abundance of butterfly species in our region. For some species this may result in a northerly movement of their distribution and as a result some southern species such as Gatekeeper, a former resident from the nineteenth century, could eventually become established or re-established here. The possible implications are discussed for each species.

AN OUTLINE OF THE GEOGRAPHY, GEOLOGY, CLIMATE AND BUTTERFLY HABITATS OF NORTHUMBERLAND AND DURHAM

Dave Stebbings, Conservation Officer, North East Branch of Butterfly Conservation

In general terms the highest land in our region is to the west of both counties. As one travels eastwards the land gradually gets lower until the coast is reached. The highest point of the region is in the north with the granite mass of the Cheviot Hills reaching 815 metres. Further south in Northumberland, the Border Hills form its western border reaching heights of between 500 and 600 metres. South of the Tyne, the North Pennines form the high land of southwest Northumberland and western Durham, reaching 600 metres in height. Going east towards the coast the land gets lower giving way in Northumberland to a series of ridges, moorland and fells before reaching the coastal plain. Coastal sand dunes form an important feature of the Northumberland coast. In Durham the limestone hills running parallel to the coast from near Sunderland to Hartlepool are significant features. In contrast to the Northumberland dunes, coastal cliffs and wooded denes are characteristic of the Durham coast.

The region is drained by several river systems which have cut their valleys from west to east following the slope of the land. From the Tees and Wear of County Durham to the Tyne, Coquet and Aln of Northumberland these valleys are important features of the region's geography.

The oldest rocks of the region are the granites which form the Cheviot Hills. These are the remains of a volcano which was active during the Devonian period some 400 million years ago. The rocks gradually get younger as one moves south and east. Most of our region consists of rocks laid down during the Carboniferous period. These rocks form the western hills of both counties and most of central Northumberland. They consist of sandstones, limestones and cementstones and underlie the moorlands of both counties and form the ridges typical of Northumberland such as the Simonside Hills. In southeast Northumberland, roughly southeast of a line from Amble to Corbridge, and in central Durham are the youngest Carboniferous rocks of the Coal Measures age. These rocks form the lowest land of the region and consist of seams of coal and sandstone, the coal being of great importance in shaping the history of the region. In east and southeast Durham are the youngest rocks, the magnesian limestones of Permian age. These form the lovely limestone hills of eastern Durham and the cliffs of the Durham coast.

Crossing the region and outcropping in various places is a volcanic intrusion called the Whin Sill. This was a lava flow which was forced between beds of rock deep underground towards the end of the Carboniferous period. This intrusion formed a thin but extensive layer of hard dolerite through the rocks of the region. Mostly it is underground but where it outcrops it forms impressive crags such as along stretches of the Roman Wall in the Steel Rigg area and the sea cliffs of Dunstanburgh and Bamburgh. Over much of the region this underlying geology is hidden by later deposits of glacial drift which covered the region at the end of the last ice age. With the possible exception of The Cheviot, it is thought no glaciers eroded the landscape of the North East, as they did in Cumbria for instance, but that ice sheets covered the region and deposited material here (Lunn 2004). These deposits known as boulder clay or till covered much of the post ice-age landscape, and had a major effect on present day drainage, agriculture and land use and consequently wildlife habitats.

As the ice retreated from the region 12,000 years ago it left a landscape devoid of flora and fauna. Therefore all the wildlife we see today has colonised the area in the intervening time. For the first 6,000 years after the ice age the region was heavily forested, firstly with birch and Scots Pine, then with oak and elm. From about 6,000 years ago human beings arrived here and started to modify the landscape, firstly clearing the forests for fuel and building material, then developing agriculture and eventually exploiting coal and mineral resources and establishing industry. So with one or two exceptions, such as the moorland peat bogs, the region's landscape is a man-made environment.

The North East of England is one of the driest parts of Britain. The hills of our western border force the prevailing westerly rain-bearing winds to drop a lot of their moisture to the west. Although the western hills of both counties receive quite high rainfall, most of the region lies in the rain shadow of these hills. We are generally colder in winter and cooler in summer than most of England. Some of our butterflies, such as Wall, White-letter Hairstreak, Holly Blue and Small Skipper, are at their northern limit for the species in Britain. Climate is not static; we have experienced both warmer and cooler periods in the past 200 years, resulting in species expanding and contracting their ranges. In the past 20 years some species have expanded northward perhaps owing to warming as a result of climate change. As a result, species such as Comma and Speckled Wood, rare 20 years ago, are now common sights.

Habitats of significance to butterflies

Upland peat bogs

Large areas of western Northumberland are covered by peat bogs; these are often referred to as the Border Mires. They have been formed since the last ice age by plant material accumulating in shallow depressions in the moorland and the high rainfall of the uplands keeping the depressions waterlogged and so preventing decomposition. Large tracts of the Border Mires were lost in the twentieth century by draining and planting of coniferous forests. Although the western moors are not good butterfly habitats the remaining peat bogs do support nationally important colonies of Large Heath. Northumberland has the honour of having more Large Heath colonies than any other English county, the only butterfly for which this can be said.

Coastal sand dunes

Northumberland has a greater area of sand dunes than any other English county. Sand dunes are unstable features. Changes in sea level and changes to erosion patterns and even wind direction can easily erode or destroy sand dune systems. However, they do support a wide range of flowering plants and provide good butterfly habitats. Many of the butterfly distribution maps show a coastal bias, particularly for Dark Green Fritillary, Grayling and Common Blue, indicating the importance of these sites.

Woodland

Statistically the North East has a high proportion of forest cover. However, this statistic hides the fact that most of it is twentieth century conifer plantations, and we actually have very little ancient or semi-natural woodland. Most of our non-coniferous woodland is along the river valley systems of both counties. It is in these woods that we find our two woodland specialists, the White-letter Hairstreak and Purple Hairstreak. Although the coniferous forests do not provide good butterfly habitat it is on the fringes of some of the plantations, where wet flushes exist, that our best colonies of Small Pearl-bordered Fritillary are found.

Magnesian Limestone grassland

Magnesian Limestone rock laid down in the Permian period is found in a belt across much of eastern Durham. Its western edge forms a prominent escarpment and the land slopes gently eastwards to the sea, where it forms sea cliffs along a large part of the Durham coast. The limestone is cut by steep-sided wooded denes leading down to the sea. This limestone area provides many different habitats including calcareous grassland, the nearest we have in the North East to the rich chalk grasslands of southern England. The area is important for our colonies of Northern Brown Argus which are dependent on Common Rock-rose *Helianthemum nummularium*, which only grows on the limestone soils. Areas of unimproved calcareous grassland such as Pittington Hill and Hastings Hill, abandoned quarries such as Wingate and Bishop Middleham and the Durham coastal cliffs and denes are vital to both the Northern Brown Argus and Dingy Skipper in County Durham.

Brownfield sites

Some of the best butterfly sites in the region can now be found in places that were former industrial sites. These include old railway lines, former collieries, quarries and former open cast sites. Many brownfield sites have nutrient-poor or contaminated soils, which flowering plants which are tolerant of such soils can colonise quickly, for example Common Bird's-foot-trefoil *Lotus corniculatus* and clovers. However grasses, which require richer soils, are slow to move in. In the North East there is a vast network of now abandoned railway lines – many are now paths and cycle ways – which often provide warm sheltered conditions, and are particularly good places for *Vanessid* butterflies such as Peacock, Small Tortoiseshell and Red Admiral. Some former collieries and open cast sites such as Druridge Bay have been converted into nature reserves and support a wide range of common butterflies due to their having a variety of habitats and plants.

Ross Sands by M Reid

CHANGES IN THE DISTRIBUTION OF LOCAL SPECIES

Harry Eales, Freelance Entomological Consultant

Over the past two centuries there have been a number of changes in the distribution of butterflies in Northumberland and Durham. Some species have been lost, some have been regained after local extinction, a few vagrants have visited us, new species have colonised some parts of our area, and in one instance a species has been deliberately introduced. In this section we attempt to give an overview of the more significant changes that have occurred.

Wailes (1858) and Robson (1899) give good accounts of the butterflies that have been recorded locally. Robson noted that between the early 1860s and mid 1870s several species disappeared completely from both counties. These species included Orange-tip, Small Blue, Holly Blue, Large Tortoiseshell, Peacock, Comma, Marsh Fritillary, Silver-washed Fritillary, Speckled Wood, Wall, Scotch Argus, Gatekeeper, and Ringlet. Of these the Orange-tip had a small resurgence in the late 1890s but quickly disappeared again with only a very few sporadic single specimen records over the next 60 years, mainly from the south of County Durham. Not all the butterflies retreated southwards during this local extinction; both the Speckled Wood and the Ringlet sustained populations in Scotland. The 1970s also saw the gradual return of several species including the Peacock and Wall. The Speckled Wood and latterly the Gatekeeper have both returned; the former is now fairly common, while the latter is presently very scarce along the Durham/Yorkshire border. The Holly Blue was always on the very edge of its northern range in our area, but in recent years has expanded up the east coast of both counties and has been recorded in some numbers at one site in Edinburgh. However the Holly Blue is subject to great fluctuations in numbers, probably due to parasitism, and it should still be regarded as a species on the edge of its northern range. The Pearl-bordered Fritillary survived until the early 1960s when the last records of it were made in the Dipton Woods and Devil's Water areas of Hexhamshire (F W Gardner, pers. comm.). There are currently only a few colonies of this species on the eastern side of the British Isles.

The Marsh and Silver-washed Fritillaries along with the Scotch Argus have sadly not recurred and are probably unlikely to do so naturally in the near future, although the Scotch Argus does occur not too far from Carter Bar on the English/Scottish Border. Two records for this species in the 1970s, one near Cornhill-on-Tweed and another at Cragside, have never been repeated, and both may have been the result of inadvertent transportation of a gravid female in the case of the Cornhill record or possibly a deliberate release(s) by persons unknown.

The Small Blue was unofficially reintroduced onto the Berwickshire coast a few years ago into an area where it had become extinct; it has since spread southwards, so that in future it may make its way back into north Northumberland. Its foodplant Kidney Vetch *Anthyllis vulnereria* is abundant in many places on our coastline and the Marshall Meadows site just south of the Border may be the place to look for it in coming years. The Ringlet returned in numbers in the early 1990s coming down from the north and up from the south and is now one of our more common species. The Comma also returned in numbers in the early 1990s.

Three species have colonised our area since the 1980s that were never previously recorded here. These are the Small Skipper, the White-letter Hairstreak and the Brown Argus (not to be confused with the Northern Brown Argus). The Small Skipper has advanced rapidly up to the

Scottish Border and beyond, but the White-letter Hairstreak has progressed more slowly, having only recently been recorded in VC68, perhaps hampered to some degree by the scarcity of elm trees. The Brown Argus has a tentative foothold in the south of County Durham and we can look forward to seeing it expand its range further.

The Large Tortoiseshell has only rarely been recorded and has probably never been a resident species. It is known to be migratory and although extinct in Britain for several decades as a resident breeding species, it still migrates occasionally to Britain but mainly to the south coast and the southeast of the country. The Brimstone has been recorded occasionally over the last two centuries, more lately in increasing numbers, but this is probably due to the great increase in recorders. The Buckthorn *Rhamnus cathartica* and Alder Buckthorn *Frangula alnus* which are the larval foodplants do not occur naturally north of Yorkshire, although some are grown in parks and private gardens.

The Marbled White was introduced into the disused Wingate quarry in County Durham in 2000 as part of a university investigation into global warming. It is doing well there, but no breeding colony has yet been established outside this original release point and only the occasional straggler has been seen elsewhere. This species has been rapidly expanding its range in Yorkshire in recent years and in future may colonise the region naturally.

Causes of change in insect distribution

Insects are, in general terms, governed in their distribution by three factors: the availability of suitable habitat, the presence of the larval food and adult nectar plants and the temperature prevailing on that habitat. As humans, we may not be capable of noticing a one degree rise in average temperature without scientific equipment, but insects certainly can. Even half a degree increase in average temperature may be sufficient to induce an insect species to shift its range. This not only applies to butterflies but also to other species of insects such as the Emperor Dragonfly *Anax imperator*. Twenty-five years ago it was not known north of Lincolnshire but since then it has moved as far north as central Scotland where, as with every county in between, it is now a resident breeding species. In this instance, the habitat and the nymphal food were already present; it was only a small change in temperature that apparently permitted range expansion. It should be recognised, however, that responses to climate change are complex and not all species can be expected to respond in the same way.

Occasionally the re-introduction of a species that has been lost locally may occur. This is usually done by well-meaning individual entomologists, who wish to see the lost species returned to where it once occurred. The County Recorders are aware of instances of species being released or introduced in the region, including Northern Brown Argus in Northumberland. Anyone knowing of such introductions is urged to give details to the Recorders.

Causes of decline and local extinctions of butterflies

There has been a substantial body of research investigating the causes of decline and extinction in British butterflies and this is well summarised in Asher *et al.* (2001). This research indicates that habitat changes are by far the most important factor causing population declines of butterflies. Habitat changes include the complete loss of areas of habitat, such as the destruction of semi-natural grasslands, hedgerows and woodland, as well as more subtle changes in land management that lead to the very precise habitat requirements of some butterfly species no longer being met.

In our region habitat losses have been caused in various ways including agricultural improvement, urbanisation and industrial development, mineral extraction (although several former quarry sites on the Magnesian Limestone are now some of our prime butterfly sites) and afforestation. In the latter case the creation of Kielder Forest in the twentieth century is a striking example, resulting in the loss of a vast area of moorland and peat bog. Fortunately, the conservation importance of the Border Mires (for the Large Heath butterfly, among others) was recognised before the original planting plans were fully implemented and 58 of them were saved and are now managed as nature reserves (Lunn 2004). Declining habitat quality due to changes in land management practices has also been important in our region. The decline in the Small Pearl-bordered Fritillary is a good example of this, where changes in grazing practices resulted in habitat change and the loss of suitable breeding conditions for the butterfly. It was only the concerted efforts of several agencies in the last decade that the habitat degradation and fragmentation that threatened the extinction of the Small Pearl-bordered Fritillary in County Durham were halted and reversed.

Both habitat losses and habitat change result in the fragmentation and isolation of butterfly populations which has further profound impacts on species survival. Small populations of butterflies are susceptible to extinction from chance events such as fire or adverse weather and the isolation of populations caused by this fragmentation then reduces the probability of recolonisation of sites, thus rendering local extinctions permanent. It has also been suggested that genetic effects such as inbreeding may also be a consequence of habitat fragmentation that contributes to local extinctions.

Whilst habitat-related factors are now considered to be of overriding importance for the well-being of our butterfly populations they cannot provide a satisfactory explanation for the nineteenth-century extinctions (and subsequent returns) of "wider countryside" species such as Orange-tip, Peacock, Comma, Speckled Wood and Ringlet. This subject is the cause of much speculation: people have blamed atmospheric pollution, long-term periods of cold and wet weather, and temperature change including global warming. The industrial revolution from the 1600s onwards certainly put a lot of pollution into the atmosphere, but here in the North East of England the prevailing winds are either east to west or west to east and the main industrial areas were along the rivers Tyne, Wear and Tees, so how could that, for instance, affect the Speckled Wood butterfly which was breeding in the area of Belford, Northumberland where the main land use has always been farming?

Climate change appears to be a much better candidate to explain the extinctions, and the loss of several species during the 1860s coincided with a period of notably cold, wet years. It has been postulated that cool periods in the nineteenth century may have been caused or at least exacerbated by the cooling effect of particles and sulphuric acid droplets ejected high into the atmosphere by known major volcanic eruptions (Frost 2005). Fluctuations in temperature, prolonged rainfall, or hotter or colder-than-average years, can certainly have destructive effects on populations. The long drought of 1976 caused many larval foodplants to wither and perish in July and August thus starving to death larvae of a good number of species, and many butterflies that emerged during this period of high temperatures could not find nectar sources, and thus they perished also.

Over-collecting has been implicated in the extinction of the Scotch Argus in Castle Eden Dene (its only known County Durham locality) in the late nineteenth and early twentieth centuries. Victorian collectors often wanted a whole series of insects in their cabinets and commercial collectors also took large numbers. There is a now untraceable pre-World War I article in which the author stated that he knew of one local (Durham) person who had 800 specimens of this butterfly for sale. The author refrained from naming the person, saying only that "He was still with us". Hull (1924) mentions this with reference to an article on over-collecting that appeared in *The Entomologist*: "The Entomologist is rightly concerned about the damage being done by excessive collecting, but can suggest there is no excuse for the man who kills all he can regardless of condition or of the numberless specimens he already has in his possession". The Scotch Argus (then called Northern Brown) used to occur in Durham but a well-known entomologist, now dead, remarked, "It is strange; I used to go down to be sure of taking 300-400 specimens in an afternoon, but now I have to work hard to get a dozen and now it is extinct". Just who this collector was is unproven, but from the numbers he collected he was apparently operating a commercial business in supplying butterflies to other collectors.

Although in most situations collecting is not generally believed to be a sufficient cause of butterfly extinctions, for a small isolated population such as that at Castle Eden Dene this heavy collecting pressure may well have contributed, perhaps alongside other factors, to its demise. Sadly, there are still some commercial collectors around today, although we may be thankful that their numbers are fewer than they once were.

The need for research in relation to our local species

The North East of England has a long and justifiably proud history of biological recording; our first insect records date back to 1769, recorded by the Rev. J Wallis in the Simonburn area on the North Tyne. Some of the earliest county lists of insects and other life forms are from Northumberland and Durham. Recording has come a very long way since those early days when even finding an identification guide for any insect order was almost impossible; if any were available, they were very expensive. It has never been easier to identify an insect than today, with a multitude of affordable and easy to use field guides, internet websites and a rapidly growing number of mobile phone apps.

It may appear that looking at some of the more recent publications relating to butterflies, and indeed other insect species, that just about everything is known about them. Nothing could be further from the truth. There are still vast areas of Northumberland and Durham that have never felt the tread of an entomologist's foot which still need exploring. In some instances that may mean several miles being covered on foot to get to places with no vehicular access. It is in those places where it is possible to make new discoveries. Never assume we know everything that is to be known about insect distribution locally.

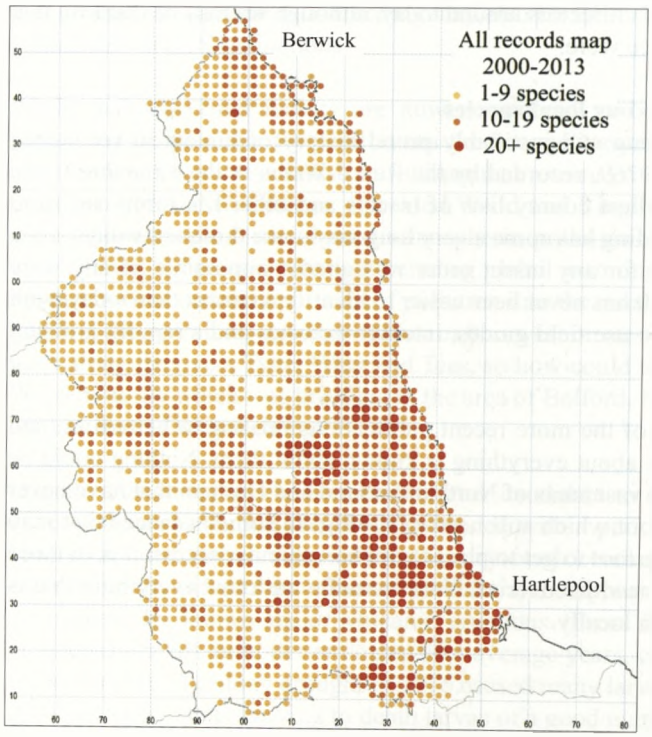
BUTTERFLY RECORDING IN THE NORTH EAST

Roger Norman, Butterfly Recorder for Northumberland 2004-2014

Regional transects

A national systematic monitoring scheme for butterflies, set up by the Institute of Terrestrial Ecology, has been operating since 1976. This was the year that our first transect was set up by Ian Findlay in Upper Teesdale National Nature Reserve, with one on Holy Island following the next year. The Transect scheme has since expanded and is now run as a partnership between the Centre for Ecology and Hydrology and Butterfly Conservation. Transects endeavour to provide a measure of abundance by weekly walking of a fixed route from April to the end of September each year under specific weather conditions. The number of transects walked in our region has steadily increased, from 19 in 1999 to 38 in 2013. The result of this dedicated monitoring by many people has enabled population trends to be determined for our commoner, or wider countryside, species. The great majority of the transects are in County Durham with only five in Northumberland. This means that the calculated abundance indices in the species accounts are greatly biased towards the south of our region.

Butterflies for the New Millennium – recording since 1995



The North of England Branch of Butterfly Conservation was started in November 1991 and recording throughout both the North East and Cumbria was actively promoted. Then in 1995 Butterfly Conservation launched its 'Butterflies for the New Millennium' (BNM) project to assess the distribution and population of all butterfly species in the United Kingdom. This was in response to concerns that many species were in decline and that their status needed to be accurately determined. Numbers of records for the region steadily increased from 2,579 received in 1995 at the launch of the BNM project to 8,437 in 2000, at which point the Branch split to form two more manageable sized groups: a Cumbria Branch and a North East England Branch. Following the first five years of the BNM project, Butterfly Conservation published their first atlas (Asher *et al.* 2001). Recording has continued to be actively promoted and by 2013 the annual number of records submitted averaged around 14,000, with approximately 150-200 observers contributing. The map shows the coverage that has been achieved since 2000, with 1,794 of the approximately 2,290 tetrads in the North East visited.

Casual records help to assess the distribution of species throughout the region and complement the transect records which generate information about trends in abundance. The combined total of records from both sources is now some 244,000, a considerable increase on the 6,000 or so records available to Dunn and Parrack for their work in 1986.

However our information is only as good as the data that we receive and it is likely that some readers of this publication will have butterfly records that could add to our knowledge. We would encourage you to submit your casual butterfly records to the County Recorders for Northumberland and Durham. We would also encourage you to take on a transect survey if you are able, although this does involve a longer term commitment to recording. Details of how to submit casual records and how to set up a transect can be found at www.northeast-butterflies.org.uk. All the records are sent by Butterfly Conservation to the Environmental Records Information Centre (ERIC) North East where they can be accessed (www.ericnortheast.org.uk).

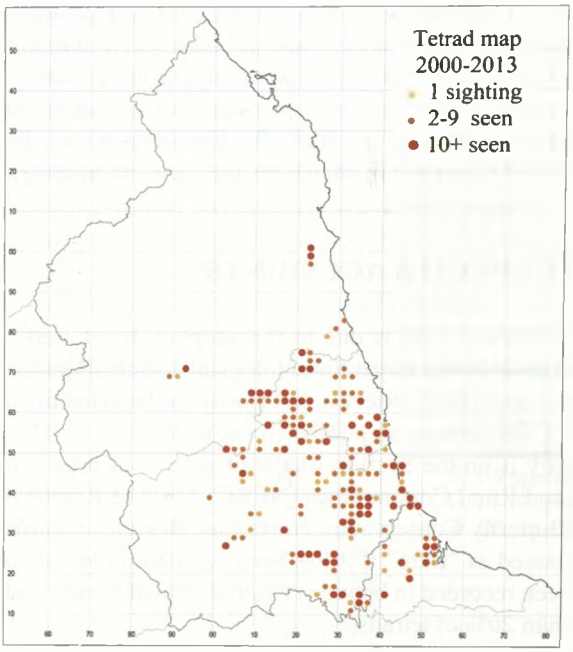
INTEPRETING THE SPECIES ACCOUNTS

The species order may appear unfamiliar to readers. This is due to the adoption by Butterfly Conservation of the new taxonomic order produced by the Royal Entomological Society (Agassiz *et al.* 2013). At the beginning of each species account the Conservation Priority has been obtained from Butterfly Conservation's assessment of the species as published on its website in May 2014. "NERC Status" is shown if the butterfly is on the Section 41 list of species of principal importance under the Natural Environment and Rural Communities (NERC) Act. The Regional Status information has been obtained from Butterfly Conservation North East Branch's records database and from this a species has been classed as "Rare" if it has been recorded in less than 5% of the region's tetrads, "Local" if it has been recorded in between 5% and 20% of tetrads and "Common" if it has been recorded in more than 20% of tetrads.

The maps cover the 14-year period from 2000 to 2013 and show the number of records in each tetrad (2km x 2km) for the region. The smallest dots represent one sighting, the medium two to nine sightings and the largest 10+ sightings. The flight period figures show the number of records in each month over the same period. Each month is then divided into four periods. The graphs of regional transect indices show year-to-year changes and highlight any long-term trends in abundance on the North East's transects for each of 19 commoner species. These have been calculated by Butterfly Conservation with the index being arbitrarily set at a value of 100 for each species at the start of the period (in 2000), regardless of the actual population level. Setting the index at 100 for the first year of recording ensures that trends for different species can be compared. The exception is for Speckled Wood, for which the start year was taken as 2006, due to its recent arrival in the region. For the less common species, which either do not occur on the transects or are recorded in too few numbers, plots of the number of records and the number of individuals are shown.

Dingy Skipper *Erynnis tages*

Butterfly Conservation Priority: High
NERC Status: Section 41 species of principal importance
Regional Status: Local, recorded in 10% of tetrads



Distribution

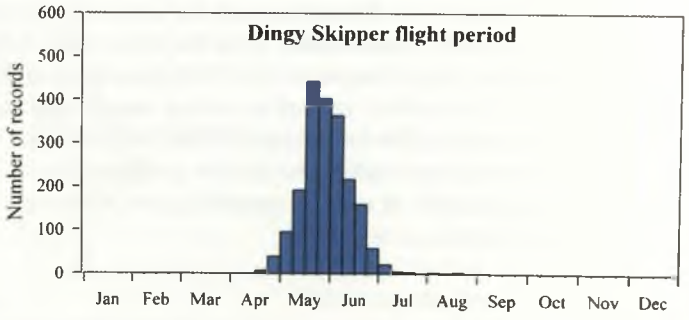
Colonies of this small grey and brown butterfly are widespread on Teesside, in central, northern and eastern Durham and throughout much of Tyne and Wear. The butterfly is much scarcer in Northumberland where it is largely restricted to sites near Blyth, Felton and the mid-Tyne valley.

Habitat

The species occurs on both coastal and inland Magnesian Limestone grassland, brownfield sites, disused quarries and other mineral extraction sites, colliery spoil heaps, woodland rides where the larval foodplant Common Bird's-foot-trefoil *Lotus corniculatus* has colonised crushed stone surfacing, sand dunes and active and abandoned railway corridors. Almost all occupied habitats comprise a sparse sward/bare ground mosaic with abundant foodplant and areas of taller vegetation upon which the adult butterflies roost. Very occasionally the species is found in damp rushy habitats where the principal foodplant appears to be Greater Bird's-foot-trefoil *Lotus uliginosus*.

Life Cycle

There is usually one generation with the first individuals appearing in early May. In most years the flight season extends to early July although numbers normally peak around the third week of May. In recent years there have been a handful of sightings in August although it is not known whether these represent a partial second brood, or whether they result from increased recorder effort rather than a genuine increase in late-flying butterflies. Wailes (cited by Robson 1899) appeared to regard this phenomenon as the norm, although Robson himself never witnessed it and Dunn and Parrack (1986) knew of only one August sighting that was made in the exceptionally hot summer of 1976.



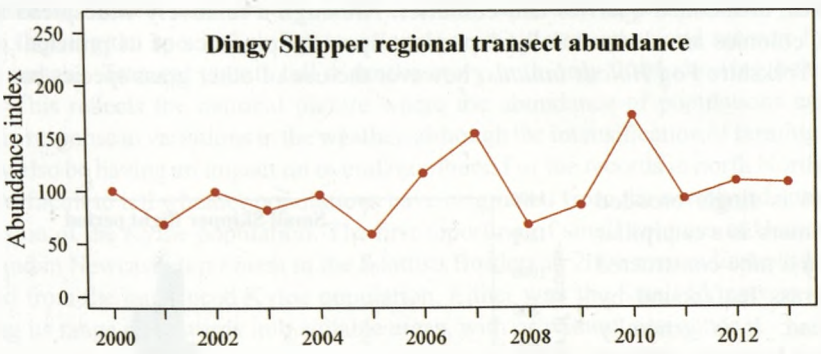
The pale-coloured eggs are laid singly upon the upper sides of the leaves of the foodplant. These darken to a reddish-orange colour after a few days. Upon hatching, larvae produce silk with which they draw together leaves of the host plant and commence feeding from within. By September larvae are fully grown and descend to the ground layer where they construct a more substantial shelter from dead leaves and other detritus in which to spend the winter. They pupate in spring without further feeding. The Dingy Skipper is a colonial butterfly; most colonies tend to be small with most surveys generating single-figure counts. However occasional single-site counts made in our region have exceeded 100 adult butterflies.

History

On a superficial level, the distribution of the Dingy Skipper appears to have changed little since the region's previous atlas in 1986. Certainly the number of colonies in Northumberland appears to be little changed. Further south, the butterfly's general pattern of distribution remains somewhat similar although a great many new sites have been discovered. Some will undoubtedly have been present though undetected in 1986, but many appear to represent recent colonisations. The butterfly was known by all the early collectors although the comparative scarcity of confirmed sites would suggest that the species was less common than is now the case.

Present Status

There is little doubt that northeast England remains a national stronghold of the Dingy Skipper. However an extensive resurveying of the butterfly's former haunts, undertaken during 2004 and 2005 under the auspices of Butterfly Conservation's "Conserving the Dingy Skipper" project, discovered that roughly one third of former colonies had been lost. Principal causes of these losses were redevelopment of brownfield sites and habitat deterioration arising from scrub encroachment and the gradual transition of the sparse sward/bare ground mosaics favoured by the butterfly to taller, grassier vegetation (Wainwright 2005). Conversely, many new sites have been found although it is likely that others were lost having never been discovered. Numbers at monitored sites appear stable.

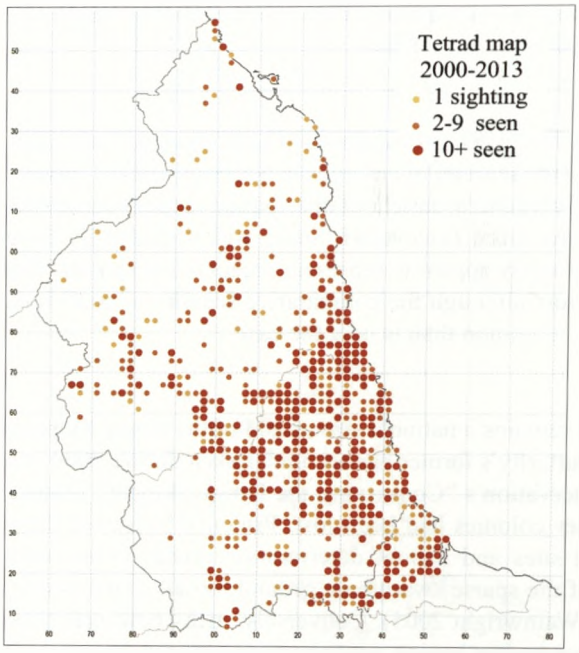


Future Outlook

Many brownfield sites occupied by the Dingy Skipper are threatened, either through deterioration of habitat quality or from redevelopment. Although the activities of man will inevitably create new areas of suitable habitat, it is unlikely that these will be either as numerous, or as large, as those created when the region's heavy industries were at their peak. It is therefore probable that colony losses arising from habitat destruction will outweigh colonisations of newly-created habitat. Fortunately the species maintains a strong presence on Magnesian Limestone sites which are largely protected from development, and it therefore seems likely that the Dingy Skipper will remain in our region for the foreseeable future.

Small Skipper *Thymelicus sylvestris*

Butterfly Conservation Priority: Low
Regional Status: Common, recorded in 32% of tetrads



Distribution

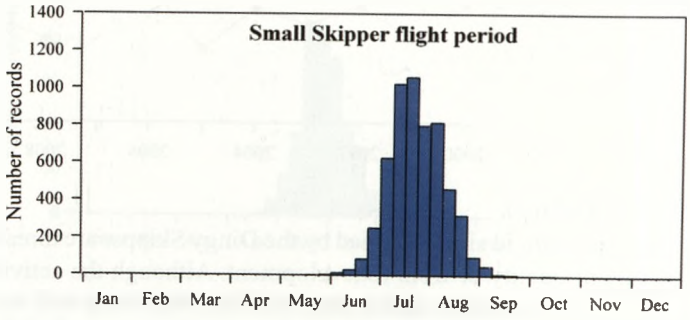
The regional distribution shows a distinct bias towards the drier, milder south and east of the region with coastal locations providing suitable conditions and habitats. To the north and west of the region, where only a scattering of locations offer appropriate conditions for colonies to form, it is much more thinly distributed.

Habitat

Despite its name, the Small Skipper is scarcely different in size from its cousin the Large Skipper, but close observation shows its golden-orange wings to be much plainer. It is found in a fairly wide variety of habitats although tall, flower rich, uncut grassland seems to be favoured, especially that which supports favoured nectar plants, for example species of thistle, knapweed, trefoil and vetch. Habitats include unimproved grassland, coastal grasslands, roadside verges, field margins, woodland clearings, hedgerows and especially waste ground and brownfield sites such as old railway lines, abandoned quarries and collieries. Although a relatively widespread species in the region, colonies are almost totally dependent upon the presence of its principal caterpillar foodplant, Yorkshire Fog *Holcus lanatus*; however the use of other grass species has also been noted.

Life Cycle

The species is single brooded and overwinters as a caterpillar surviving in a tube constructed out of a grass leaf bound by silken thread. It is generally on the wing between mid/late June and mid-August with peak numbers being recorded in July. In some years it has been recorded as early as late May and individuals have also been found as late as October in the region.



History

It appears that the Small Skipper is a relatively recent arrival in the region as it receives no mention in the writings of either Robson (1899) or Bolam (1925). Dunn and Parrack (1986) make reference to records from Fulwell Quarry, Sunderland in 1979 but they suggest that these may have been the result of an unauthorised release, as they were not seen in subsequent years despite specific and rigorous searching. The next reference they make to the species is in 1985 when "two flourishing groups" were found at Witton-le-Wear Nature Reserve in County Durham. They noted that "These colonies seem to be well established and may have been on the reserve for some time". Since then it has spread northwards and has become quite frequently recorded and widespread throughout the region.

Present Status

In order to test how rapidly butterfly species can colonise new areas in response to climatic warming, researchers at Durham University co-ordinated a project which involved releasing a number of Small Skippers in Kyloe Quarry, north Northumberland. The site was chosen because of the presence of suitable breeding habitat, the prediction of climatic suitability and the fact that it was some 35 km north of their range limit at the time. Approximately 400 individuals were translocated from donor sites and released in July/August 1999, and a further 200 in late July 2000. Monitoring of numbers at the release site during the flight period in subsequent years showed that not only did the population grow but more importantly it was able to expand its range into suitable habitat nearby. The project aimed to investigate the theory that many species, not only butterflies, are significantly lagging behind climatic change in terms of expanding their ranges. Despite causing some controversy at the time over the introduction of a species which was not considered to be in decline, the project came up with some interesting findings. Their overall conclusion was that "assisted colonisation may be a feasible and cost-effective means of enabling certain species to track climatic change" (Willis *et al.* 2009).

Recent records of Small Skipper have indicated that there has been a continuing spread northwards through Northumberland although there are short term fluctuations relating to good or bad summers. Smaller numbers of records in some years seem to be balanced by larger counts in others, showing the species' ability to colonise suitable new areas and recover from poorer breeding seasons. Transect counts tell a similar story with only 2004 showing below average numbers. This reflects the national picture where the abundance of populations can fluctuate annually in response to variations in the weather, although the intensification of farming in lowland areas may also be having an impact on overall numbers. For the records in north Northumberland it is now difficult to tell whether populations have originated from the northward spread or from an expansion of the Kyloe population. The first reporting of small colonies at Hassendean near Hawick and in Newcastleton Forest in the Scottish Borders in 2006 may indicate that these have originated from the introduced Kyloe population. Either way the Small Skipper is successfully expanding its range northwards into suitable areas, with or without assistance.

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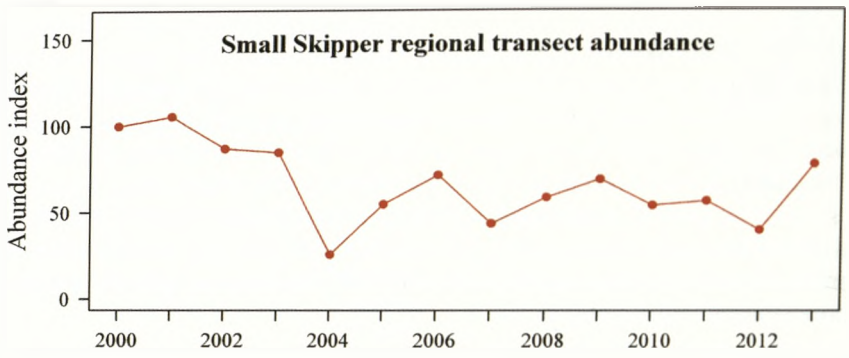


Future Outlook

As with many other common species, whilst the long term prospects for population numbers and distribution do not give any cause for alarm, the Small Skipper's future is closely linked to the general health of the countryside. Restoration of old industrial areas is almost inevitable as their land use status is changed; however evidence from sites such as Weetslade Country Park suggests that careful management together with the provision and maintenance of suitable flower-rich rough grassland can result in good populations of Small Skippers remaining for all to enjoy.

Small Skipper by R Mawson

The rather unfairly named **Dingy Skipper** by R Mawson

Orange-tip by R Mawson

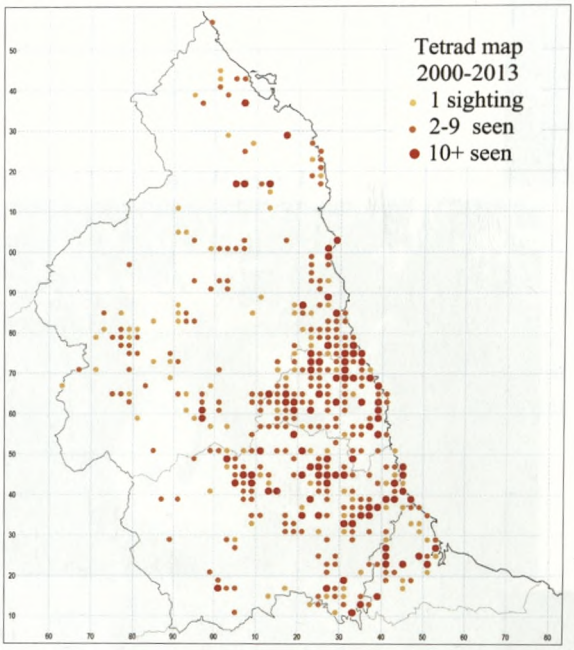
Large White by R Mawson

Small White by M Eccles

Green-veined White by R Mawson

Large Skipper *Ochlodes sylvanus*

Butterfly Conservation Priority: Low
Regional Status: Common, recorded in 23% of tetrads



Distribution

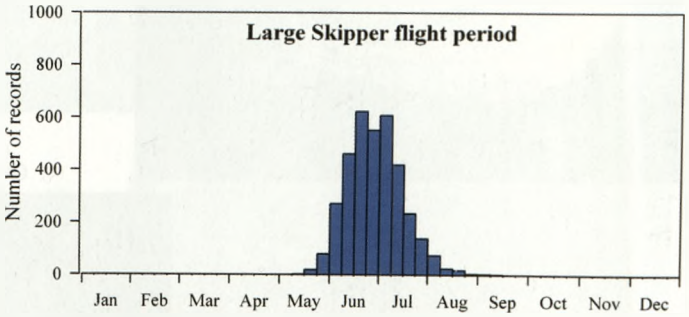
The Large Skipper is a common butterfly in the eastern half of Durham and southeast Northumberland, despite the region being its northern limit in Britain. It is distinctly coastal in its distribution in the northern half of Northumberland, being found in the sand dune systems there. It is absent from the western moors of both counties, although it can be found in suitable habitat along the river valleys which cut into the moors.

Habitat

It is found in sheltered patches of unimproved grassland where coarse grasses are allowed to develop into tussocks. These include grassland, woodland rides, sand dunes, field edges and particularly brownfield sites such as disused quarries, plus old railway lines and collieries which have been developed into cycle ways and country parks. The caterpillar foodplant is Cock's-foot Grass *Dactylis glomerata* and probably Purple Moor-grass *Molinia caerulea*.

Life Cycle

There is one generation a year with the first individuals appearing from mid-May and peaking in mid-June. By mid-August the flight season is over. The species overwinters as a larva in grass tussocks.



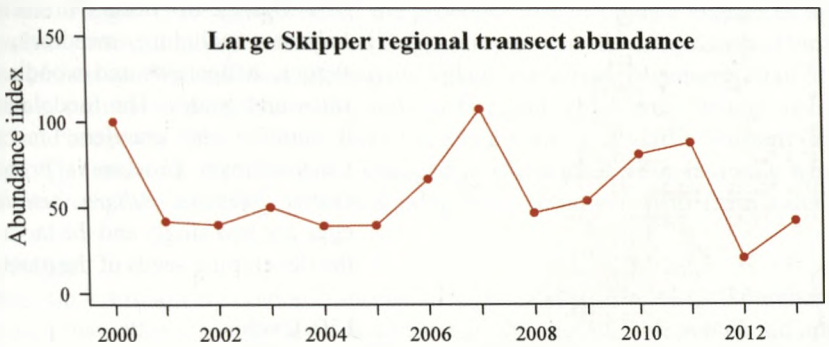
History

The Large Skipper was rare in our region in Robson's time (1899). He records it as "seldom met with in our district" and says it was confined to the Darlington area and to Castle Eden Dene. Even Bolam (1925) says it was still "rare or very locally distributed". So it is perhaps strange to find it relatively common and widely distributed today. The expansion seems to have begun in the 1960s when Dunn and Parrack (1986) say it spread into the Riding Mill area of Northumberland. The increase accelerated in the 1970s when they say it "rapidly colonised other areas of south and mid-Northumberland." By the late 1980s it had reached its current distribution in Durham and been recorded in north Northumberland at Detchant Woods near Belford. The

reasons for this increase are not known but it may be due to the effects of climate change making our region more suitable for the insect.

Present Status

The Large Skipper has maintained a slow but steady increase in both numbers recorded and its range in the region. A feature of its distribution is the spread into the sand dune systems of Northumberland during this time. Based on Butterfly Conservation North East records, it reached a peak in terms of numbers of records and individuals recorded in 2006, 2007 and 2011, with poor years recorded in 2001, 2002 and 2012. It now seems to have reached a position of stability with yearly fluctuations not being significant. The abundance index from regional transects shows a peak in 2007 but the trend is uncertain.



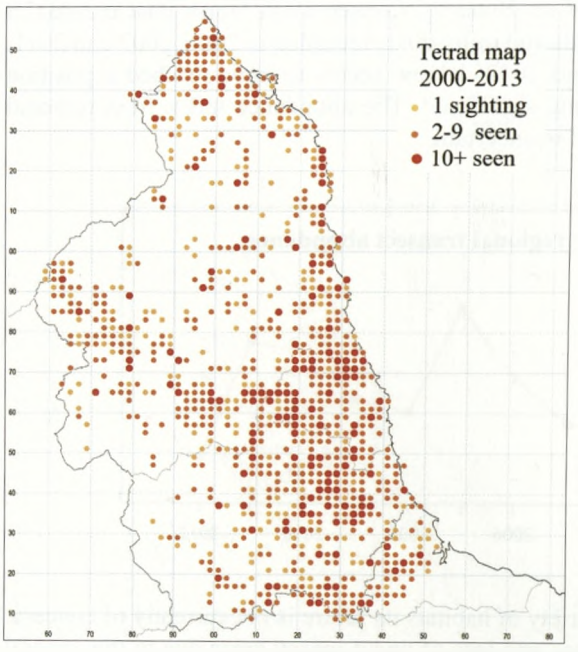
Future Outlook

As the Large Skipper is found in a wide variety of habitats its future is not currently of concern. However, redevelopment of brownfield sites and loss of uncut grassy areas due to the general tidying up of the countryside are potential problems.

Large Skipper
by J Wallace

Orange-tip *Anthocharis cardamines*

Butterfly Conservation Priority: Low
Regional Status: Common, recorded in 48% of tetrads



Distribution

This charming butterfly is widely distributed at low density throughout the region, wherever there is suitable habitat.

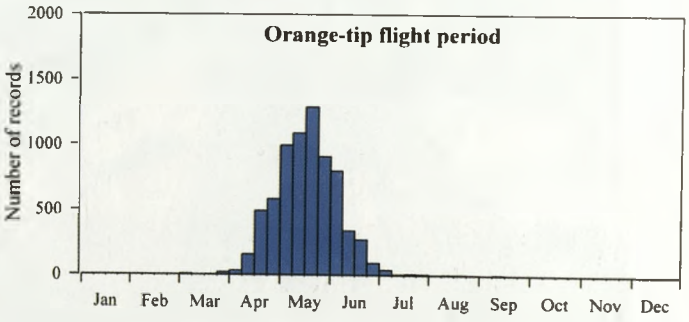
Habitat

The Orange-tip occurs in damp grassy habitats including meadows, roadside verges, hedgerows and woodland edges, rides and glades. The foodplants include a number of crucifers, in particular Cuckooflower *Cardamine pratensis* and Garlic Mustard *Alliara petiolata*. The eggs are laid singly and the larvae feed on the developing seeds of the plant.

Life Cycle

There is one generation per year with the first individuals appearing in March (earliest 5 March) and usually peaking by the third week of May. The flight season is more or less over by the end of June but a small number of records in August and September may indicate a very small second brood in some years. The species overwinters as a pupa and may overwinter twice before emerging as an adult. This has been proposed as a possible survival tactic to deal with the unpredictability of the weather in spring when the adults normally emerge (Eales 1999).

History



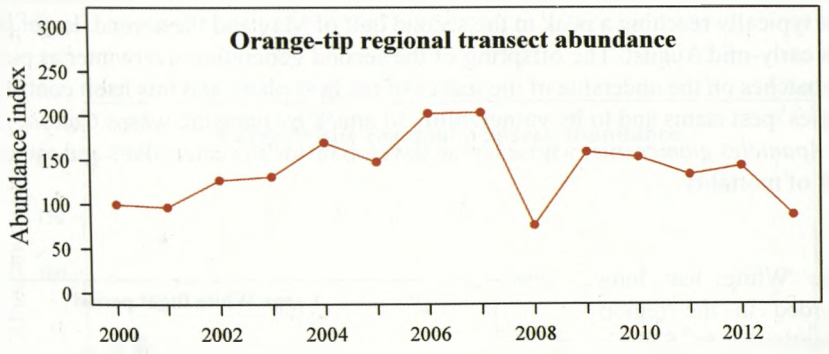
The Orange-tip is one of the earliest documented species in the region, recorded in *The natural history and antiquities of Northumberland* (Wallis 1769) as "the orange-yellow and white butterfly". Wallis noted that it was frequent in warm shady vales but the species has experienced mixed fortunes since then. Both Robson (1899) and Bolam (1925) note the major decline of the Orange-tip in the second half of the nineteenth century which left the species extinct in VC68 and virtually so in VC66 and VC67. Albert Long (1979) detailed the disappearance of the species from our region and its

subsequent return in the twentieth century. This appears to have occurred in fits and starts in the first half of the century and only really took off in the 1960s.

The reasons for the Orange-tip's disappearance and subsequent return are unclear. Bolam (1925) noted that its foodplants "have always been plentiful enough" but Long (1979) in opposition to this view reports the suggestion of Mr E C Pelham-Clinton that agricultural improvement, especially drainage and grazing, may have led to the gradual disappearance of the Orange-tip but that the development of forestry may have subsequently reversed this since Cuckooflower grows along drainage ditches in young plantations. Clearly if this was the case it is no longer sufficient to explain the present day distribution of the Orange-tip which is by no means confined to areas of forestry. Long suggested that a reduction in mowing roadside verges could also be a factor in the return of the species to the region as it may have favoured the growth of Garlic Mustard. Courtney and Duggan (1983) emphasised the probable role of climate change as the principal factor involved. Interestingly, Courtney and Duggan report that the distribution of the Orange-tip at the time of their study was almost exclusively linked to riverside locations (29 of 30 locations) in Durham in contrast to populations in southern England which were widely associated with woodland and hedgerow habitats. They linked this to a scarcity of Garlic Mustard in hedgerows in Durham. This situation seems to have changed in subsequent years and now we commonly find both the Orange-tip and Garlic Mustard along hedgerows well away from watercourses.

Present Status

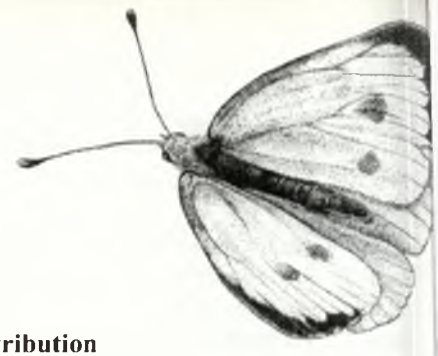
The Orange-tip is a relatively common species though usually seen in small numbers and much less common than other *Pieridae* species resident in the region. The population appears to be relatively stable with fluctuations between years being attributable to weather conditions. Casual observers reported 2012 and 2013 in particular as poor years for this species reflecting the wet and cool summer of 2012 and the protracted cold weather of the spring of 2013. However the transect abundance index also shows 2008 as a particularly poor year.



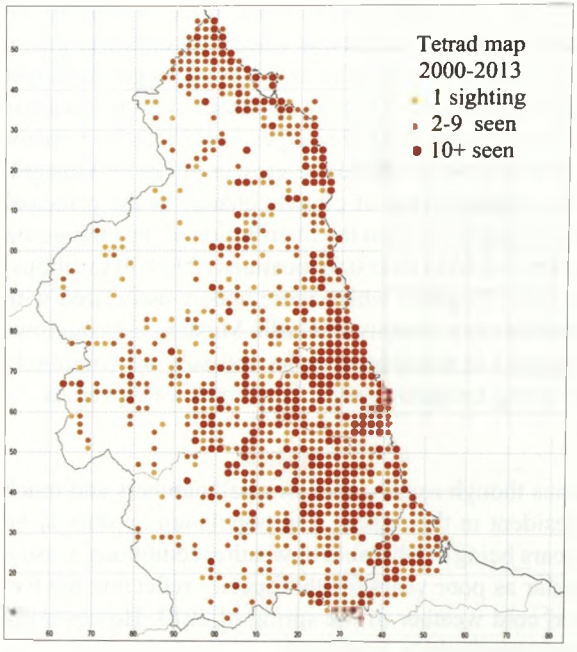
Future Outlook

Having once disappeared from our countryside, for reasons that are not well understood, there must remain the possibility that the Orange-tip could again see a reversal in its fortunes. This plus the reliance of one of its main foodplants, the Cuckooflower, on conditions that are not compatible with modern farming methods, means that despite the apparently healthy condition of the population at present this is a species to watch.

Large White *Pieris brassicae*



Butterfly Conservation Priority: Low
Regional Status: Common, recorded in 53% of tetrads



Distribution

The Large White is widely distributed throughout the region, becoming scarce in the upland areas in the west. Although the map undoubtedly reflects the true distribution of the species in the region, the paucity of records from the uplands may be exaggerated by a lack of observers in these areas.

Habitat

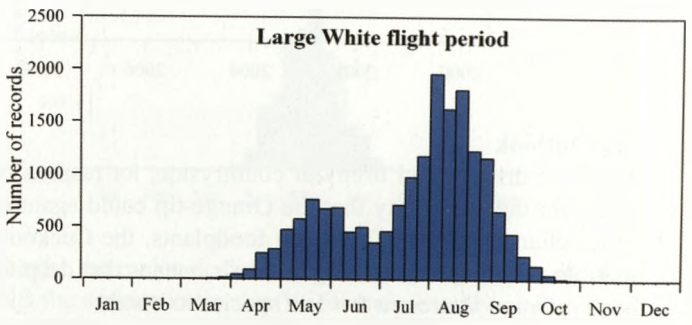
The Large White is strongly mobile and may be encountered in a wide range of habitats. It feeds on various *Crucifer* spp. but its principal foodplants are cultivated *Brassica* spp. and *Nasturtium* spp. and it is a significant and well-known garden pest as a result.

Life Cycle

The Large White usually produces two generations (occasionally three) in a year with the first emergence typically reaching a peak in the second half of May and the second, larger generation peaking in early-mid August. The offspring of the second generation overwinter as pupae. Eggs are laid in batches on the underside of the leaves of the host plant, and this habit contributes both to the species' pest status and to its vulnerability to attack by parasitic wasps *Cotesia glomerata* (formerly *Apanteles glomeratus*) whose larvae develop inside the caterpillars and can cause very high levels of mortality.

History

The Large White has long been recorded in the region and is mentioned in Selby's (1839) list of the fauna of the Twizel Estate in north Northumberland. Robson (1899) found it to be "very common all over the district except on the moors and higher uncultivated ground". Whereas



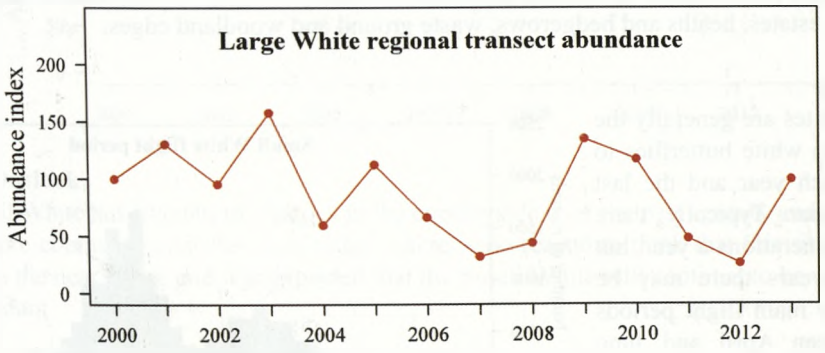
Robson considered the Large White to be absent from high ground, both Bolam (1925) and Dunn and Parrack (1986) report the species as occurring in upland areas. Bolam describes seeing Large Whites "on our highest moorlands" in Northumberland where he found that the butterflies were invariably flying purposefully in one direction and suggested that he might be witnessing migrants. This seems a reasonable conclusion and both historical and present day records would suggest that this is a species that principally finds its breeding habitat in the lowlands and occurs at higher altitude mainly whilst passing through as a result of its wandering habits.

Nowadays we consider the Large White to be one of our commonest butterflies, but there is some indication, albeit partly subjective and unsupported by quantitative data, that it is rather less common than it once was. Dunn and Parrack state that "it is certainly seen in smaller numbers [in the 1980s] than it used to be in the 1920s and 1930s, except during periods of intensive immigration". Asher *et al.* (2001) speculate that infection with *granulosis* virus brought by migrating adults from the continent may have caused numbers to fall in Britain after the mid 1950s, and also point out that the intensification of agriculture and increasing use of pesticides on *Brassica* crops may also have suppressed numbers of this species.

The resident population of the Large White is supplemented by immigration, and there are occasional records of spectacular landfalls of this species on our coast. Robson mentions witnessing one such event in July 1867 in Hartlepool when he estimated "millions" made landfall, whilst Dunn and Parrack refer to two such events, one in July 1937 when W Wannop witnessed hundreds of Large Whites coming in off the sea to the north of Bamburgh, and the other in August 1949 when Tom Dunn himself watched a steady stream of butterflies flying in over Marsden cliffs over a period of two hours.

Present Status

The Large White is one of the commonest and most widespread species in the region. Although numbers fluctuate from year to year there is nothing to suggest any real trend either in numbers or in range within the region. Numbers were very low in the poor summer of 2012 but recovered well in 2013.

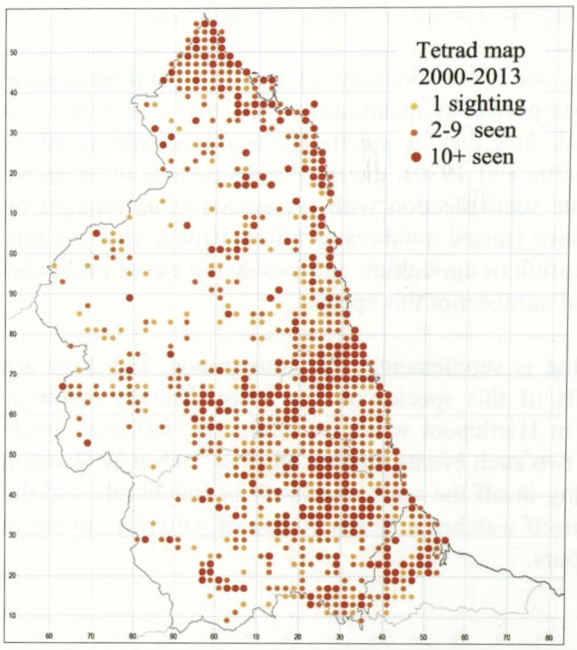


Future Outlook

Although its status as a pest species means that it is targeted with pesticide controls in both commercial and domestic gardens, the Large White's survival in the countryside is not threatened.

Small White *Pieris rapae*

Butterfly Conservation Priority: Low
Regional Status: Common, recorded in 50% of tetrads



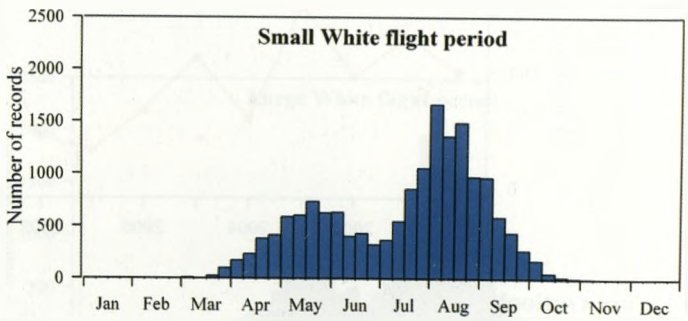
Distribution

The Small White is a common, widespread and highly mobile species and is abundant in central and eastern areas in County Durham and along the coast up through Northumberland. It can be found in the heart of our towns and cities, and in suburban and rural areas particularly where its foodplants grow. This butterfly is more sparsely recorded in upland areas of Northumberland and in the North Pennines to the west of Durham although this may be accentuated by a lower number of recorders in these less densely populated areas.

Habitat

The Small White lays its eggs on a variety of cruciferous plants including cultivated cabbages, Oil-seed Rape *Brassica napus*, Garden Nasturtiums *Tropaeolum majus* and to a lesser extent wild crucifers such as Charlock *Sinapis arvensis,* Wild Mignonette *Reseda lutea* and Hedge Mustard *Sisymbrium officinale*. The greatest numbers of Small White butterflies can congregate in farmland over fields of Oil-seed Rape or other *Brassica* spp. plants and in gardens and allotments. However the Small White is very mobile and can be found anywhere from upland river valleys to coastal grasslands, roadside verges, railway tracks, town parks, industrial estates, heaths and hedgerows, waste ground and woodland edges.

Life Cycle



Small Whites are generally the first of the white butterflies to appear each year and the last to disappear. Typically there are two generations a year, but in good years there may be three. The main flight periods are between April and June with numbers peaking in May, and again between July and September with numbers at their highest in August when the numbers in the region are augmented by migrants. Butterflies have been recorded on the wing from the beginning of March through to the beginning of November. The species overwinters in the pupal stage.

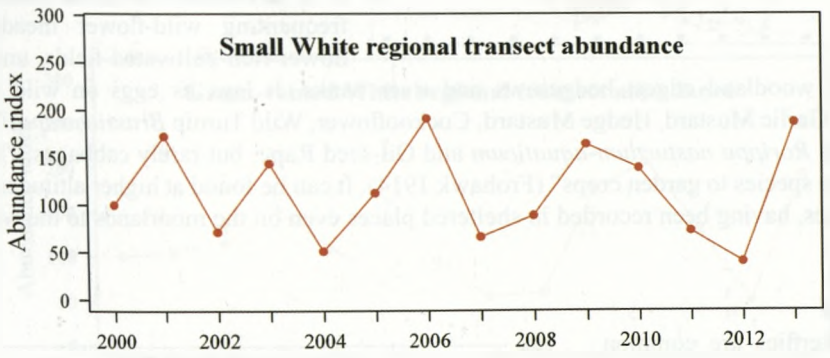
History

Calvert (1884) of Bishop Auckland noted the Small White as common, while Robson (1899), Fawcet (1911) and Bolam (1925) all comment on the Small White being more common/ numerous than the Large White. However it is unclear exactly how abundant this butterfly was over 100 years ago, before the modern-day intensification of agriculture, mechanisation and the introduction of herbicides and pesticides.

Dunn and Parrack (1986) note that the Small White was less prominent along the north Northumberland coastline and scarcer in the afforested area in the northwest, but not uncommon on the open sedge moors in the west of both Northumberland and Durham. In Durham the greatest numbers were found in the east along the coast and the Magnesian Limestone plateau grasslands. Dunn and Parrack also mention that Small White caterpillars are susceptible to predation and parasitic attack by wasps *Cotesia glomerata* (formerly *Apanteles glomeratus*) and suggest that this butterfly "is dependent on immigration for continued survival in this country…".

Present Status

The Small White is one of the more common butterflies seen around this region. In most years it is the second most common white butterfly seen after the Large White, in contrast to the situation reported in the nineteenth and early twentieth centuries. Small White numbers do seem to fluctuate from year to year, reflecting the weather conditions. For example in 2012, an extremely wet year, recorded numbers were well down on previous years. In contrast in 2009, following a warm winter and dry and sunny spring, numbers recorded were the highest during this period. The transect results show that the abundance index is stable.

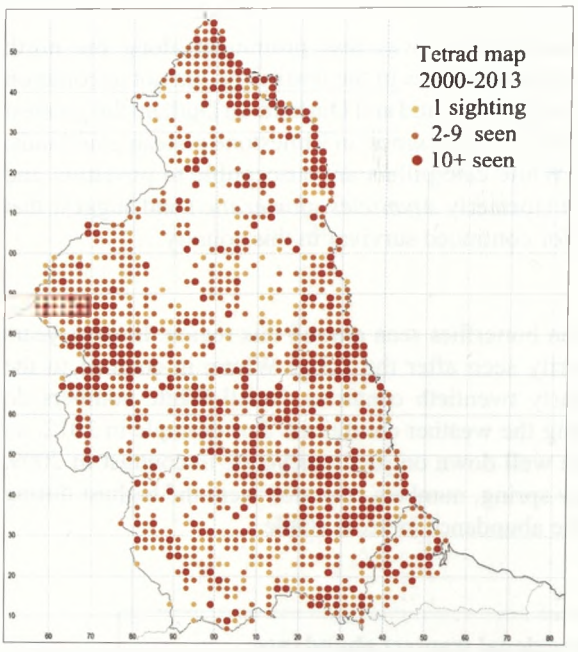


Future Outlook

The Small White has adapted to changes in the countryside over the past century and is still one of the more common butterflies seen today. There is no reason to think that this situation will change in the near future and it is expected that the Small White will continue to be widespread and abundant.

Green-veined White *Pieris napi*

Butterfly Conservation Priority: Low
Regional Status: Common, recorded in 70% of tetrads



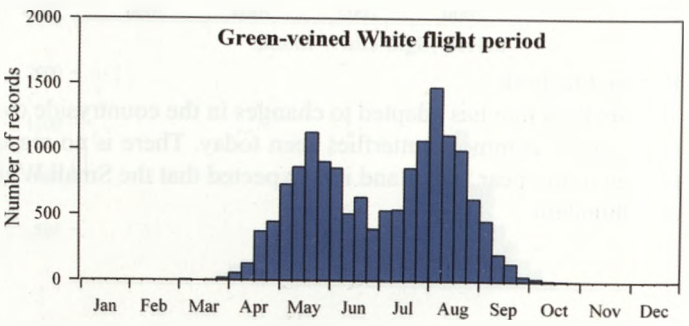
Distribution

The Green-veined White is our most widespread butterfly and one of the commonest. It may be found almost anywhere in our region except in very dense woodland, exposed moors or intense urban development unrelieved by even the occasional weed. Unlike the other Whites it can be particularly abundant in the western parts of the region (D Wainwright, pers. comm.). It is not thought to be a migrant species.

Habitat

The Green-veined White thrives in damp pasture and woods. While not a threat to cabbages, the Green-veined White may be attracted to garden flowers, but it is essentially a countryside species, frequenting wild-flower meadows and flower-rich cultivated fields, unimproved grassland, woodland edges, hedgerows and river banks. It lays its eggs on wild crucifers, including Garlic Mustard, Hedge Mustard, Cuckooflower, Wild Turnip *Brassica rapa*, Charlock, Watercress *Rorippa nasturtium-aquaticum* and Oil-seed Rape, but rarely cabbages; "It is not a destructive species to garden crops" (Frohawk 1914). It can be found at higher altitudes than our other whites, having been recorded in sheltered places even on the moorlands to the west of the region.

Life Cycle



Adult butterflies are common throughout the spring and summer, appearing in two broods from April to June and July to October; individuals can live for up to 21 days. Eggs are laid separately, hatch in under ten days, and caterpillars feed for two to three weeks before pupating on their foodplant. The first brood adults emerge from their pupae in the spring, mate and produce a new generation which pupates in June-July. Some remain as pupae until the following spring but many hatch out in July-August the

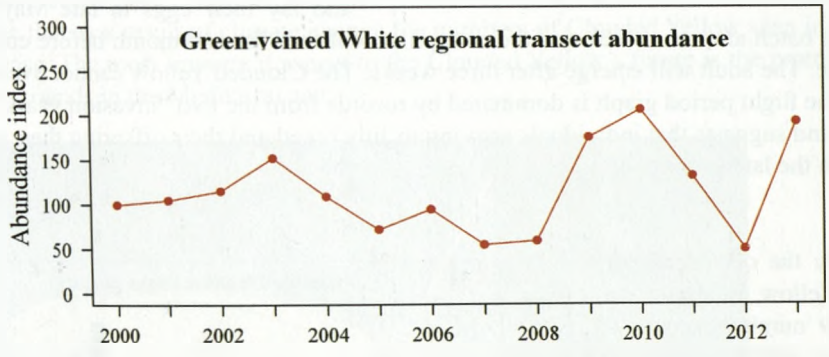
same year to form a strong second brood. These second-brood butterflies are typically slightly larger than the first brood's adults. They mate and produce caterpillars which pupate and, like the first group, overwinter as pupae to emerge next spring, forming that year's first brood. The first brood's underside markings are darker than those of the second brood, while there is less black on the upperside in the first brood, particularly in males. The "veins" which contribute to the butterfly's name are merely dusky black scales on the underside of the wings, outlining the structural veins or nervures, and they appear greenish against the cream background. There is some variation in the number of wing spots, and there are differences in the strength of the markings between the southern and northern British subspecies; northeast England hosts both (Warren 1968). Exceptionally, a third brood was noted in the region in 1937.

History

Despite early recognition of Green-veined White as a distinct species of no serious threat to *Brassica* crops, little mention was made of it historically; it was too common and unspectacular to draw attention to itself. Robson (1899) merely stated "This species is also very common all over the district", whilst Bolam (1925) was equally brief: "Abundant throughout the district from early May till the end of August". Early observers noted that active males emitted a scent of verbena or lemon-scented mint (Barrett 1895).

Present Status

This butterfly continues to be the most widespread species of the region, having been recorded in 70% of tetrads. Recorded numbers have been quite consistent over the period. There were dips in numbers reported in 2007 and 2012 which were years with poor summers. The highest yearly regional index for the period was in 2010. It can still be safely stated that the Green-veined White is "abundant throughout the district".

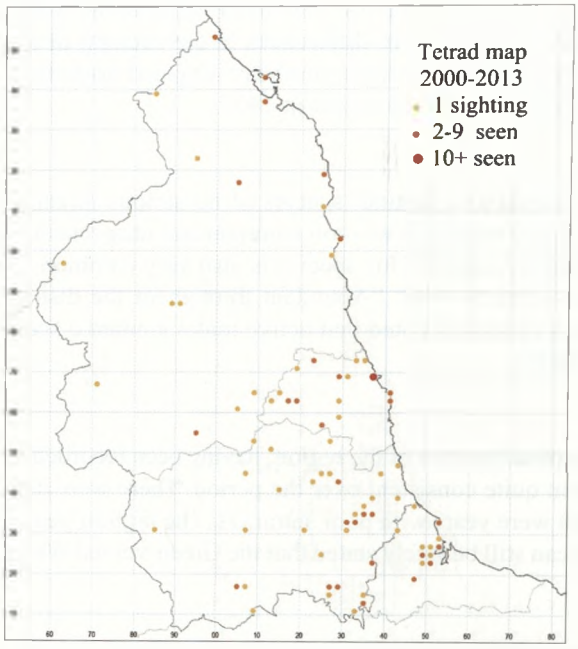


Future Outlook

The Green-veined White is one of the most common and widespread butterflies of our region. There is no reason to think this situation will change in the near future.

Clouded Yellow *Colias croceus*

Butterfly Conservation Priority: Not assessed
Regional Status: Rare migrant, recorded in 4% of tetrads



Distribution

The Clouded Yellow is a migrant from the continent so it is perhaps unsurprising that the majority of records of this species come from the south of the region and show a coastal bias.

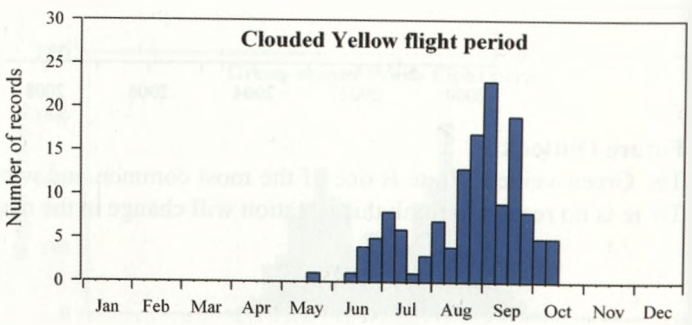
Habitat

The Clouded Yellow lays its eggs on clovers *Trifolium* spp. or Lucerne *Medicago sativa*. Fields of Red Clover *Trifolium pratense* or Lucerne with patches of bare ground are the best places to search for it. However, as it is a migratory species, the Clouded Yellow can be seen in a wide variety of habitats on passage.

Life Cycle

The migrant adults arrive in the spring and lay their eggs in late May to early June. Eggs hatch after one week and the caterpillar will feed for one month before entering the pupal stage. The adult will emerge after three weeks. The Clouded Yellow cannot overwinter in the UK. The flight period graph is dominated by records from the two "invasion years" of 2000 and 2006 and suggests that individuals arriving in July breed and their offspring then appear on the wing in the late summer.

History

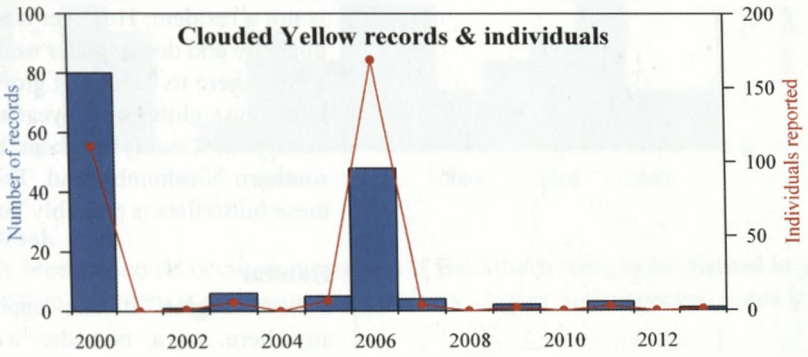


Historically the occurrence of Clouded Yellow is similar to today: low numbers recorded most years interspersed with invasion years. Robson (1899) and Bolam (1925) note that the species can be seen all over the region - even as far north as Berwick - but rarely in any great numbers. They also note that one specimen was taken on 4 October. Dunn and Parrack (1986) recall an account by J W Heslop-Harrison who wrote "The year 1941 will always be remembered by local entomologists as the 'great' Clouded Yellow year. From Barnard Castle to Berwick they were seen".

According to Dunn and Parrack (1986) the largest influx of Clouded Yellow occurred in 1947 with an estimated 30,000 individuals arriving in the UK. The largest report they received for Durham stated that "about 30 specimens were in Ryhope Dene on 26 August 1947 (J K Morton)". 1983 was another good year for the Clouded Yellow. The first unconfirmed records were received in June from Newcastle with the first confirmed sightings being on 10 July and on 16 July from Teesdale. The species flew throughout July, August and September.

Present Status

As with many migrant species the number of Clouded Yellow varies from year to year. The last invasion years were 2000 and 2006 with 111 and 169 individuals recorded respectively. Although not an annual visitor to the region small numbers of Clouded Yellow are recorded in most years.



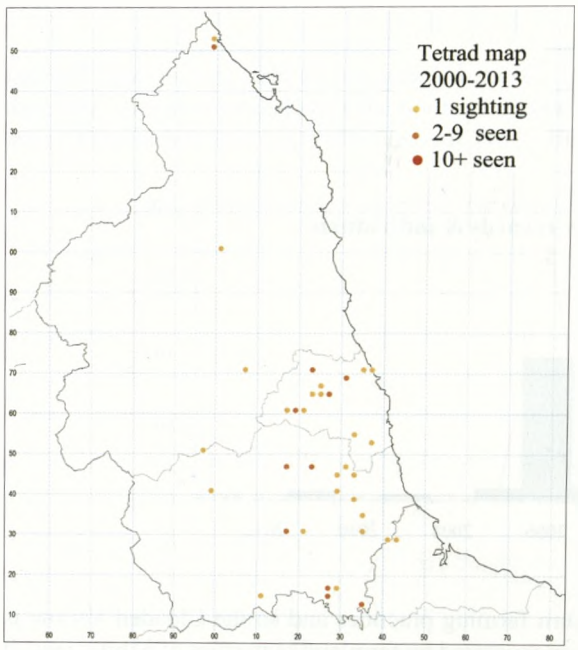
Future Outlook

Clover is commonly cultivated under modern farming practices and so the Clouded Yellow is unlikely to face the most common problem encountered by farmland butterflies of habitat loss. It is possible that as a result of climate change the numbers of Clouded Yellow seen in the region will increase. The most important aspect to the Clouded Yellow's future is the protection of its breeding grounds in the Mediterranean.

Clouded Yellow by K Dover

Brimstone *Gonepteryx rhamni*

Butterfly Conservation Priority: Low
Regional Status: Rare, recorded in 2% of tetrads



Distribution

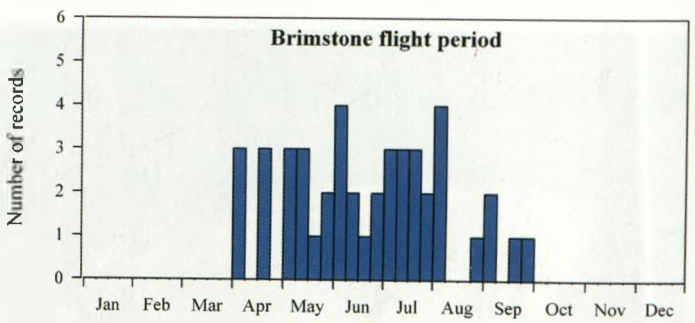
The distribution of the Brimstone in Britain is closely related to the distribution of its caterpillar foodplants, Buckthorn and Alder Buckthorn. As these two species are not native to our region the butterfly is not a resident. However it is a nomadic butterfly and does wander well away from areas where its foodplant grows. It is rare but a few sightings each year are reported, mostly in County Durham but also in southern Northumberland. The source of these butterflies is probably Yorkshire.

Habitat

In our region it can appear almost anywhere as a nomadic wanderer. It is attracted to places where tall purple flowers grow such as Wild Teasel *Dipsacus fullonum*, Buddleia *Buddleia spp.*, Purple Loosestrife *Lythrum salicaria* and thistles (Thomas and Lewington 2010).

Life Cycle

There is one generation per year. Newly emerged adults appear from August and can be seen feeding into autumn. The Brimstone then hibernates as an adult butterfly and is one of the first butterflies to emerge on warm days in spring the following year.

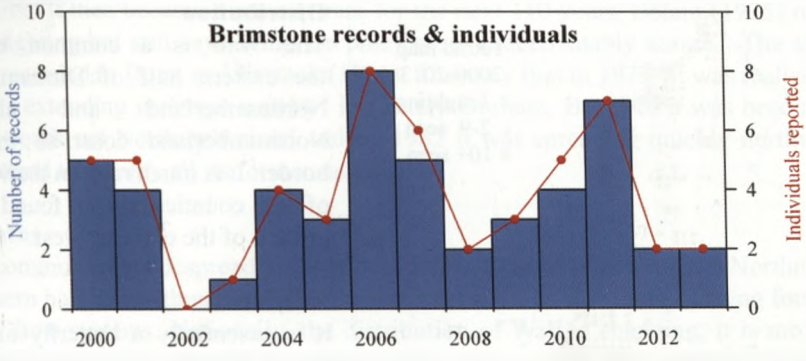


History

Writing about Northumberland and Durham, Robson (1899) says the Brimstone "straggles into these counties on very rare occasions only", but describes the Brimstone as "far from scarce" in Yorkshire. Bolam (1925) is of the same opinion saying "The Tees seems to bound the northward extension of this butterfly" and that "it is rarely noticed in Durham and only once in Northumberland." Dunn and Parrack (1986) only mention three sightings of Brimstone between 1950 and 1977 in Northumberland, a surprisingly low number as it is seen more frequently today.

Present Status

There have been about 50 Brimstones reported to local recorders since 1995, mostly from County Durham and the Newcastle and North Tyneside areas. However one was seen as far north as Tweedmouth in 2006. The best year for sightings was 2006 when eight records were received. The average number seen in the region per year is about three and in an unrepeated event larvae were seen on planted Buckthorn at Low Newton Junction near Durham in 2009.



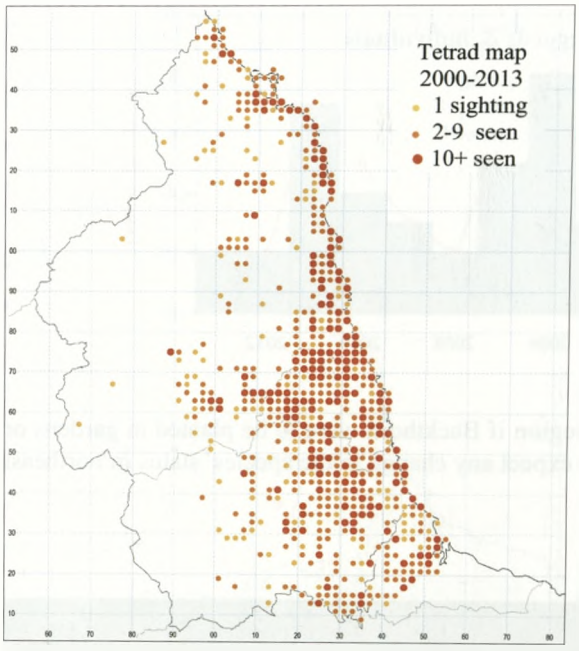
Future Outlook

It is possible breeding could occur in our region if Buckthorn were to be planted in gardens or parks. Other than this there is no reason to expect any change in the species' status in northeast England.

Brimstone by G Beckwith

Wall *Lasiommata megera*

Butterfly Conservation Priority: High
NERC Status: Section 41 species of principal importance
Regional Status: Common, recorded in 34% of tetrads



Distribution

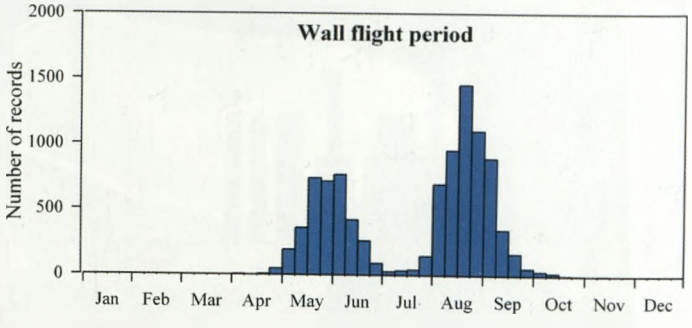
The Wall is a common butterfly in the eastern half of Durham, southeast Northumberland and along the Northumberland coast to the Scottish border. It is much rarer in the western half of both counties and not found in the high ground of the extreme west.

Habitat

It is essentially a butterfly of grassland and especially dry unimproved rather neglected places with broken ground and bare patches where it can bask in the sun. These include unimproved grassland, woodland rides, sand dunes, field edges and particularly brownfield sites such as disused quarries, and old railway lines and collieries which have been converted into cycle ways and country parks. The caterpillar foodplants are common grasses such as Yorkshire Fog, Wavy Hair-grass *Deschampsia flexuosa* and species of bents *Agrotis* spp.

Life Cycle

There are two generations a year. The spring generation appears in late April or early May and peaks in the second half of May and the first half of June. This generation is derived from overwintering caterpillars. The second generation appears in late July and lasts until the end of September, peaking in mid-August. The second generation develops from eggs laid by the spring generation and is nearly always more abundant than the earlier one. Caterpillars from the second generation overwinter to produce the next year's spring generation.

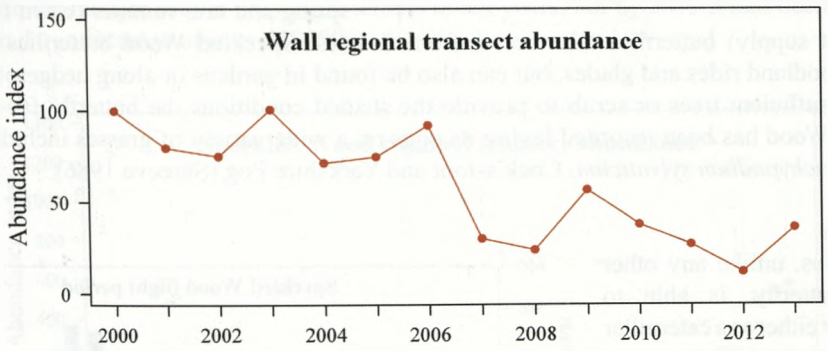


History

The Wall has undergone a most remarkable change in fortunes over the last 150 years. From being common and widespread over both Northumberland and Durham in the early nineteenth century, it disappeared quite suddenly and became rare for about 100 years, then regained all its former territory equally quickly in the late twentieth century. Robson (1899) records the Wall as being "generally distributed through both counties" and "much the most abundant butterfly in the district". However, he says all this changed in 1861 after which there was a rapid and sudden decline. It then became distinctly rare for the next 110 years. Bolam (1925) records the occasional sighting but still says it has become "most unaccountably scarce". The start of the recovery is recorded in Dunn and Parrack (1986). They say that in 1972 "it was realised that the butterfly was extending its range rapidly" in County Durham. By 1976 it was becoming more common in southeast Northumberland and by 1982 it was spreading quickly northwards into Northumberland to occupy all its former range.

Present Status

Today it is common and widespread in the eastern half of Durham and southeast Northumberland. In the northern half of Northumberland it is more coastal in its distribution, being found mainly in the sand dune systems. Nationally, the distribution of Wall is changing; it is moving north through our region into Scotland, but disappearing from central and southern England away from coastal areas. Abundance indices from regional transects show a significant decline over the period 2000-2013. However, the regional database of casual records does not reflect this and indeed suggests a slight increase in records, individuals and tetrads over this period. Whilst transects and casual records are different approaches to butterfly monitoring, this difference in trends may reflect a changing distribution and clearly merits further investigation, which is underway and will be reported.

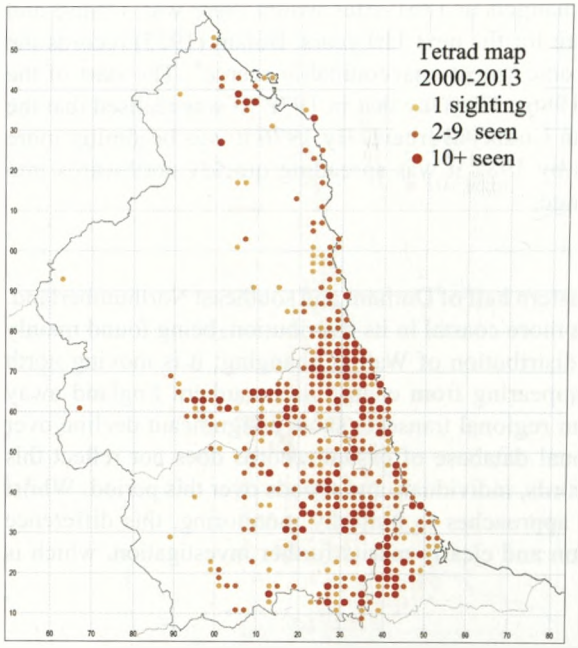


Future Outlook

Locally the species remains widespread and abundant, but historically it has been shown this status could change very quickly. It is currently unclear how seriously the Wall is threatened in our region. However, the regional transect results suggest that the declines seen in the south of England away from coastal areas are starting to affect northeast England. If this is correct, the distribution and abundance of Wall will change significantly in the next few years. Loss of habitat through redevelopment of brownfield sites and general tidying up of the countryside are other potential problems.

Speckled Wood *Pararge aegeria*

Butterfly Conservation Priority: Low
Regional Status: Common, recorded in 21% of tetrads



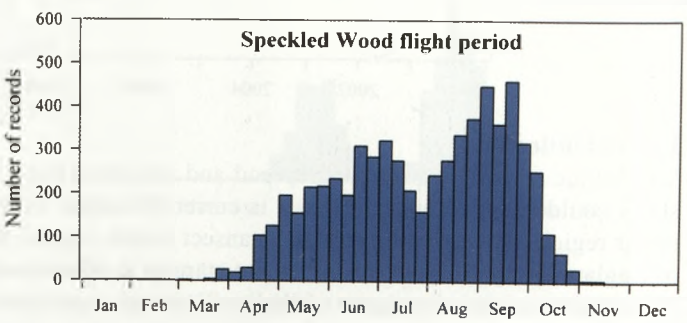
Distribution

The Speckled Wood is to be found more commonly in wooded parts of the region and favours coastal and river valleys. The species has only recolonised the North East since 2000 and is still spreading. It has been reported that numbers tend to increase following wet summers, but fall after drought years (Tomlinson 2002).

Habitat

The aptly named Speckled Wood favours the damper areas of woodland and scrub where it can find dappled sunlight and lush grass. Speckled Wood will often perch on sunlit leaves sometimes above head height where they can be easily missed. Males spend their days either basking or patrolling their breeding territory. Both sexes feed on aphid honeydew but in spring and late summer (when honeydew is in short supply) butterflies take nectar from flowers. Speckled Wood butterflies typically inhabit woodland rides and glades, but can also be found in gardens or along hedgerows where there are sufficient trees or scrub to provide the shaded conditions the butterfly favours. The Speckled Wood has been recorded laying its eggs on a wide variety of grasses including False Brome *Brachypodium sylvaticum*, Cock's-foot and Yorkshire Fog (Shreeve 1986).

Life Cycle



This species, unlike any other British butterfly, is able to overwinter either as a caterpillar or a chrysalis and adults can be seen throughout the summer, often with a notable peak in mid to late September. Individual butterflies seldom fly for longer than a week and the extended flight period of the species reflects the emergence in spring of individuals that overwintered as pupae overlapping with the slightly later emergence of those that overwintered as caterpillars. These spring butterflies then give rise to another brood which emerges over an extended period throughout the summer but peaking in late August or

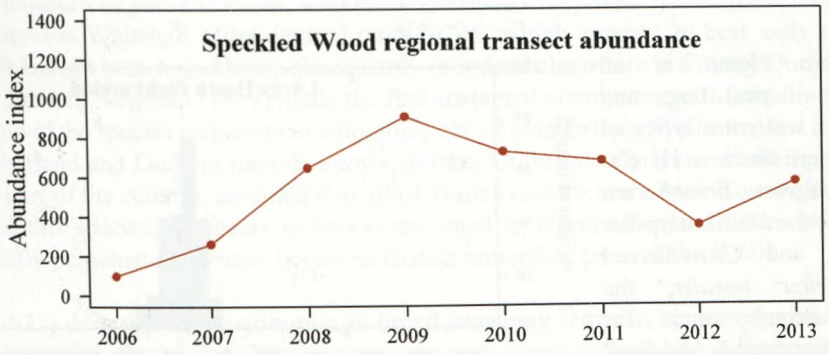
early September. There may then be a further brood in long warm seasons (Emmet and Heath 1989; Thomas and Lewington 2010).

History

This is a butterfly which has undergone several, often dramatic, changes in status in the last 200 years. In this region Dunn and Parrack (1986) described it as being well distributed until the 1840s before it inexplicably began to decline. However it was extinct by the end of the nineteenth century and Robson (1899) described no recent records. The disappearance from our region at this time was associated with a drastic contraction of the Speckled Wood's range across the country as a whole, which resulted in the species becoming restricted to parts of southwest England, lowland Wales and western Scotland (Asher *et al.* 2001). Although there are few if any records prior to 2000, reports of small numbers of butterflies along the River Tees at Winston (Waller and Hunter 2001) suggest the possibility of a small, and likely relict, breeding population here with stray insects coming into other parts of the region from either Yorkshire or Cumbria.

Present Status

By 2004 the species was expanding rapidly in Yorkshire and had started to recolonise the North East with evidence of a pattern of colonisation of the coastal denes in Durham before it spread more widely. In 2006, 558 individuals were recorded in the North East. The vast majority of these were in Durham with only eight from Northumberland. In the following five years the species went from strength to strength establishing itself more widely in the region and spreading steadily northwards and westwards, reaching Berwick-upon-Tweed in 2009 where Malcolm Hutcheson observed one on 7 September. In 2011, 3,383 individuals were recorded between 5 March and 29 October. The butterfly was seen flying on 75% of these days. Although the poor summer of 2012 saw a reduction in numbers it continues to have a strong presence in the North East. The spread into our region has been remarkably rapid; in 2003 the species had been recorded (in the modern era) in only eight tetrads in ten years, but by 2013 it had been recorded in 426 tetrads, an increase of over 5200%.

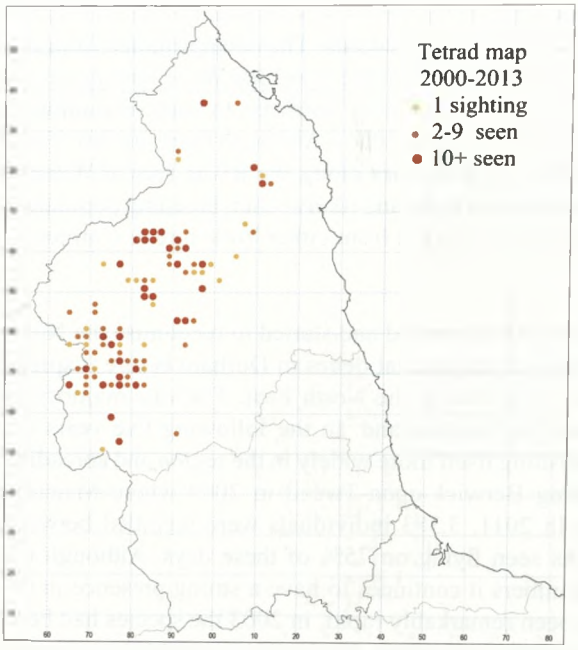


Future Outlook

This is one of the few species that is doing well, with a continuing expansion to its range, possibly linked to climate change. It is likely that further expansion into eastern Northumberland will take place.

Large Heath *Coenonympha tullia polydama*

Butterfly Conservation Priority: High
NERC Status: Section 41 species of principal importance
Regional Status: Local, recorded in 5% of tetrads

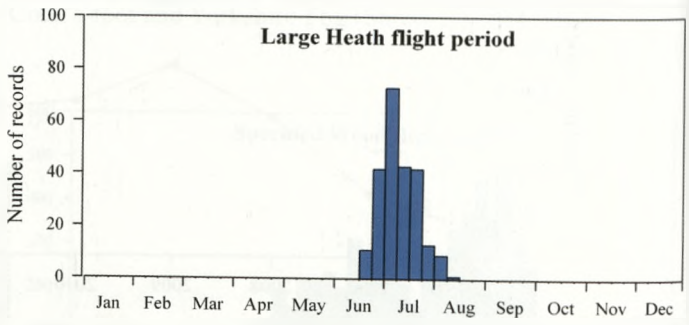


Distribution

One of the few British butterflies with a distinctly northern distribution this species has had perhaps more changes of generic, specific and common English names than any other British butterfly. With Yorkshire records now restricted to lowland peat moors near Doncaster and to sites in the North York Moors, and the species being entirely absent from County Durham, the Large Heath's stronghold on the east side of England lies in west and north Northumberland. It is absent from the lowland areas of the county and appears to be essentially restricted to land north of the Tyne gap.

The genetic make up of isolated colonies of the Large Heath differ greatly over the United Kingdom; even four different sites of this species in Northumberland have been shown to have differences in their DNA (Joyce *et al.* 2009).

Habitat



The Large Heath is an inhabitant of peat bogs and a range of wet mire types of habitat where there is Hare's-tail Cottongrass *Eriophorum vaginatum*, the main caterpillar foodplant, and Cross-leaved Heath *Erica tetralix*, the favoured nectar source for adults. It was regarded by Ford (1945) as one of the earliest butterfly colonists of Britain after the end of the last ice age. In Northumberland the current sites range in altitude between 100 and 430 m.a.s.l. and in site area from less than one up to 180 hectares. The oviposition behaviour, habitat requirements and possible management action to improve sub-optimal habitats have been described by Wainwright (2011).

Life Cycle

The flight period of the adult is usually between the last week in June and the end of the first week in August, depending on weather and site altitude. Extensive captive breeding of specimens reared outdoors, over several years, under as near natural conditions as possible, has revealed that larvae can be split into three groups: those that emerge as adults the following year, those that overwinter twice and a very small percentage that survive over three winters. This may increase the likelihood of some of the brood surviving when weather conditions or host plant quality may be unpredictable from one year to the next. Studies conducted by the author (Dennis and Eales 1997, 1999) have also established that the minimum air temperature at which this species flies is 14 °C, and that, unlike almost all other British butterflies, emergence of the adult insect is not governed by latitude, but by the altitude of the site. Hence individuals can be on the wing on a low level Lincolnshire site and on similar low level site in Perthshire as much as a week or more before the earliest emergences take place in Northumberland.

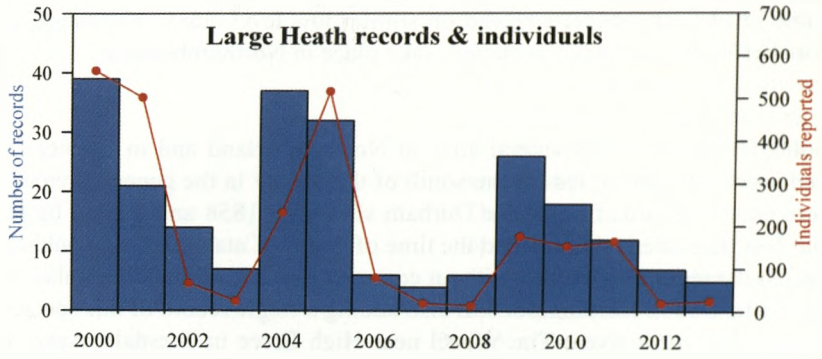
History

George Wailes (1858) recorded several sites in Northumberland and in County Durham. The Durham sites were all more or less in the south of the county in the general area of Hamsterley Forest. There are no records from these Durham sites after 1858 and it must be presumed the butterfly was lost from these sites around the time of Wailes' Catalogue being published. Robson (1899) repeated the records of Wailes without comment and added a small number that had been brought to his attention in Northumberland also adding a single record of this species being seen in some numbers in 1860 above The Wheel near High Force in Teesdale. Again there are no additional records for this area, and this site is now submerged beneath Cow Green Reservoir. The loss of this butterfly in County Durham is likely due to the lack of good quality deep peat bogs, or the impact of drainage. Most of the Durham moorland has just a thin layer of peat over glacial clay which with few exceptions cannot support the larval foodplant and adult nectar plant. The only twentieth century mention of the Large Heath as a Durham species is by Blackie (1948) who states that he is informed by J W Heslop-Harrison that, "He had never seen it in the county except for one spot, which he had no intention of revealing": this was a frequently used Harrison phrase. The late T C Dunn, who knew Harrison exceptionally well, advised the author that the site was Whitehall Moss centred on NZ0746, which appears, at best, only marginally suitable. It has not been found here subsequently or indeed elsewhere in County Durham despite searches. Edward Newman (1869) made the first sustained attempt to get information about the distribution of the species and wrote to entomologists all over Britain. Wailes replied and sent the Northumberland and Durham records known to him. Unfortunately Newman being unfamiliar with this part of the country, assumed that all of Wailes records were from County Durham and wrote that this species: "Appears to be exterminated in Northumberland". This mistake was subsequently perpetuated in many books on British butterflies up until the 1960s.

Bolam (1925) describes the distribution in broad sweeping terms in Northumberland and only names a few actual sites in the north of the county; sadly most of these have been lost to drainage or peat extraction. Dunn and Parrack (1986) more or less repeat all the previously known records and cite some recent work done by Dr C A M Reid. Reid, who was then a student at Newcastle University, did a survey of this butterfly in Northumberland in 1984 and examined all the old recorded sites, and added several new ones, which brought the total of Northumberland sites to 74.

Present Status

In 1995 the author started an intensive five year survey for the whole of the insect's flight period of five to six weeks, as well as earlier visits to prospective sites to carry out detailed site surveys. Considerable help was provided by the various statutory agencies, estates and smaller landowners regarding access and Phase 1 Vegetation Survey maps were of great assistance in locating potential sites, as bogs and mires have their own floral communities. At the end of the five year survey some 280 sites had been surveyed and the butterfly was found on 161 of them (Eales 1999). Northumberland's colonies account for the majority of Large Heath in England, but precise numbers are difficult to monitor from year to year due to the remoteness of much of the butterfly's habitat.



Future Outlook

In recent decades the Forestry Commission and the Ministry of Defence have both become very conservation conscious and take an active interest in nature conservation. The Northumberland National Park, Wildlife and National Trusts along with many landowners are now aware of the need to conserve this butterfly's habitat. Whilst the establishment of Kielder Forest and other conifer plantations will have resulted in the historic loss of mires, it would now appear that the position regarding the species' habitat is broadly stable. Conservation actions to help all the Large Heath colonies in our region are to be greatly welcomed and planning applications to extract peat are not likely to meet with success in future. Peat bogs are amongst the world's most endangered habitats and are rightly considered a major conservation priority. As a species with a northern distribution, it is possible it may retreat northwards if the climate warms and/or its habitat of peat bogs and mires changes significantly. Many Large Heath sites are remote and potentially dangerous to venture on to, so annual casual records tend to be sporadic and unrepresentative of the species' abundance or distribution in the region. Specific surveys will be needed to assess its future distribution and abundance.

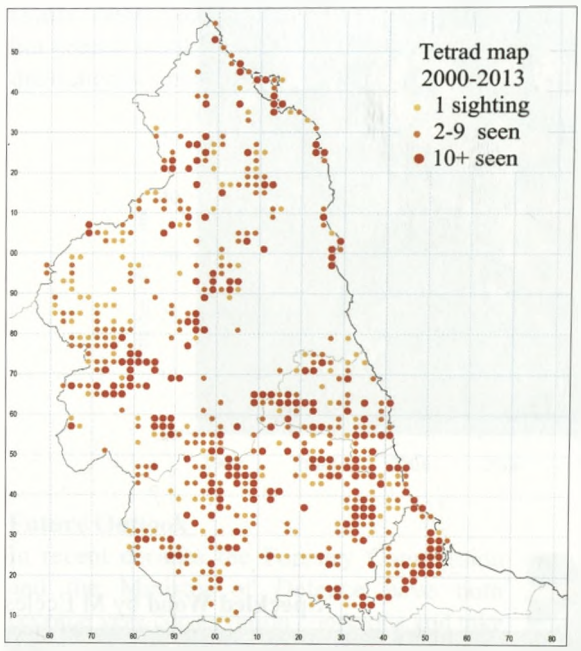
Large Heath by G Beckwith

Wall by R Mawson

Speckled Wood by M Eccles

Small Heath *Coenonympha pamphilus*

Butterfly Conservation Priority: High
NERC Status: Section 41 species of principal importance
Regional Status: Common, recorded in 33% of tetrads



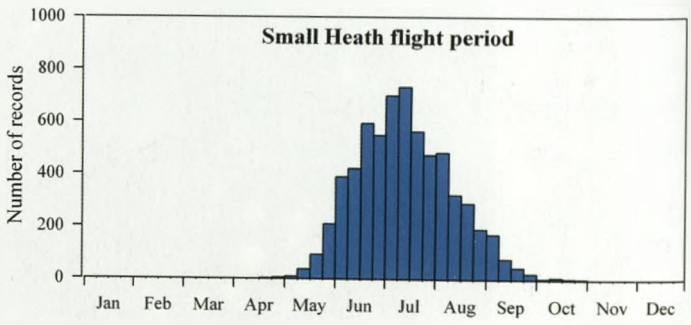
Distribution

This species is generally regarded as a widespread and fairly common butterfly in both counties, and it can be found generally from the coastal dune systems to the top of the highest hills in both Northumberland and County Durham.

Habitat

The larval foodplants are fine grasses within a short sward. These tend to grow in places where there is no deep soil or where the soil is very nutrient poor, for example brownfield sites, quarries, disused railway lines, thin peat soils on moorland, and sand dune systems. On the moors it is sometimes abundant in open grazed areas where sheep have kept the grass short. It can also be found around the dry edges of peat bogs.

Life Cycle



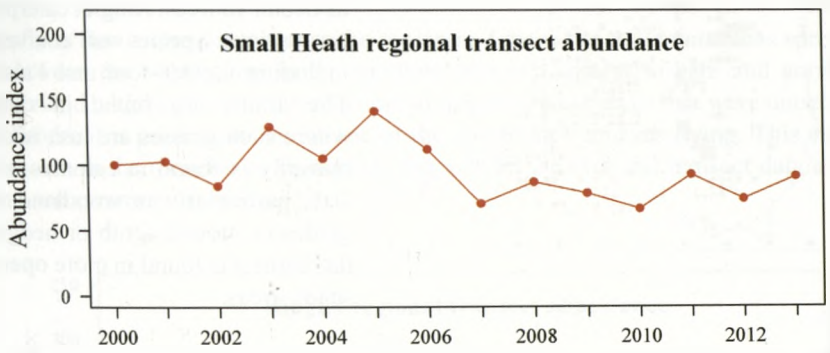
There would appear to be two main broods per year, in the spring and again in late summer with a carry over of larvae from late or slow developing individuals from the previous year filling in the gap between them (a possible subject for further research). The result is a prolonged flight period, stretching generally from mid-May to the end of September, with peak abundance in July. When at rest the Small Heath holds its wings together, and like other species of *Coenonympha* it never basks with open wings, but angles them so that the undersides of the wings are exposed to as much sunlight as possible. Once its body temperature is high enough it alters its position to point its wings directly at the sun so that virtually no sunlight falls upon them.

History

This species is only briefly mentioned by Robson (1899), who describes it as a "very common and abundant little butterfly". Bolam (1925) comments similarly, saying it "abounds everywhere, even to the tops of our highest hills". He adds that "it is said, with some show of reason, to be the most common butterfly in the country". Dunn and Parrack (1986) reported that the species was fairly common in both counties where it occurs but that its distribution was rather patchy. They indicated that numbers were well down on those of the immediate post-war years. They also considered this species to exhibit a strong dislike of cultivation and to be absent from some areas of agriculture.

Present Status

There appears to have been little overall change in the distribution for Small Heath between 1995 and 2103. There is currently a gap in the distribution in the lower lying eastern part of Northumberland which was not particularly apparent in the map presented by Dunn and Parrack (1986) and may reflect the generally arable nature of the land and changes in agricultural practice in the 25 years since their work was published. Transect results show no obvious trend since the millennium.



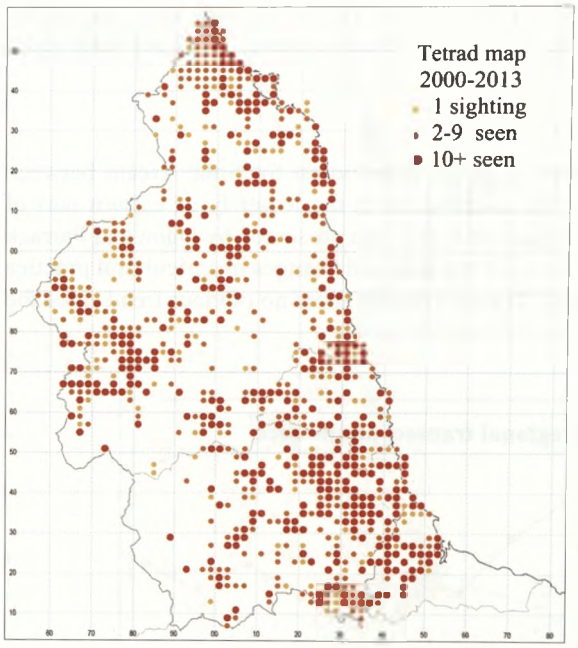
Future Outlook

This butterfly, like many others, occasionally fluctuates greatly in numbers from year to year. It is currently widespread and abundant in the region and not considered to be of conservation concern. However over Britain as a whole many colonies have disappeared recently, so Butterfly Conservation has put a high conservation priority on the species nationally.

Small Heath by J Wallace

Ringlet *Aphantopus hyperantus*

Butterfly Conservation Priority: Low
Regional Status: Common, recorded in 44% of tetrads



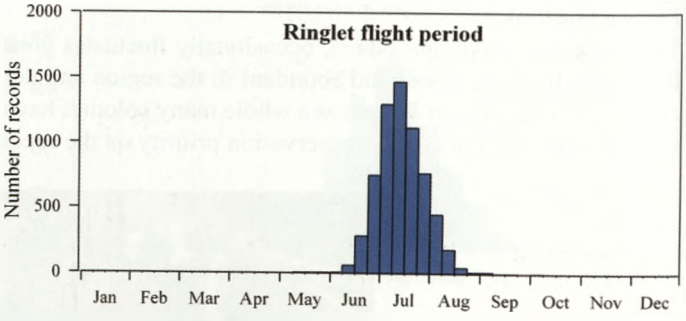
Distribution

This widespread butterfly, with its distinctive eye spots, has extended its range in England and Scotland in recent years. The butterfly is now widespread and expanding across our region.

Habitat

It is found on damp grassland throughout Britain and Ireland where it favours Bramble *Rubus spp* Thistle *Cirsium spp* and Wild Privet *Ligustrum vulgare* flowers as nectar sources. Ringlet caterpillars feed on various species of coarser grasses including Cock's-foot and False Brome. The adults are found in damp areas where such grasses are lush and tall. The butterfly is found in colonies of variable size, particularly in woodland rides and glades or around scrub or hedgerows. In the north it is found in more open and less shady areas.

Life Cycle



There is one generation and the butterfly is typically on the wing during the latter half of June, peaking in July with relatively few on the wing during August. Adults continue to fly with a characteristic bobbing flight in dull, cloudy conditions when most other butterflies are inactive. The larvae are nocturnal, hiding by day at the base of a tussock and emerging at night to feed. The larvae hibernate while in the third instar, but will feed on warm evenings during the winter before resuming regular feeding in the spring. The pupa is formed in a flimsy cocoon at the base of a grass tussock.

History

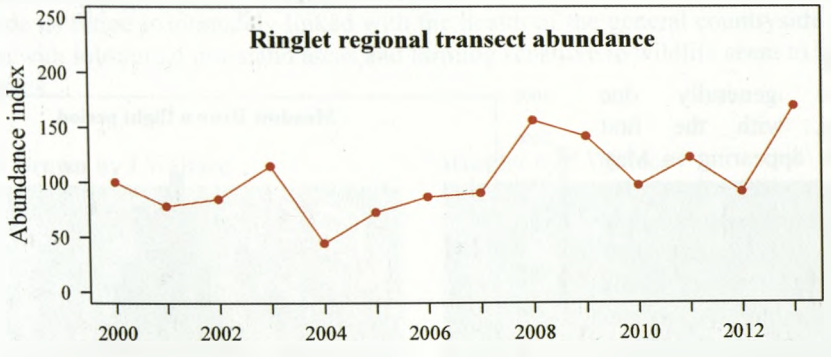
In the first half of the nineteenth century the Ringlet was assessed as abundant up to 1858 by Robson (1899), but it then "became exceedingly scarce very shortly after that date". Bolam (1925)

describes a similar situation of "formerly well-distributed and common, is said to have almost disappeared from some of its southward stations in Northumberland", but "present over the border in many places in Berwickshire". It appears to have suffered a period of range contraction until more suitable climatic conditions encouraged an increase in their breeding capabilities and a tendency to spread out from traditional sites. However the causes of the regional decline are obscure, as it persisted both to the south and to the north of our region before reoccupying its former range. Dunn and Parrack (1986) described the few breeding groups in the North East as relict colonies, with the main centre on the Northumberland coast between Bamburgh and Berwick, and only five post-1950 tetrads occupied in County Durham.

Present Status

Frost (2005) describes an expansion in Yorkshire during the 1990s, colonising the most northern parts of VC62 and VC65 in Yorkshire. This colonisation continued into County Durham and by 1998 there were nearly 100 recorded tetrads as a rapid north and northeasterly expansion took place. There was also expansion in north Northumberland, so that by the end of the twentieth century the Ringlet occupied a rather strange distribution in the North East. It was largely absent from a central belt some 50 km wide running southwest to northeast, but widespread in southern and eastern County Durham and in north and western Northumberland.

The butterfly is now widespread across the region and since the millennium has spread to close the gap between the populations in the southern part of County Durham and north and west Northumberland, although it is still thinly spread in some of the areas that were unoccupied until recently. Where it is present, it can be one of the commonest species flying. This expansion in range is shown in the increase in abundance index from the regional transect data as Ringlet is now being seen on more transects.

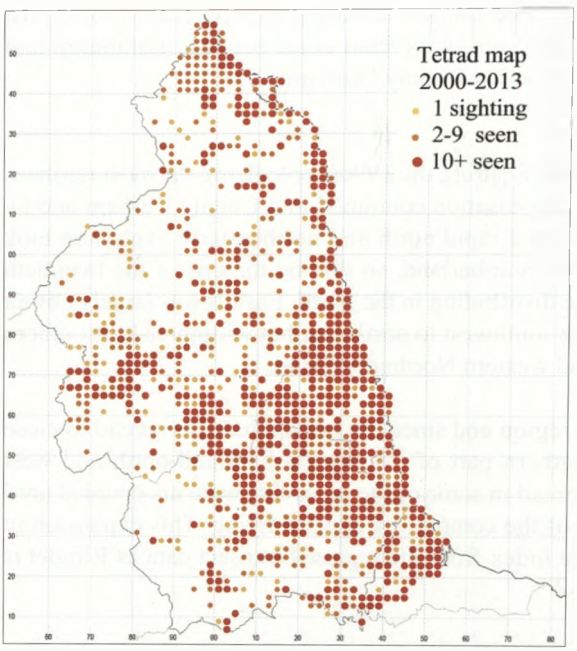


Future Outlook

The Ringlet is one of the few species extending its range in the UK. Whilst most of the UK's butterflies fared badly during the wet summer of 2012, it was widely reported that butterflies whose larvae feed on grasses saw increases in adult numbers recorded in 2012. This was not the position in our region, but the long-term trend has been one of expansion and it is to be hoped that this continues and that the Ringlet maintains its recent widespread status.

Meadow Brown *Maniola jurtina*

Butterfly Conservation Priority: Low
Regional Status: Common, recorded in 57% of tetrads



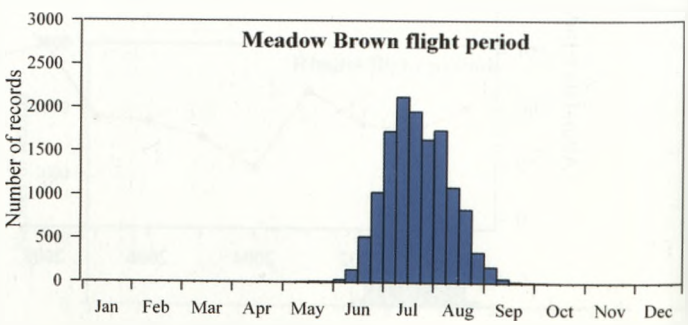
Distribution

This aptly named butterfly abounds in most rural or semi-rural habitats with coarse grasses and a range of nectar plants, but excluding dense woodland and heather moors. It is often seen in weather conditions which have driven other butterflies to shelter. The distribution map suggests that it is more sparsely distributed in the west of our region.

Habitat

Unimproved grassland, heaths, coastal grassland, less intensively managed parks and local nature reserves, roadside verges, widened woodland rides, hedgerows and the network of public rights of way all offer suitable habitat for this species. Its caterpillar foodplants are various fine leaved grasses such as fescues, bents and meadow grasses *Poa* spp.

Life Cycle



There is generally one generation, with the first individuals appearing in May and numbers peaking in July. By early September most Meadow Browns have completed their life cycle, but a few individuals can still be on the wing as late as October. Adult butterflies may live for 12 days. A few days after mating females lay or drop their eggs, apparently indiscriminately, among various grasses on which the caterpillars feed. The species overwinters as larvae, feeding on warm days, and pupates typically in May. The butterfly emerges after two to four weeks.

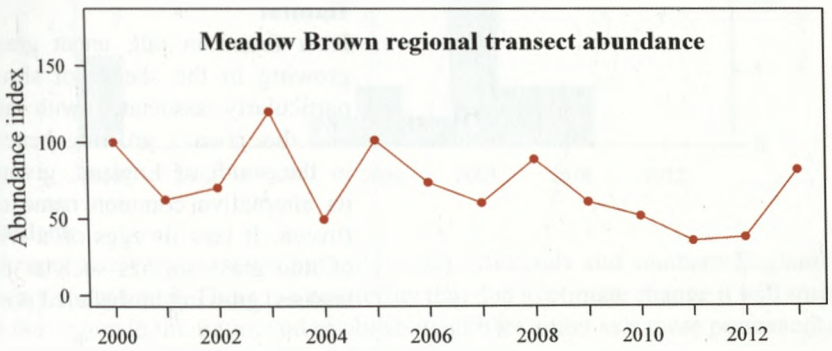
History

Perhaps because it is so ubiquitous and unspectacular, early lepidopterists such as Robson (1899) and Bolam (1925) had very little to say about the Meadow Brown apart from noting considerable variation in its wing colours and patterning from individual to individual and region to region. They noted that it was less common in our higher, more western districts. Nationally it has

always been numerous: "from its wide distribution and general abundance, this may be said to be our commonest butterfly" (South 1906). Dunn and Parrack (1986) considered it common and evenly distributed throughout the two counties but noticeably less common in the Border forests. They also report that there is a race in Cassop Vale of abnormally bright coloured butterflies approaching the Scottish form *splendida*.

Present status

The Meadow Brown has maintained its predominance in butterfly counts in our region in recent years. Based on recent recording it is somewhat less widely distributed but more numerous than the Green-veined White, the most widespread butterfly in the region. The transect counts show that its abundance has not significantly changed this century, but merely fluctuated from year to year. The hot summer of 2013 appears to have reversed a spell of four years of decline.



Future Outlook

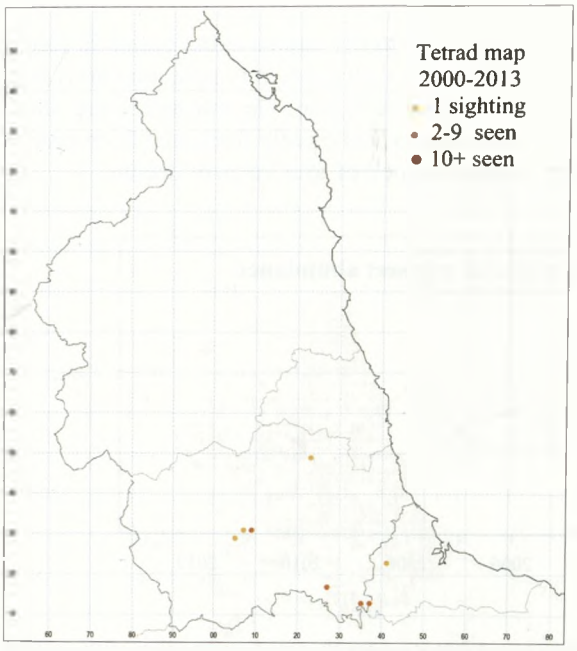
The Meadow Brown is a very common butterfly and is not under threat. As a species of the wider countryside its future is intimately linked with the health of the general countryside. A diverse landscape with substantial grassland areas and farming sensitive to wildlife seem to be essential requirements.

Meadow Brown by J Wallace

Ringlet by J Wallace

Gatekeeper *Pyronia tithonus*

Butterfly Conservation Priority: Low
Regional Status: Rare, recorded in less than 1% of tetrads



Distribution

The Gatekeeper is at the northern limit of its British distribution in the very south of our region. It has been recorded occasionally in the Darlington, Teesside and Hamsterley Forest areas.

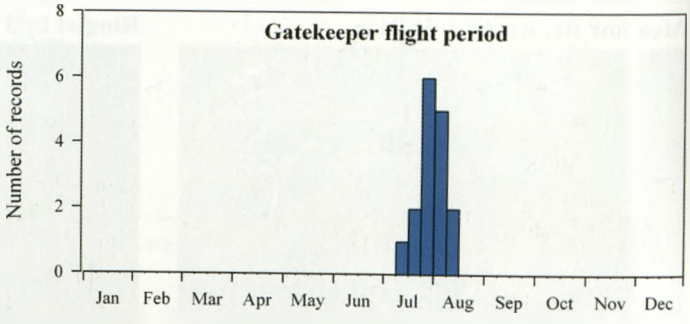
Habitat

It is found in tall, uncut grassy areas growing in the shelter of shrubs. It is particularly associated with hedgerows and the grasses growing beneath them in the south of England, giving rise to its alternative common name of Hedge Brown. It lays its eggs on a wide range of fine grass species such as bents and fescues, growing in sheltered positions.

Life Cycle

There is one generation per year and the flight season is concentrated in the period mid-July to mid-August. It hibernates as a caterpillar deep in clumps of grass.

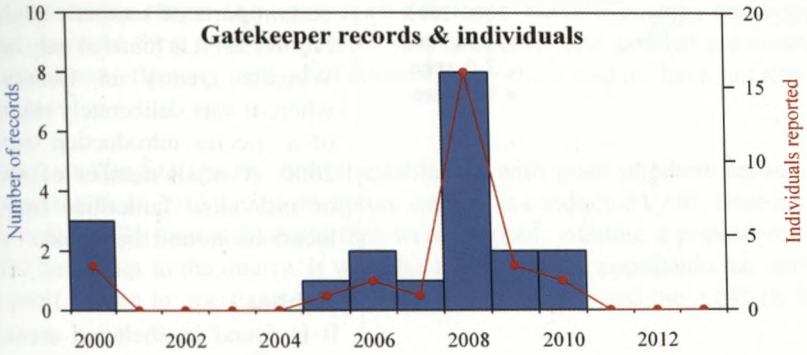
History



In the nineteenth century the Gatekeeper was "reputed to be common, and locally abundant, in the southern part of Northumberland, reaching as far as Morpeth, but seems to have grown scarce in recent years" (Bolam 1925). Robson (1899) noted that the Gatekeeper was "widely distributed throughout both counties". However he goes on to say that it was "scarcely so plentiful as it was twenty or thirty years ago". In the twentieth century the butterfly all but disappeared from Northumberland and Durham, with only occasional sightings. Dunn and Parrack (1986) say "This is another species which, sadly, has become extinct". It seems that its range contracted southwards to the southern half of England.

Present Status

There is evidence that the Gatekeeper may be returning to our region in the twenty-first century. Along with some other species it may be expanding northwards as a result of climate change. It is now widely distributed in Yorkshire and is increasingly being seen in the very south of our region. There were a number of sightings in the Hamsterley Forest area from 2005 to 2008. A total of 16 individuals were seen in County Durham in 2008, but records have now fallen away and there have been three blank years, in 2011, 2012 and 2013.



Future Outlook

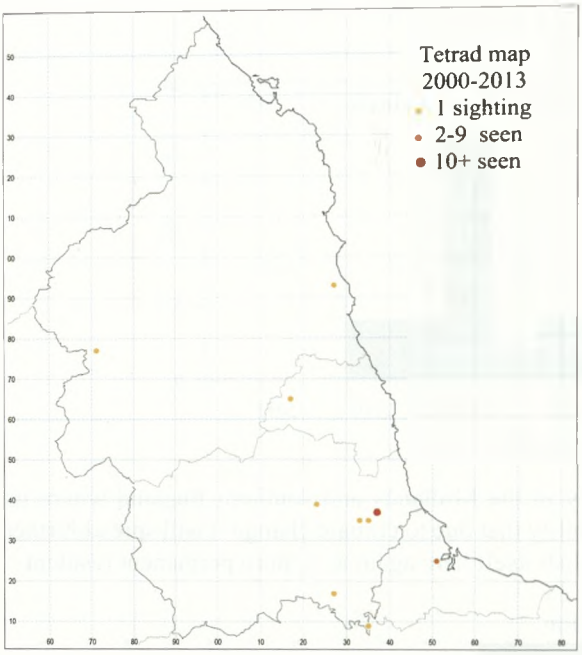
The Gatekeeper is a very common butterfly in the Midlands and southern England where its survival is not under threat. There is a possibility that due to climate change it will spread further north into our region in the future and establish itself here again as a more permanent resident.

Gatekeeper by J Asher/Butterfly Conservation

Marbled White by S Austin

Marbled White *Melanargia galathea*

Butterfly Conservation Priority: Low
Regional Status: Rare, recorded in less than 1% of tetrads



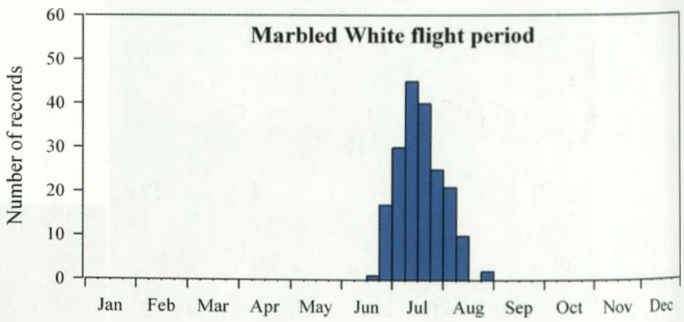
Distribution

Marbled White is a common species in certain parts of southern England. In the North East it is found at only one location, Wingate Quarry in County Durham, where it was deliberately released as part of a species introduction experiment in 2000. A small number of records exist of individual butterflies from scattered locations around the region.

Habitat

It is found in sheltered areas of rough, open, flower-rich grassland with a tall sward particularly on limestone and chalk. In southern England the Marbled White can turn up in cultivated gardens. The main caterpillar foodplant is Red Fescue *Festuca rubra* but other grasses are used.

Life cycle



There is one generation with the first adults appearing in late June and numbers peaking in July. By early September the flight season is over. Eggs are laid or simply dropped in suitable grasses: "this butterfly has a peculiar habit of dropping its eggs among the grass without attempting to attach them to anything" (Frohawk 1914). After hatching the larvae eat their egg shells and hibernate amongst dead vegetation. In the spring they emerge to feed on various grasses, initially by day and, when larger, at night. They pupate in the soil in May.

History

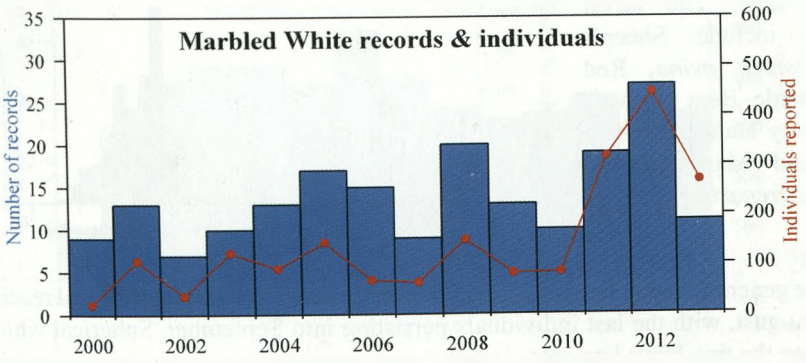
Marbled White was not mentioned in Dunn and Parrack (1986). The first record in the region was by Hew Ellis of two at Bishop Middleham Quarry on 15 July 1994. These were believed to be from an unofficial release at the site and appear not to have persisted. There were no more records until the release at Wingate Quarry in 2000.

Present Status

The release at Wingate Quarry in County Durham was based on research suggesting some species do not respond quickly enough to survive climate change by moving to new habitat. One technique proposed to counter this effect was assisted colonisation: the release into suitable habitat beyond its normal range of a number of specimens of a threatened species. These might be captured from a healthy natural population or bred in captivity. In an experiment led by Durham University (Willis *et al.* 2009) to test the practicality of assisted colonisation, some 500 Marbled Whites from Yorkshire were released in Wingate Quarry in 2000, 65 km beyond their then-known distribution range. The site was chosen for its suitable ecology and vegetation and the butterfly's survival there over the past 13 years suggests that assisted colonisation can be an effective, and cost-effective, method of conservation where species have not kept pace with climate change.

The population at Wingate Quarry is well established with good numbers recorded annually since the introduction. In 2013 a mark-recapture study was conducted by the Durham University team and a total of 475 individual butterflies were marked, yielding a population estimate of just over 800 butterflies in the quarry. It was also noted that the population has spread beyond the quarry itself and on to grassland between the nature reserve and the A181 (S Willis, pers. comm.).

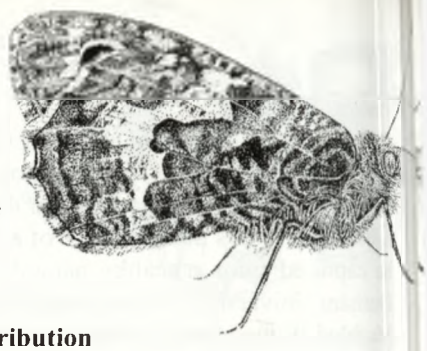
The vast majority of records in the region are from Wingate Quarry suggesting that the species has so far not been able to spread effectively from this site. Willis *et al.* (2009) reported seven males recorded more than a kilometre from the release location in the first year and in subsequent years found that only 2% of records were more than a kilometre from the release site. In 2006, 95% of individuals were recorded within 500 metres of where the original release took place five years earlier. Occasional records of individual specimens at sites distant from Wingate Quarry, such as Teesside, Wark Forest, Tyneside and in the Darlington area remain unexplained, since the species is not known to stray any distance from its colonies, at least in the north. An individual at Teesmouth may well have arrived from the south.



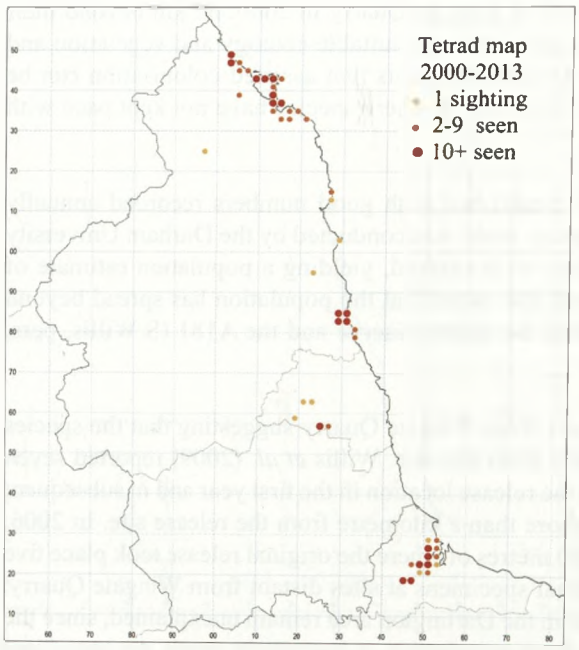
Future Outlook

No special conservation efforts have been made at Wingate Quarry and its survival there can be considered unassisted. The Marbled White seems likely to persist as a healthy population at Wingate Quarry but so far it has shown little sign of spreading significantly from there.

Grayling *Hipparchia semele*



Butterfly Conservation Priority: High
NERC Status: Section 41 species of principal importance
Regional Status: Rare, recorded in 3% of tetrads

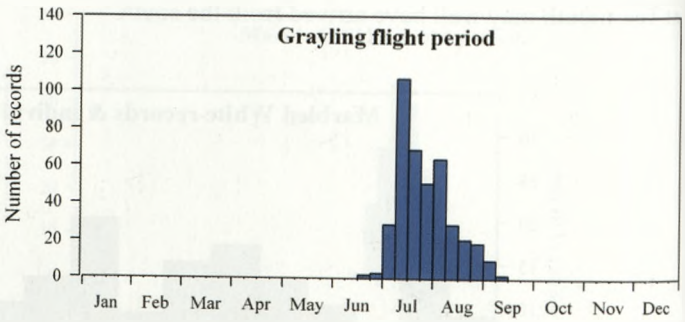


Distribution

The Grayling has a mainly coastal distribution in our region with three main centres of population. In the south of the region the species is recorded on a number of brownfield sites in the Teesside area. In Northumberland there is an established population on brownfield land and extending into the dunes at Cambois near Blyth, and then in the north of the county there is a population centred around Holy Island. A small number of records come from the Newcastle-Gateshead area.

Habitat

Grayling require a warm microclimate and occur in a wide range of dry, well drained soil types. Habitats are characterised by sparse vegetation, large areas of bare ground and sheltered, sunny spots in open situations, typically coastal dune systems and many brownfied sites. The larval foodplants include Sheep's Fescue *Festuca ovina*, Red Fescue, Bristle Bent *Agrostis curtisii*, Early Hair-grass *Aira praecox* and Marram grass *Ammophila arenaria*.



Life Cycle

There is one generation with the first individuals on the wing in mid-late June and reaching a peak in July or August, with the last individuals persisting into September. Spherical white eggs are laid singly on the fine-leaved grasses, usually small tussocks growing in full sun and surrounded by bare ground. The larvae hibernate at the base of the grass tussocks before continuing to feed in the spring. Fully grown in June, the larvae pupate in a silk-lined cavity below the surface of the ground.

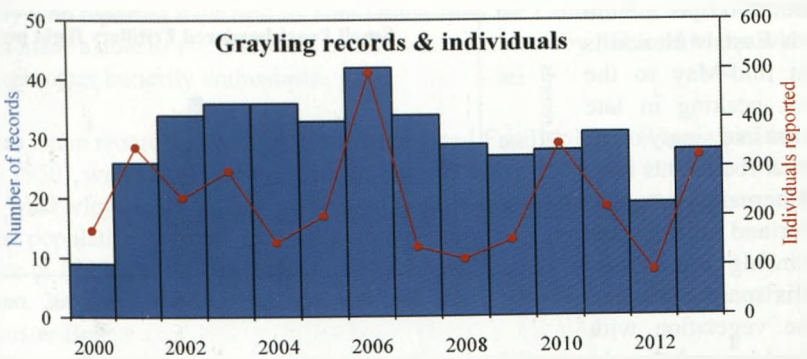
History

Early authors such as Robson (1899) and Bolam (1925) described a butterfly that was much more widespread in the region. Robson cited various observers finding it widely distributed including more southerly sightings in the region from Jarrow down through Sunderland and Ryhope to Castle Eden and Hartlepool. He quoted George Wailes (1857) as finding the butterfly "swarming" in the ballast hills around Jarrow, and noted that he had himself found it common on the ballast hills of Hartlepool and the railway cutting above Hart Station, industrial conditions that clearly suited the butterfly's predilection for warm, open ground. Bolam (1925) described the Grayling as "abundant in suitable places in all our counties". Bolam also described the Grayling as being found inland in the hills around Wooler, Alwinton and Allendale.

The distribution known to Robson (1899) did not persist and Dunn and Parrack (1986) state that they had not a single record of the species in Durham. They record that the species continued to be present, as in Robson's day, in the Northumberland dunes between Seahouses and Cocklawburn as well as on Holy Island. They do not refer to the Cambois population but do mention records extending south along the coast to Boulmer which they viewed as suggestive of a tendency towards expansion.

Present Status

Apart from the long-known populations in north Northumberland, strong colonies were found in 2001 at Cambois and at Teesmouth. A further colony was then found at a Gateshead quarry in 2005. Grayling records in the region for this period are characterised by generally low individual counts (ones and twos) interspersed in some years with spectacularly high numbers of adults. For example, counts of over 100 individuals were recorded in 1995, 1997 and 2000 at Ross Links near Belford and in 2000 at Holy Island. High numbers also occurred in 2006 in Cambois, and in 2009 and 2010 at Dorman's Pool and Reclamation Pond on Teesside. Between 2000 and 2012 the maximum number of individuals recorded each year peaked at 494 in 2006 and reached its lowest level in the miserably wet summer of 2012 with only 91 individuals.

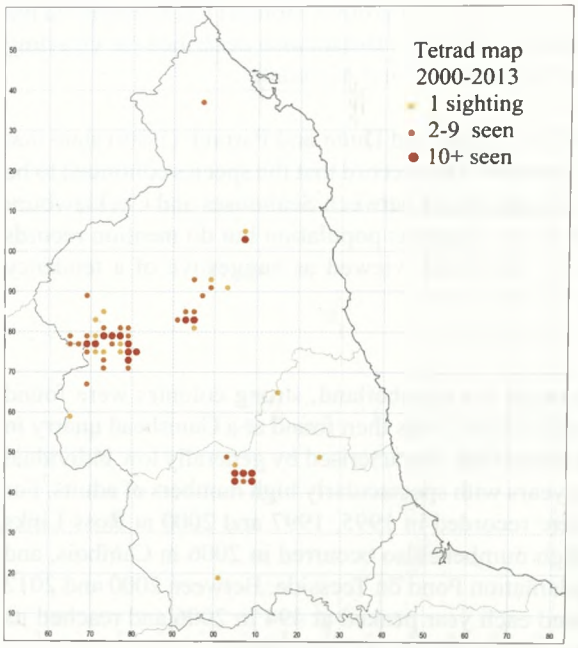


Future Outlook

The Grayling is listed as high priority by Butterfly Conservation based on a long term national decline. In the North East the species' sites on Holy Island and other coastal dune locations are secure as also, probably, are those on active industrial sites in Teesmouth. Brownfield sites including the population at Cambois could potentially be threatened by future redevelopment.

Small Pearl-bordered Fritillary *Boloria selene*

Butterfly Conservation Priority: High
NERC Status: Section 41 species of principal importance
Regional status: Rare, recorded in 3% of tetrads



Distribution

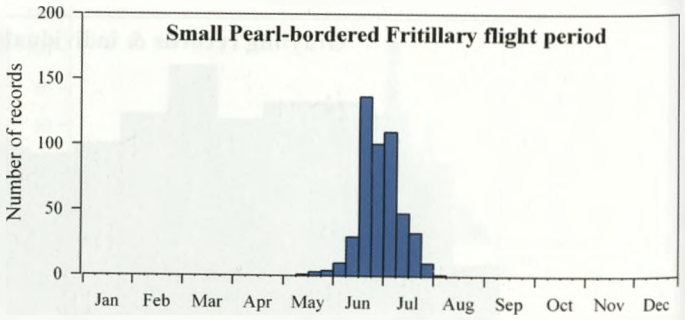
In Northumberland the butterfly has a central and western distribution concentrated around Wark and Kielder Forest, Harwood Forest and Sweethope Lough. In northwest Durham it is restricted to the Waskerley area on tributaries of the rivers Wear, Derwent and Browney.

Habitat

In the North East this butterfly is confined to sheltered wet flushes, damp grassland and grassland/bracken/scrub mosaics, where the larval foodplants Marsh Violet *Viola palustris* and Common Dog Violet *Viola riviniana* grow. Most such sites are small and dispersal between them appears to be poor, with the butterfly requiring a suite of adjacent sites around which it can move as habitat quality fluctuates.

Life Cycle

There is one brood per annum in the North East, with adults flying from mid-May to the end of July, peaking in late June. Eggs are laid singly on or near the larval foodplants with the larvae hibernating amongst the leaf litter and emerging to feed the following spring. Most larval time is spent concealed amongst the vegetation with infrequent basking and short bouts of feeding. Pupation takes place in April close to the ground hidden in the vegetation.



History

Early authors provide few Northumberland records; Robson (1899) records the butterfly at Meldon Park near Morpeth and at Hexham. Bolam (1925) records it at Staward Peel on the River Allen and at Hepple Park and Billsmoor near Elsdon. Dunn and Parrack (1986) conclude that the

butterfly had almost disappeared from Northumberland providing only one contemporary record from near Wallington in 1985. Since that time, late twentieth century surveys have revealed the butterfly to be much more widely spread in Northumberland.

Small Pearl-bordered Fritillary was once distributed across the whole of County Durham. Ornsby (1846) reports it from Flass on the River Deerness near Esh Winning, Wailes (1858) records Gibside and Shull, Robson (1899) adds Durham City, Cotherstone, Hesleden Dene, Thornley on Derwent, Chopwell, Winlaton Mill and Ebchester. Gatiss (in Fawcett 1911) records it at Pontop Pike near Dipton. Subsequent publications, often in the *Vasculum*, indicate that the butterfly was once well distributed along the upper valleys of the rivers Browney, Derwent and Wear and describe a general decline in a westerly direction as the twentieth century progressed. Dunn and Parrack (1986) could only record a small number of colonies bordering the A68 between Tow Law and Consett (the Waskerley locations) and in and around Hamsterley Forest (near Dryderdale Farm and on Shipley Moss, Knitsley Fell). But there were others; Dr Phil Gates knew Small Pearl-bordered Fritillary on the Harthope Beck near St Johns, upstream of Dryderdale from 1979 to 1987 (Gates 1987), and Doug McCutcheon and Gordon Graham found the butterfly on the Thornhope Beck near Ladley Burn in 1983. The Hamsterley Forest/Wolsingham colonies disappeared during the late twentieth century. Subsequently in 2006 the butterfly was found on the Waskerley Beck above Tunstall Reservoir, currently the only known upper Wear catchment location and possibly functionally linked to the upper Browney populations.

The River Derwent colonies had declined to what was thought to be extinction by the mid-twentieth century until in 2006 a small colony was discovered on the Rail Gap Burn, a tributary of the Hisehope Burn. A similar westerly decline happened along the rivers Deerness and Browney; it was still present on the Stanley Beck near Waterhouses in the mid-1960s (Keith Dover, pers. comm. 2009) and on the Browney at Sawmill Wood in 1994 (John Hope, pers. comm. 2009) and Butsfield Abbey in 1996 (Harry Eales, pers. comm. 2009). Ultimately the butterfly persisted in only four discrete colonies to the east of Waskerley, situated on the nascent River Browney, the Black Burn and the Wood Burn. These sites were discovered in 1982 by Doug McCutcheon and Enid Murray who reported their find to Tom Dunn, then the County Recorder for butterflies and moths. Tom made a note of the discovery which was later seen by Michael Mann who spread the word amongst other butterfly enthusiasts.

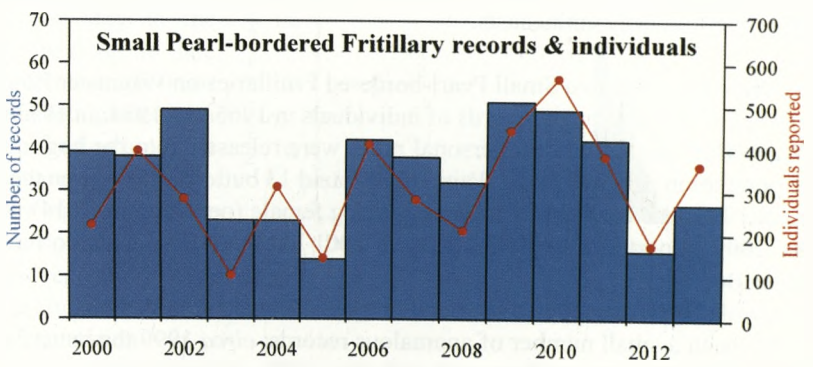
In 1949 Tom Dunn recorded two Small Pearl-bordered Fritillaries on Wannister Bog, Waldridge Fell (Dunn 1950), with subsequent records of individuals in 1965 and 1974. In 1993 three larvae bred from Waskerley stock (author's personal note) were released onto the bog in the hope of boosting the population. In 1998 Dave Wainwright found 13 butterflies flying on the bog, with a further three in 1999, one of which was an egg laying female (pers. comm. 2014). Keith Dover (pers. comm. 2009) reported a single butterfly in 2001 but there have been no further records from Wannister Bog.

There have also been a small number of anomalous records; *circa* 1999 the butterfly was found on Pow Hill Bog on the Derwent Reservoir and circa 2003 on Hedleyhope Fell, in both cases for only one season, suggesting that these may have been releases. In 2005 a single Small Pearl-bordered was photographed on the Hart to Haswell Walkway near Hesleden Dene and there is a record of a single butterfly from Westfield Pasture, Ryton in 2009. Wynyard Park has a 1950 record (Dunn 1950) and a further tentative record from Wash Plantation in 1976 with other possible sightings in the Wynyard area. There is a 2013 unverified record from near Cotherstone.

Present Status

This is one of Durham's rarest butterflies. In 2002 the four remaining core Waskerley butterfly sites (all that were then known) were assessed for habitat quality and found to be succeeding to rank vegetation or dense bracken. Unoccupied adjacent potential habitat was made unsuitable by overgrazing by sheep, with few violets. In response to the need for landscape-scale habitat restoration a consortium of interested parties including Butterfly Conservation, Durham County Council, Durham Wildlife Trust and enthusiastic landowners worked together to implement sympathetic management on and between the existing sites through scrub clearance, the establishment of correct grazing regimes and the planting of violets. Results have been impressive with an additional two hectares of occupied habitat by 2009, tripling the 2002 resource (Ellis and Wainwright 2012). As a result butterfly numbers have increased and newly created connective habitat has been colonised. Colonies increased during the early stages of the management work and now seem to be stable although still susceptible to moving between habitat blocks as habitat quality fluctuates. In addition, further areas of suitable habitat were discovered and mapped and two new colonies discovered, increasing the Waskerley network to six colonies. Nevertheless the butterfly remains at great risk; the number of colonies and individuals is small and the outliers on the Wear and Derwent catchments may be completely isolated. Local extinction remains a real possibility.

Dr Dave Wainwright carried out surveys in Northumberland in 2002 and 2003 finding 20 occupied colonies all of which were small, being less than 100 individuals and dependent on Marsh Violet as the preferred foodplant. Some sites were losing good quality habitat through succession to rank vegetation or by self-seeding conifers and none were in conservation management (Wainwright 2003). However in general he considers the species not to be under imminent threat and that the Kielder and Wark Forest populations are probably stable but again prone to colony shift as habitat blocks optimise (pers. comm. 2014). The butterfly has now also been found in small numbers at 12 sites in the Sweethope and Harwood Forest areas and in further new sites found recently in the Rothbury area (O'Brien *et al.* 2007-2012). It seems possible to expect further colonies to be found in future years in areas of the county dominated by coniferous forest or sheepwalk.



Future Outlook

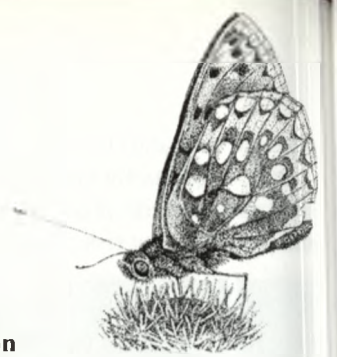
In Britain in recent years the Small Pearl-bordered Fritillary has declined dramatically with a 34% fall in distribution and a 70% fall in abundance since the 1970s, especially in central and eastern England (Ellis and Wainwright 2012). The UK and Durham Biodiversity Action Plans and Butterfly Conservation all consider it to be a high priority for conservation.

New recording and conservation projects in County Durham are boosting numbers and distribution where local gains are bucking the national trend, but the situation remains grave with the current gains always at risk if management resources cannot be maintained. In Northumberland it seems stable but with the risk of incremental colony loss if habitat quality degrades.

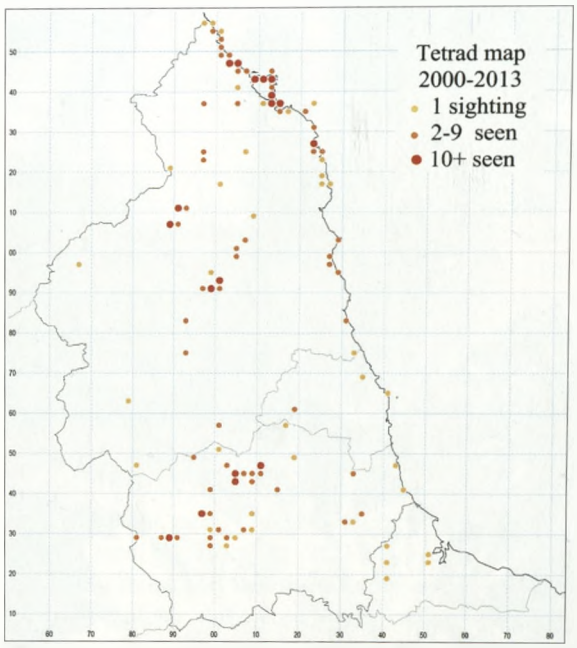
Grayling by S Brennan

Small Pearl-bordered Fritillary by K Walton

Dark Green Fritillary *Argynnis aglaja*



Butterfly Conservation Priority: Medium
Regional status: Local, recorded in 6% of tetrads



Distribution

Our most widespread and common fritillary, the Dark Green Fritillary has declined over the last 100 years, but not as extensively as our other fritillaries. After an accelerated decline in the North East in the 1960s and 1970s it is now believed to be recovering and may be spreading a little. It is more able to retain its distribution as it has less demanding ecological requirements than other fritillaries being able to breed in wetter cooler climates and using a wider range of habitats, which make it more resilient to environmental changes (Asher *et al.* 2001).

The regional distribution map suggests that Dark Green Fritillary is still widespread, being found from the coast to the uplands in both counties but concentrated on favoured locations of suitable habitat. In Northumberland it is represented along most of the coastline but is particularly abundant on Holy Island and further north along the coast to the Scottish border. Inland concentrations centre around Kidland Forest, Rothbury and the Simonside Hills, Harwood Forest and west of Wooler. In Durham it can still be found on the coastal and limestone plateau grasslands. In the west it is found in Upper Teesdale, around Hamsterley Forest and from the Waskerley area in the upper Browney valley (which in recent years has held a particular concentration of this species) north to Muggleswick on the Derwent. Its wide-ranging habit however means it can turn up almost anywhere.

Habitat

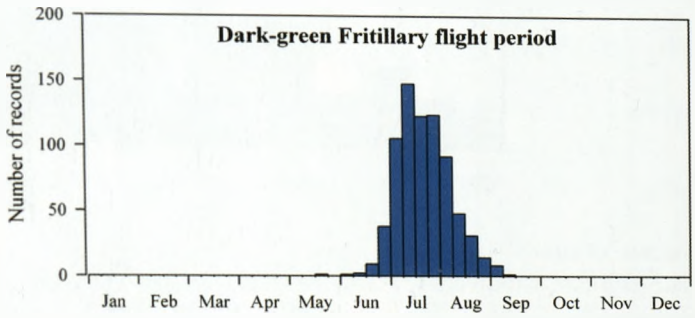
A strong and wide-ranging flyer, this powerful butterfly frequents flower-rich habitats including grasslands, coastal grasslands, cliff tops, dunes, heather moorland, wet flushes, acidic grassland with bracken and larger woodland rides and clearings. They must be places with abundant nectar sources and where the most common caterpillar foodplants - Common Dog Violet, Hairy Violet *Viola hirta* and Marsh Violet - grow in sufficiency.

Life Cycle

Dark Green Fritillaries occur in low densities over large areas within which there are small pockets of suitable breeding habitat. The butterfly is single brooded and in the North East it flies from late June to late August. Eggs are laid on or near the foodplant and the larvae enter hibernation immediately after hatching. The following spring larvae begin to feed, thermo-

regulating by basking on or below the vegetation. Larvae pupate towards the end of May in the leaf litter or within grass tussocks emerging three to four weeks later according to weather conditions (Emmet and Heath 1990).

History



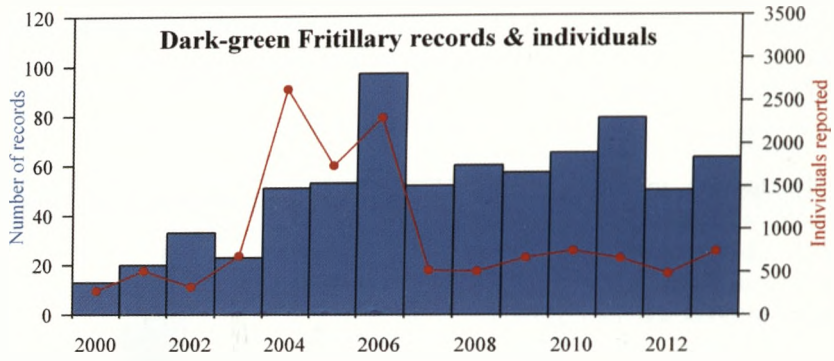
The butterfly appears in all lists since being first recorded by Ornsby in 1846 at Castle Eden Dene and in fields near Flass. Robson (1899) describes its status as "I fear it is disappearing from our district" and in 1905 (in Page 1905) he states it "has now quite left the coast". Subsequently G Heslop-Harrison (1949) records its return to the coast more than 70 years later with a capture at Black Hall Rocks. By the 1980s Dunn and Parrack (1986) are able to write that it is "a little more plentiful now than it was [in Robson's time]" and describe it as widespread in Durham. Current records suggest it to be a little more plentiful now than it was when Dunn and Parrack made their observation, although Dave Wainwright (pers. comm. 2013) does remember a period in the late 1990s early 2000s when it was once again hard to find.

An example of how common the species once was is provided by Thomas Gatiss (in Fawcett 1911) who describes collecting 36 in one day on a six mile walk along lanes just west of Lanchester and a further 40 on the same route a fortnight later in 1900. He subsequently records it as being scarce since 1902 with none in 1903; one wonders why! A walk along the same route today reveals a landscape stripped of its ability to support butterflies by opencast mining and agricultural intensification.

Heslop-Harrison (1929) considered the Dark Green Fritillary to be the true identity of the butterfly described by John Wallis of Simonburn in Northumberland as the Large Tortoiseshell butterfly *Nymphalis polychloros*. Wallis (1769) records the Large Tortoiseshell as "not unfrequent": a description which seems very unlikely in Northumberland for a butterfly which, even then, was only sparsely distributed in its southern strongholds and a very rare vagrant in the north, and which is now functionally extinct as a breeding species in the UK. Subsequent authors have given uncomfortable and qualified support to Wallis, not daring to suggest an error or to offer an alternative. Heslop-Harrison's argument is plausible but not wholly convincing.

Present Status

Numbers of individual butterflies counted between 2000 and 2013 show three exceptional years from 2004 to 2006 when more than double the average numbers were flying. Since then average numbers have decreased with the poor summer of 2012 showing only half the norm, a situation not unexpected given the year's poor weather. The period since 2008 has seen a series of excellent counts by Dave Liddle and co-workers in the Waskerley area of Durham which may now be considered the stronghold for this species in VC 66.



Future Outlook

The Durham Biodiversity Partnership classes the Dark Green Fritillary as a priority species and has an action plan for its conservation. Butterfly Conservation considers it to be a medium priority species in the north and has published information, including a fact sheet on how to manage land to benefit the butterfly.

This fritillary seems to be able to withstand the vagaries of climate fluctuation providing habitat conditions remain suitable. The current political climate for reduction in agricultural subsidies for wildlife-friendly land management is cause for concern and it remains to be seen whether enough large scale habitats can be retained or created to support the butterfly into the future.

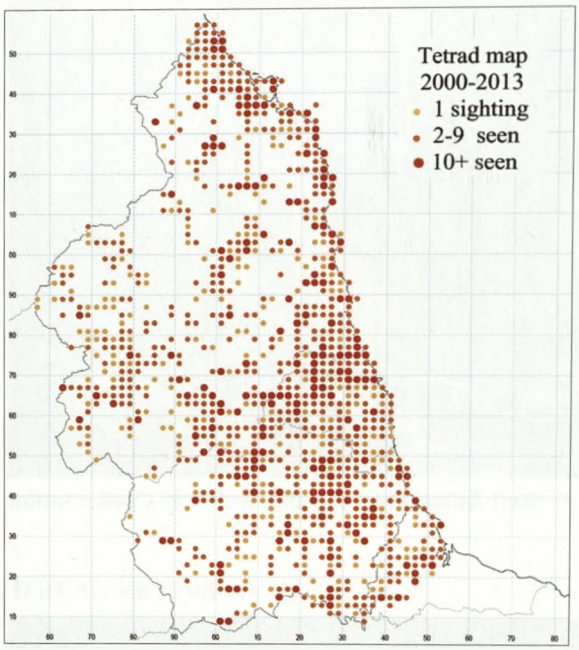
Dark Green Fritillary by R Mawson

Red Admiral by J Asher/Butterfly Conservation

Painted Lady by K Walton

Red Admiral *Vanessa atalanta*

Butterfly Conservation Priority: Low
Regional Status: Common migrant, recorded in 57% of tetrads



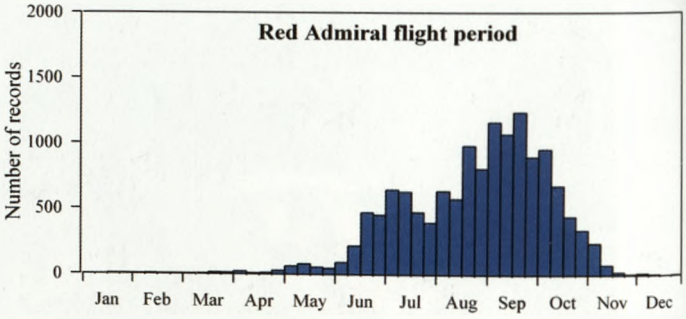
Distribution

This migratory species is found in a wide variety of habitats and in all parts of the region with the exception of the high land to the west of both Durham and Northumberland.

Habitat

The Red Admiral is not restricted to any particular habitat but can be found generally about the countryside. It is a regular visitor to gardens, including those in urban centres, where it feeds on the nectar of garden flowers. Females are usually found near nectar sources or patches of Common Nettle *Urtica dioica*, their larval foodplant. The species does not establish colonies but has an open population structure.

Life Cycle



The Red Admiral is notable, along with the Painted Lady, for its long migration cycles. Each spring individuals migrate north to avoid summer drought conditions in southern Europe. This migration is timed so that individuals arrive at their northern breeding sites at a time when their larval food plant is growing rapidly. A reverse, southwards, migration occurs in late summer (Mikkola, 2003). Migrations make use of high altitude winds to cover long distances in a relatively short time and can cover the 3,000 km from northern Europe to the Mediterranean in around five weeks (Mikkola, 2003). There have been frequent reports of overwintering individuals, often seen on the wing during warm periods over the winter months. Pollard and Greatorex–Davies (1998) analysed survey data from 1976 to 1996 and found that the number of individuals seen in spring was not correlated with the numbers seen in the preceding autumn. It therefore appears that few overwintering individuals survive and have no discernible effect on the number of individuals seen during the succeeding summer. The Red Admiral's flight period extends across the whole of the year, individuals

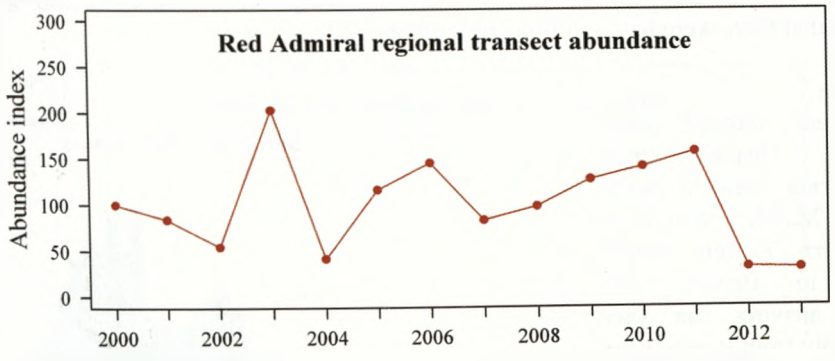
having been recorded on the wing in every month. The flight periods have several peaks, and show an increase in numbers through June, probably reflecting the arrival of migrants, and peaks in August and September with the emergence and migration of adults.

History

The Red Admiral has a long recorded history in the region, the earliest record being by J Wallis at Simonside in 1769. The species appears to have been a variable visitor to some parts of Northumberland and Robson (1899) reports that it "almost disappeared from the two counties" in the 1860s and did not increase in number for another 20 years. The ERIC database holds records from R Embleton who recorded them as "very numerous" at Embleton in 1865 and Wasserman who recorded them as "not uncommon" at Cullercoats in 1875. Calvert (1884) describes the species as "appearing in hundreds on the wing in one season, and perhaps not one to be seen for several succeeding years". The species appears to have been a regular visitor during the twentieth century with records from the majority of years. The historic records for the species make it clear that populations can fluctuate widely from year to year.

Present Status

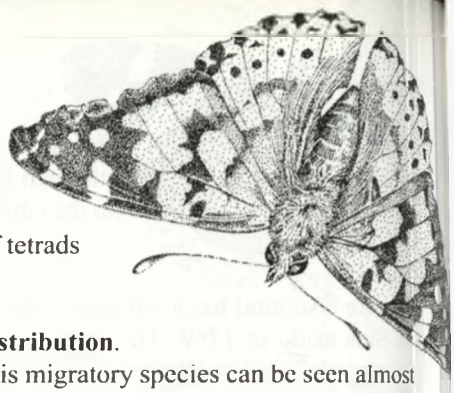
The assessment of the status of the Red Admiral is difficult due its migratory nature. The number of individuals arriving in Britain is strongly influenced by weather patterns over mainland Europe and it is possible that the UK Butterfly Monitoring Scheme under-records the numbers of emerging individuals as they are often seen on the wing after recording ends for the year in October. Given favourable weather these late individuals may successfully complete the migration to southern Europe. Figures from our records database show that the Red Admiral is more consistent in its appearance in the North East than our other long distance migrant the Painted Lady. There are reasonable numbers seen each year with 2003, 2006 and 2011 standing out as good years with above average sightings and 2002, 2012 and 2013 showing well below average figures. This pattern is reflected in the transect abundance indices.



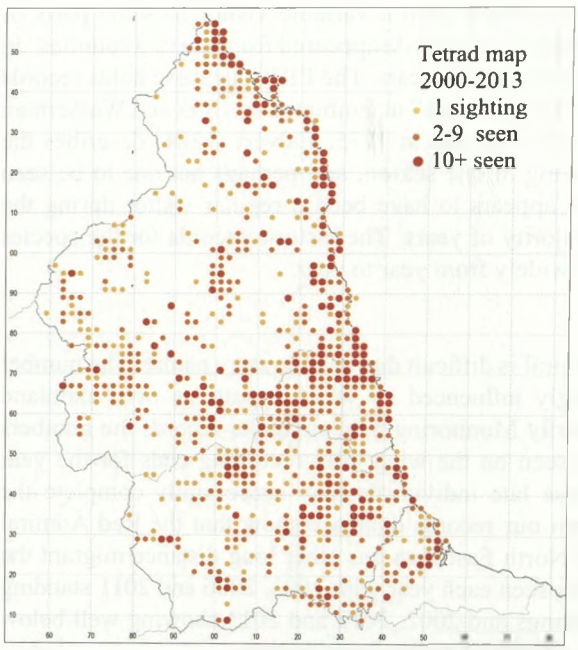
Future Outlook

Butterfly Conservation lists the species as of low conservation priority, its numbers having risen nationally by 25% since the 1970s. The species' use of widely available habitats and an almost ubiquitous larval foodplant means that it is unlikely that it faces an imminent threat.

Painted Lady *Vanessa cardui*



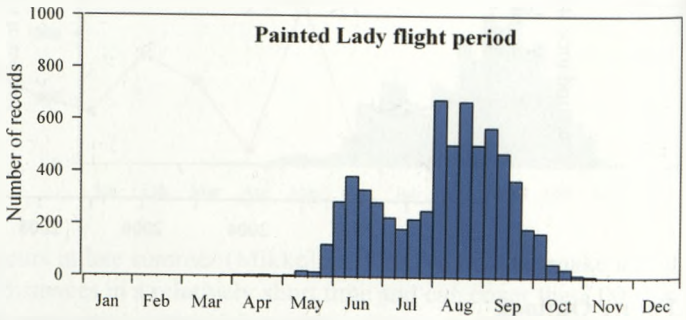
Butterfly Conservation Priority: Low
Regional Status: Common migrant, recorded in 44% of tetrads



Distribution.
This migratory species can be seen almost anywhere in the region. It is widely distributed over County Durham but seen less often on the moors of the far west of the county. In Northumberland there is a distinct concentration of sightings in the southeast and along the coast but with many butterflies also turning up in forested areas such as Kielder.

Habitat
The Painted Lady can be found in almost any flowery habitat. It does, however, favour dry open areas such as heaths and sand dunes. It is a regular garden visitor and can be seen in urban gardens and parks feeding on nectar. Its main caterpillar food plants are Creeping Thistle *Cirsium arvense* and Spear Thistle *Cirsium vulgare* although it has been recorded using a range of other plants (Thomas and Lewington, 2010). Its caterpillars can become abundant and in Cornwall in June 2009 in two "thistly" fields covering some seven and a half acres it was estimated that there were half a million caterpillars.

Life Cycle
Every year Painted Lady butterflies leave their overwintering area in North Africa in March and migrate to southern Europe before arriving in Britain. The numbers arriving can vary considerably from year to year. In 2009 high numbers were recorded after heavy winter rains in the Atlas Mountains of Morocco led to a good growth of thistles. This resulted in hundreds of thousands of butterflies emerging in February and flying into southern Europe.



In our region adults are usually first seen in April and numbers build up as other migrants arrive in May and June. These breed and give rise to the next generation which peaks in August.

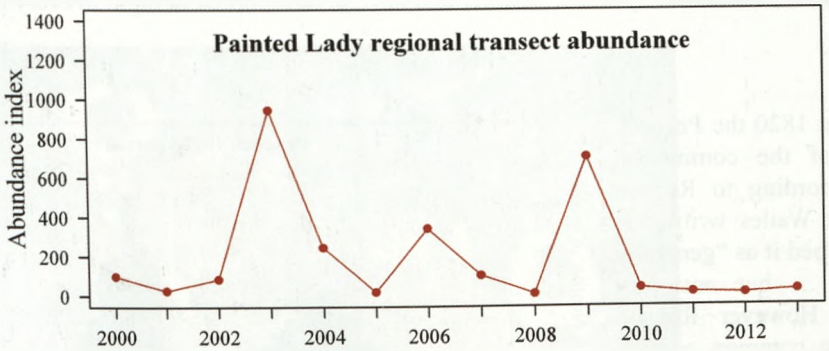
Second generation butterflies can sometimes be seen flying on sunny days in October. The 2009 migration has been well documented (Fox, 2009 and Anonymous, 2010) and research using a combination of monitoring by butterfly enthusiasts and high altitude insect monitoring radar during that year answered many of the remaining questions regarding the migration of this species. It showed that not all Painted Lady butterflies die in this country at the end of the summer as was previously thought, but many make a high altitude southerly migration. In the spring of 2009, it was estimated that approximately 11 million arrived in Britain and 26 million departed in the autumn.

History

Robson (1899) describes an "immense flight" of Painted Ladies in 1879 as extraordinary. He describes the same erratic pattern of migration as was seen in 2009/2010 as occurring in the nineteenth century. Bolam (1925) describes similar variations in numbers but suggests this species may hibernate; something which is unlikely in this region. Dunn and Parrack (1986) found no evidence that it ever survives our winter and describe the greatest concentrations of butterflies as being along the coast later in the summer. In describing a report of 25 freshly emerged in Cramlington on 31 July 1980 they suggest local breeding from an earlier arrival as an explanation. Examination of records from 1839 to the present day confirms that the erratic patterns of migration and huge variations in numbers recorded from year to year are typical of this species.

Present Status

The huge variations in numbers seen in northeast England are the result of factors far away from this country, happening more because of weather conditions in North Africa than here. In good years such as 1996, 2003 and 2009 this irruptive migrant was recorded widely in the North East with the largest totals coming from coastal locations. It is much less consistent in its appearance than our other migrant species, the Red Admiral. For example in the good year of 2009 7,597 individuals were recorded in the region whereas the following year only 163 were recorded, a drop of 97%.

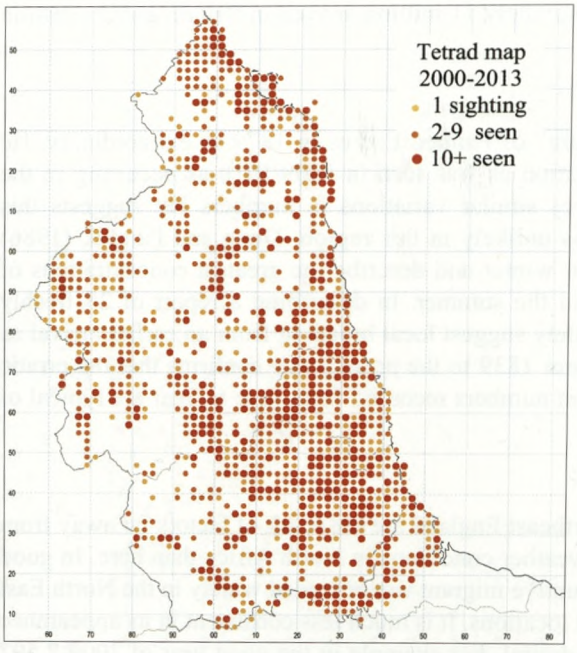


Future Outlook

The Painted Lady migrates annually between North Africa and Northern Europe and the numbers seen in this region will therefore continue to depend on this migration and on breeding conditions in its winter home. There is no reason to think that the pattern of good and bad years observed over the last 200 years will not continue in the future.

Peacock *Aglais io*

Butterfly Conservation Priority: Low
Regional Status: Common, recorded in 63% of tetrads



Distribution

This spectacularly patterned, strong flying butterfly is easily recognised and is recorded in most habitats in our region, and throughout the region except in the more exposed parts of the Cheviots and the North Pennines.

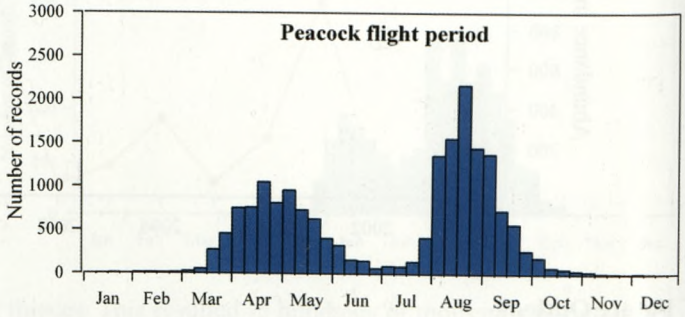
Habitat

The Peacock's nomadic character and strong flight mean it can be found throughout our region, preferring more sheltered habitats in woodland clearings and rides as well as grasslands, hedgerows, parks and gardens.

Life Cycle

There is one brood produced annually with the overwintered adults emerging from hibernation to breed. They are one of the first species seen in February or March with peak numbers reached in April. Eggs are generally laid in April and May on Common Nettle and these give rise to a new generation of adults that start to appear on the wing in July and peak in August. These butterflies feed for a few weeks before entering hibernation. Adults may be disturbed from hibernation by warm weather and have been recorded in flight in every month of the year.

History

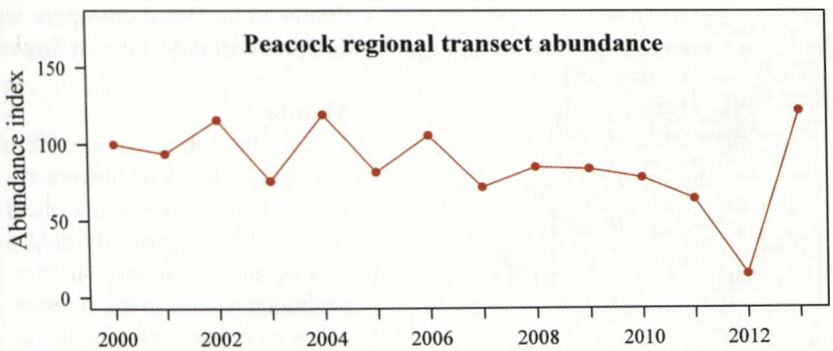


Up to about 1820 the Peacock was one of the commonest insects, according to Robson (1899), but Wailes writing in 1858 described it as "generally distributed … but not very common". However Robson says it was common enough in most places up to 1860 but that afterwards it became very rare as he failed to find larvae anywhere and thought it only an occasional visitor. In the early part of the twentieth century it apparently became even rarer with only six or seven individuals recorded in the *Vasculum* up to 1939. In 1939 F C Garrett recorded it in 12 locations in Northumberland and Durham between Barnard Castle and Bamburgh.

In the second half of the twentieth century the species saw a resurgence. Dunn and Parrack (1986) stated "In Northumberland it can now be described as widely but thinly distributed throughout the county" and "it is recorded from all parts of Durham".

Present Status

Nationally, the Peacock is expanding its range northwards and can now be found as far north as the Highlands and northeast of Scotland. In our region it has become one of our most abundant and widespread species and is recorded in new tetrads in most years. In common with many of our species the Peacock had a series of poor years from 2010 to 2012 reflecting the poor summer weather. The transect data since 2000 show a long-term decline but the index recorded in the warm summer of 2013 was the highest of the whole period suggesting that the decline has been driven to a large extent by poor summer weather and that when weather conditions are good the species is capable of responding strongly.



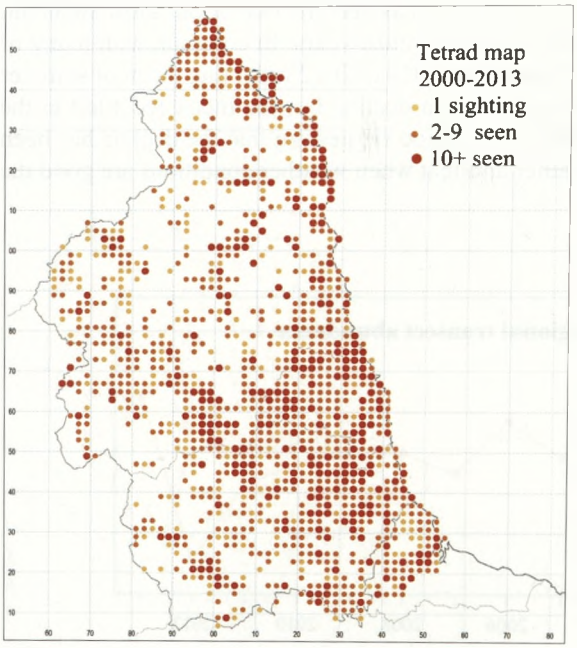
Future Outlook

As a widespread species which is not dependent on any threatened habitat or foodplants the Peacock is likely to remain abundant and subject to fluctuations in numbers only in relation to annual variations in weather conditions.

Peacock by D Stebbings

Small Tortoiseshell *Aglais urticae*

Butterfly Conservation Priority: Low but concern over recent decades
Regional Status: Common, recorded in 65% of tetrads



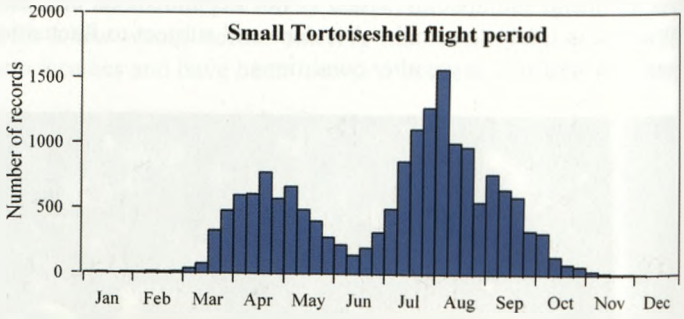
Distribution

The Small Tortoiseshell is one of the most widespread butterflies of the region. It is common throughout County Durham, southeast Northumberland and all along the Northumberland coast. Numbers drop only slightly as one goes westwards, and there are even records from the high moors to the west. Being a nomadic butterfly it is likely to be found anywhere where there are patches of nectar-rich flowers.

Habitat

It can be found in a wide variety of habitats, wherever flowers or the most usual larval foodplant, Common Nettle, occurs. This is typically field margins. It is a common garden visitor as an adult, particularly later in the summer when it is often seen feeding on Buddleia.

Life Cycle



There are typically two generations each year in the south of the UK but only a single generation in our region. The adult overwinters and is one of the first butterflies on the wing when it emerges from hibernation, usually peaking around April as the weather improves. The green-coloured eggs are laid in large overlapping batches on the underside of the leaves in nettle patches in full sun. The emerging larvae build a communal web and have four moults. The adult butterflies seen in summer then feed up before entering hibernation. In warmer years, it is possible to see the adult on the wing even in December and January.

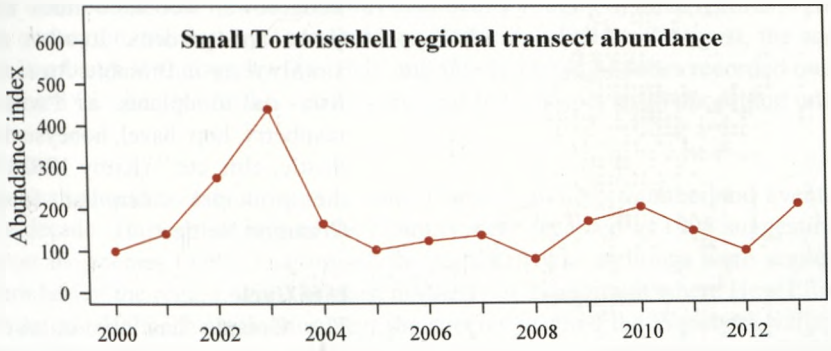
History

Since records began this species appears to have been widely distributed across every part of our region and, despite some suggestions to the contrary (Bolam, 1925), at even the highest altitudes in the region. Bolam also suggested that only one generation occurs in the region; this is not

always the case and Dunn and Parrack (1986) report that the number of generations is largely determined by the weather. In cooler, wetter years a single generation is likely, whilst a second generation is the norm in more clement years. The flight season graph does show a hint of a third peak in late August/early September which may support this suggestion. However it has also been suggested (D Wainwright, pers. comm.) that the appearance of a second brood may in fact be due simply to adults re-emerging from hibernation to do some autumn feeding and that there is a lack of second brood larval records to confirm bivoltinism in this region.

Present Status

Regional records received since 2000 remain fairly consistent with between 1,659 individuals being reported in 2000, the poorest recent year, and 4,757 in 2003, the best recent year. The number of reported tetrads has varied in these two years between a low of 220 in 2000 and a high of 459 in 2003. Transect abundance indices, shown below, have also remained relatively constant and a statistical analysis shows that the trend appears stable.

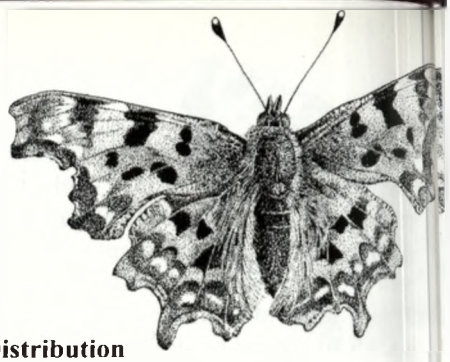


Future Outlook

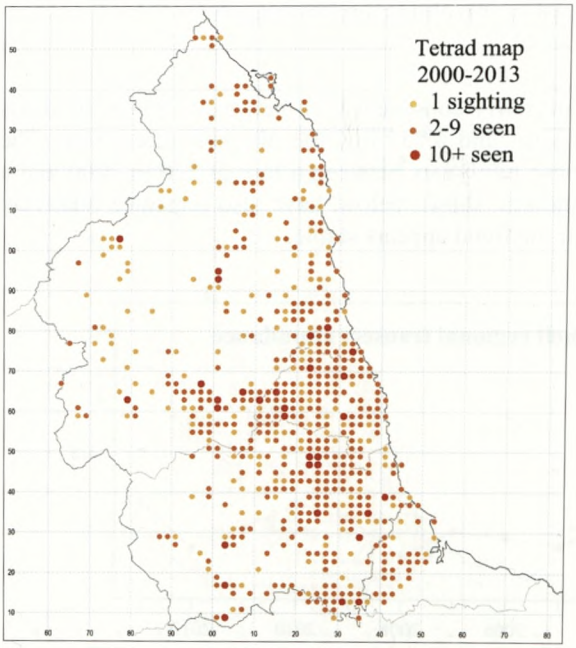
The species remains widespread and relatively abundant and is capable of adjusting the number of generations to reflect weather patterns; this undoubtedly accounts for much of its success as a species and as long as Common Nettle remains widespread and abundant the species' status is probably assured. In the south of England the parasitic fly *Sturmia bella* has had an adverse effect on Small Tortoiseshell numbers in recent years; if this parasite reaches this region it may have an impact on numbers here.

Small Tortoiseshells
by G Beckwith

Comma *Polygonia c-album*



Butterfly Conservation Priority: Low
Regional Status: Common, recorded in 32% of tetrads



Distribution

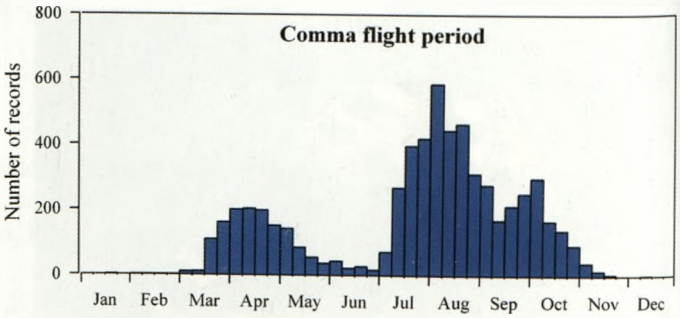
The Comma is generally widespread and common in suitable habitat in the eastern half of County Durham and in southeast Northumberland. It is more unevenly distributed away from these areas.

Habitat

The Comma is found in flower-rich hedgerows, woodland rides and edges, parks and gardens. It often nectars or simply rests on Bramble. An early account lists its foodplants as "wild currant, raspberry, hop, hazel, honeysuckle, nettle, thistle, elm, etc." (Kirby 1862). However the principal caterpillar foodplant is Common Nettle.

Life Cycle

The Comma has one or two broods. Adults typically emerge from hibernation in March and April. Pairing takes place after hibernation. A captive female laid over 400 eggs in irregular batches between 17 April and 1 June (Frohawk 1914). Some offspring develop quickly and hatch in June to form the second generation. These adults are often noticeably paler, more orange than brown on their upper side, and are known as the *hutchinsoni* form (named after Emma Sarah Hutchinson, a nineteenth-century lepidopterist). They in turn produce a brood of the darker form, which hatches in September. Meanwhile other offspring of the first brood develop more slowly, also hatching as the dark form in July to September. Both broods hibernate as adults to appear the following year. The Comma's survival is aided by its virtual invisibility among leaf litter when its wings are closed, betrayed only by the white comma or "c" of its common and scientific names.



History

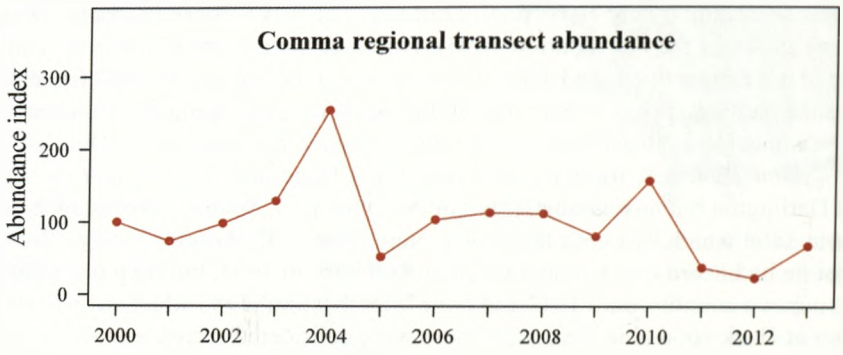
Though once common, the Comma declined nationwide in the nineteenth century. In 1769 the Rev. John Wallis in Simonburn, Northumberland, had reported it as "not unfrequent in vale-meadows, and gardens in August" (Wallis 1769). A century later it was reported that "previous

to 1865 it was so common near Hartlepool, Durham, that half a dozen might be swept off the flowers at one stroke of the net" (Barrett 1895). However, by the late nineteenth century it had become rare, if not extinct in this and many other regions of the country. In 1857 it had been noted that the Comma had "disappeared from many places where it was formerly abundant" (Stainton 1857), but Newman (1871) listed sites in our region where it had been seen: "Durham. Formerly at Gibside – *John Hancock*; formerly at Castle Eden Dene and Shull – *William Backhouse*; formerly at Darlington but now almost, if not quite, extinct – *J. Sang*) ... Northumberland. I saw a specimen in 1868 which had been taken near Newcastle – *W. Maling*". George Bolam (1925) reported that he had heard of a Comma taken at Rothbury in 1904, but no more sightings were recorded in our two counties until 1942 and none after that until 1985 when one was recorded by B N Rossiter at Hackwood near Hexham. These were considered strays, and Dunn and Parrack (1986) did not consider the species to be recolonising the region, although they noted that it was undergoing some expansion of its range in the Midlands at the time and held out the hope that it might eventually return to the North East.

In 1991 the Comma was still no further north than Scarborough but three records were reported in 1992 in our region, the first by Tom Dunn on Waldridge Fell on 8 August, the second on 1 October at Bamburgh Wyndings by D G Bell, and finally David M Jones recorded one in Castle Eden Dene on 8 October. No further records are held for this species in our region until 1995.

Present Status

The recolonisation northwards through County Durham and Northumberland eventually took less than a decade. Thirteen records of the Comma were received in 1995 suggesting that this was the year the species finally recolonised the region. These sightings were scattered across the southern half of the region, with the most northerly at Tynemouth where Hew Ellis recorded one on 10 August 1995. The following year the species reached the Wansbeck valley in VC67 and a total of 60 records were received. Numbers recorded increased year by year thereafter and by 1999 Harry Eales found several in ones and twos in the Kielder/Elsdon/Otterburn areas of Northumberland. By 2004 the species had reached East Ord near Berwick-upon-Tweed where it was recorded by Malcolm Hutcheson. By this stage the species had been recorded in 498 tetrads within the region (26%) and whilst the centre of gravity of the distribution was to the south, the spread of records extended well into remoter, less heavily prospected western and northern parts. The Comma had good years between 2004 and 2007 with, for example, 2006 generating 684 records of 1,386 butterflies. Since then numbers have slipped downwards each year until 2012 when there were only 174 records of 222 individual butterflies, the worst year since 1998. The summers during this period were characterised by low temperatures and a lack of sunshine and so it is likely that this setback was simply the result of poor weather. The good summer of 2013 appeared to have boosted numbers with 439 records of 1,267 individuals. Notwithstanding these fluctuations, the Comma may now once again be described locally as "not infrequent". An analysis of the transect counts, shown below, indicates a decline on these monitored sites of 56% between 2000 and 2013.



Future Outlook

There are no obvious threats to the Comma but its population has fluctuated in the past. Like many butterflies it is affected by the weather and so any climate change may determine future abundance in our region.

Comma by K Walton

Small Copper (*caeruleopunctata* form)
by K Walton

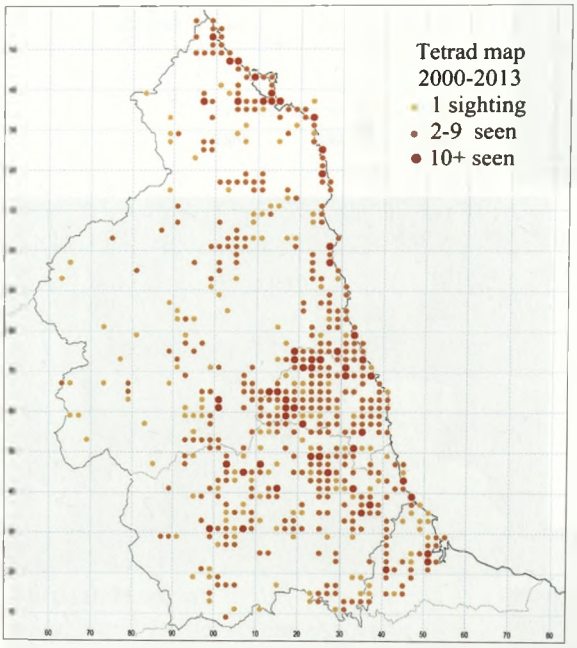
Purple Hairstreak
by J Asher/Butterfly COnservation

Green Hairstreak by G Beckwith

White-letter Hairstreak by M Eccles

Small Copper *Lycaena phlaeas*

Butterfly Conservation Priority: Low
Regional Status: Common, recorded in 31% of tetrads



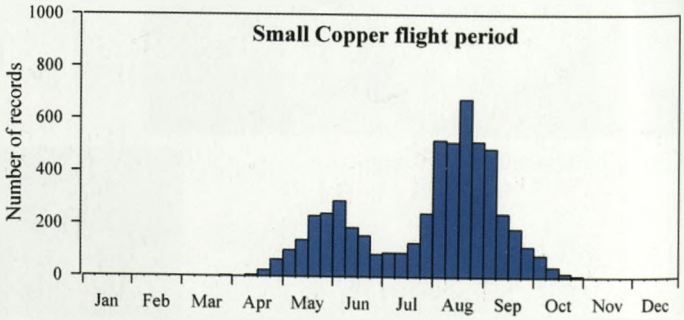
Distribution

This butterfly's regional distribution shows a distinct bias towards the drier, milder south and east of the region with coastal locations providing suitable conditions and habitats. To the north and west of the region it is more thinly distributed where only river valleys offer a range of more appropriate sites. Despite its diminutive size it is a strong flier and can be recorded some distance from its breeding localities which may explain regular garden sightings in urban areas.

Habitat

The Small Copper is found in a wide variety of habitats, favouring those which provide warmer, drier and more sheltered conditions. These include unimproved grassland, moorland margins, woodland clearings, bare riverbanks, coastal dunes, roadside verges, waste ground and brownfield sites, as well as disused railway lines and collieries. Although a widespread species, colonies are dependent upon the presence of its caterpillar foodplants, Sheep's Sorrel *Rumex acetosella* and Common Sorrel *Rumex acetosa*.

Life Cycle



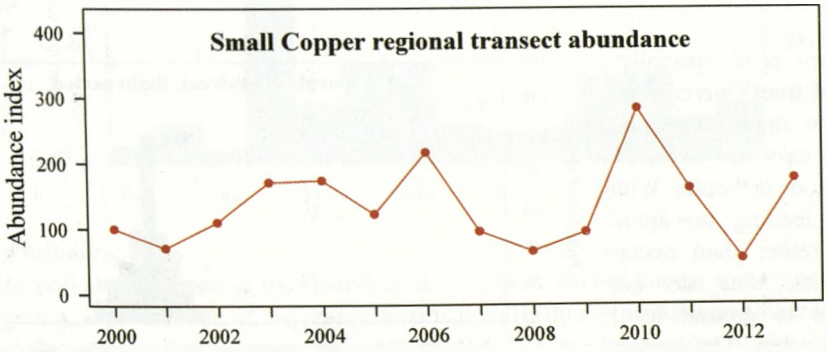
There are normally two generations a year, but occasionally three have been noted in particularly warm summers. The first generation is usually seen in the first week of May although the earliest sighting has been in March. This generation is usually over by the end of June before the second, more numerous generation is on the wing by late July or early August. The butterfly spends much of its time basking with open wings on favoured perches. Males defend their territories vigorously and will intercept any other butterfly or indeed insect which approaches too closely. It is reported regularly throughout September with the latest ever sighting being in late October – this almost certainly the result of a third generation. The species overwinters as larvae produced by the second generation.

History

The species is first mentioned by Calvert (1884) who simply records it as "common". Later Robson (1899) describes it as "generally distributed and occurs in all suitable localities", noting also that the August and September broods were more numerous and in some years "very plentiful". The *Vasculum* contains several references to the species. J W Heslop- Harrison (1920) noted the variety *caerulopunctata,* having a subterminal row of blue spots on the hind wing, as being "common in the Team Valley". Later he notes (1928) that this variety occurred in greater numbers in the later broods. In a later article (1931) entitled "Rabbits and the Small Copper Butterfly" he argued that "the butterfly's sorrel foodplant thrives if rabbits keep the surrounding vegetation in check". Bolam (1925) also notes that it was "Somewhat local, but widely distributed all over the district". He also commented upon the fact that the species varied considerably both in size and colour. Finally, Dunn and Parrack (1986) described the species as being generally distributed over the whole of the region and in particular along the coast and main river valleys. The absence of records from some localities they suggested was due more to a lack of recorders than anything else, as the species was well known for its ability to quickly colonise even quite small open spaces, for example where soil slips had occurred along small rivers and streams and where there was no shortage of the foodplant.

Present Status

The status of the Small Copper has not changed much in recent years and small variations in records seem to be short term fluctuations relating to good or bad summers. Fewer records in some years seem to be compensated by larger counts in other years showing the species' ability to colonise suitable new areas and recover from poor breeding seasons. Transect counts tell the same story with smaller numbers being reported in 2001 and 2008 followed by larger counts in 2006 and 2010. This reflects the national picture where the abundance of populations can fluctuate annually in response to climatic variations, although the intensification of farming in lowland areas may also be having an impact on overall numbers. However the transformation of old industrial sites into managed open spaces such as country parks can provide ideal conditions for this species.

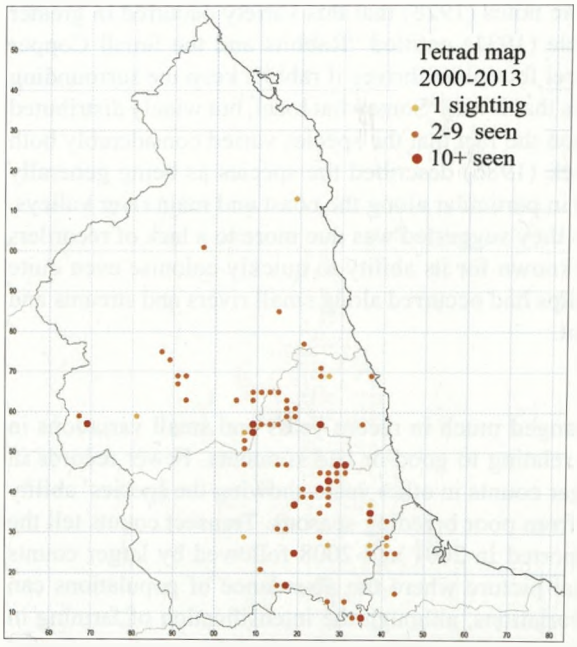


Future Outlook

The Small Copper is not considered as a species of conservation concern, either nationally or regionally, and so its long term prospects for population numbers and distribution do not give any cause for alarm. However its future is linked to the general health of the countryside and to the preservation of suitable natural and semi-natural habitats.

Purple Hairstreak *Favonius quercus*

Butterfly Conservation Priority: Low
Regional Status: Rare, recorded in 4% of tetrads

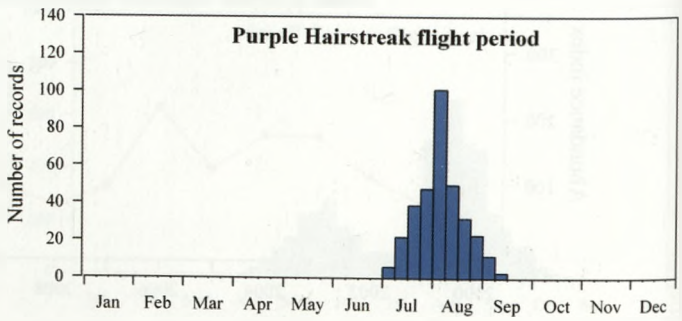


Distribution

The Purple Hairstreak is widespread and common in southern Britain but becomes scarcer northwards, being rare in County Durham and southern Northumberland. There is then a gap of around 130 km before it is found again in the central belt of Scotland and there are records as far west as Ardnamurchan near Fort William. It is present in the right habitat in County Durham and the Tyne valley but apparently absent from further north in Northumberland. However it can be easy to overlook and with the general scarcity of observers in central and northern parts of the county this absence may be more apparent than real. Our most northerly record is an individual in the Alnwick Garden on 18 August 2011 which had descended to near ground level. There are occasional records in the Borders region in Scotland, the most recent being two on the Bowhill Estate, Selkirk in the 1950s, with none since (Mercer *et al.* 2009). Further searching may reveal that in fact it is generally distributed north of the Tyne valley.

Habitat

This species is a specialist, living on oak trees *Quercus* spp, often in the upper branches, making it easy to overlook and detection difficult. With the adults feeding on aphid honeydew rather than nectar from flowers, they do not come down to ground level particularly often. The easiest way to observe them is to find an observation point where the tops of the oak trees are level with, or below the observer.



Life cycle

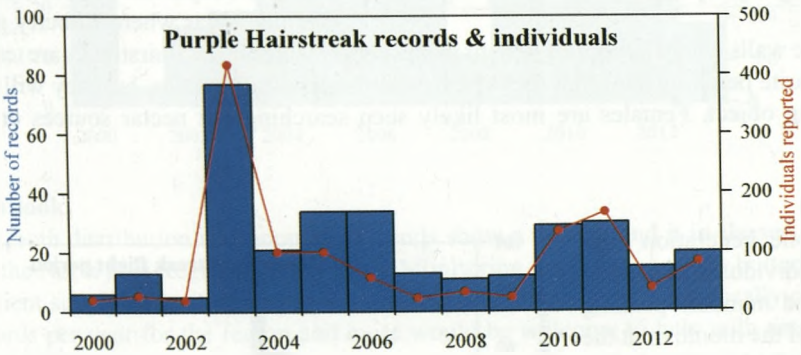
There is one generation per year and the flight season is from the beginning of July to the end of August. Eggs are laid around the twigs and flowers of oak and the larvae remain unhatched within the egg, overwinter and only emerge the following spring.

History

Robson (1899) quotes a small number of records for the nineteenth century, one from Wailes (1858) who stated that it was pretty abundant towards the middle of August near Gibside, but not knowing of any other locality. Robson's other records for the immediate area were of several in 1872 near Dunston seen by Mr Hedworth and one captured by John Hancock at the end of Derwent Bridge, Gibside. In Northumberland, Robson (1899) reported it at Parkend on the North Tyne in 1896 and at Monk Wood, Whitfield in west Allendale in 1915. There then followed a smattering of records through the twentieth century, from J W Heslop-Harrison at Birtley and Ravensworth in 1916 and 1917 and by F C Garrett at Gibside in 1933. Other records came from Devil's Water in 1933 and from T C Dunn near Rowlands Gill in 1956 and by H T Eales a few years later. J Durkin found two nearby at Low Friarside in 1985. Dunn and Parrack (1986) considered this to be the only surviving colony in the two counties and the species' existence to be "so tenuous as to be bordering on extinction".

Present Status

Enthusiastic searching in the late 1990s by a number of observers paid dividends with I J Waller finding one in the Deerness valley in 1998 and H T Eales near Hexham in 1999. S Kirtley and M Hunter found it near Darlington and D Wainwright near Finchdale Abbey in 2000. There then followed a steady increase in the number of sites at which this difficult species was found. It now seems that it is present in suitable habitat throughout County Durham and in southern Northumberland, particularly along the Tyne valley. Recent records indicate a presence at the Alnwick Garden and at Holystone in the upper Coquet valley. Since the butterfly was searched for without success by a number of recorders before the 1998 discovery, it seems likely that the present distribution reflects a recent and exciting expansion in the region. Further searching may reveal whether it is continuing to expand northwards.

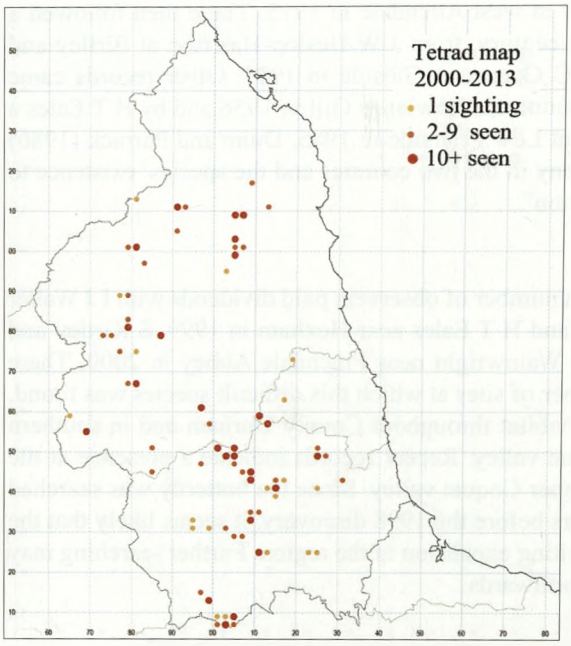


Future Outlook

Given the prevalence of oak in the British landscape there do not appear to be particular threats to the species. If the climate of the region warms then further expansion northwards may occur, provided that warmer spring temperatures do not lead to any decoupling of the timing of bud-break in oak with the emergence of caterpillars.

Green Hairstreak *Callophrys rubi*

Butterfly Conservation Priority: Medium
Regional Status: Rare, recorded in 4% of tetrads



Distribution

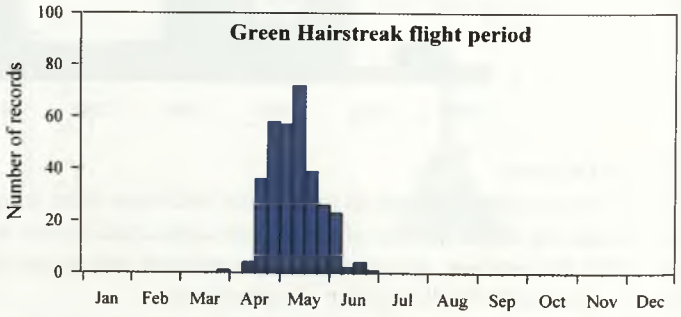
This butterfly is nationally and regionally the most widespread of the hairstreaks and is unmistakable because of the green underside to the wings. Green Hairstreaks are likely to have been overlooked in the past and probably remain under-recorded especially in the more remote areas.

Habitat

The butterfly can be found in a wide variety of habitats in Britain where there is open grassland or moorland with patches of scrub. In this region it is found mostly in discrete colonies at higher altitudes where Bilberry *Vaccinium myrtillus* seems to be the preferred foodplant. Other possible foodplants include Common Birds-foot Trefoil, Gorse *Ulex europaeus* and Broom *Cytisus scoparius*. Good places to look include areas where Bilberry grows close to dry stone walls where butterflies benefit from shelter. Male Green Hairstreaks are territorial and have favourite perching sites that they use to wait for passing females, but they will investigate any passing object. Females are most likely seen searching out nectar sources or when egg laying.

Life Cycle

There is one generation with the first individuals appearing in April and numbers peaking at the end of the month or at the beginning of May. The larvae are green in colour with yellow markings and woodlouse shaped. The Green Hairstreak overwinters as a pupa often covered by soil and possibly in association with ants (Thomas and Lewington 2010).

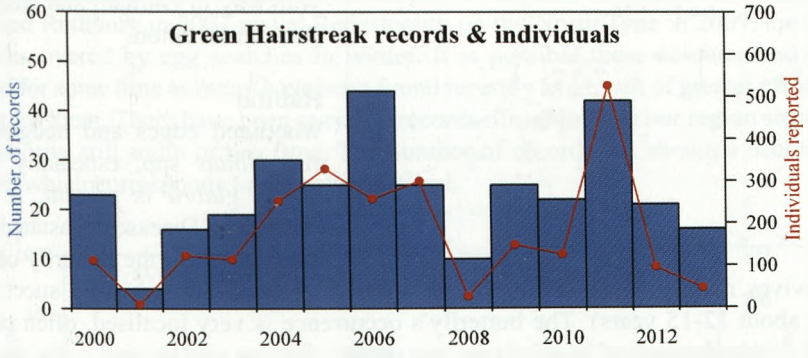


History

Although known to occur throughout the country by collectors in the nineteenth century (Coleman 1860) it was only added to the list of Durham insects in 1924 by J W Heslop-Harrison and J R Johnson. Dunn and Parrack (1986) suggest that Harrison and Johnson must have been aware of the species' presence at least one year earlier since they quoted breeding data. The site was Waldridge Fell and two years later Harrison and Johnson published the occurrence of the species in Dipton Woods. In 1936 they disclosed that the Dipton Woods colony had in fact been discovered by J French at the end of the previous century. Dipton Woods remains an important site today and there are recent records for Waldridge Fell.

Present Status

Prior to the 1970s this species was only known from four sites (Dunn and Parrack 1986) but more recently persistent searching has revealed more colonies in 73 tetrads in Durham and Northumberland. 2011 was an exceptional year for the species with 526 individuals recorded from 17 tetrads. 221 individuals (42% of the total numbers) were from Dipton Woods showing that this well established colony continues to thrive. The exceptionally dull and cool spring of 2012 saw numbers recorded drop dramatically to 93 individuals and still further to 47 individuals in the cold, late spring of 2013.



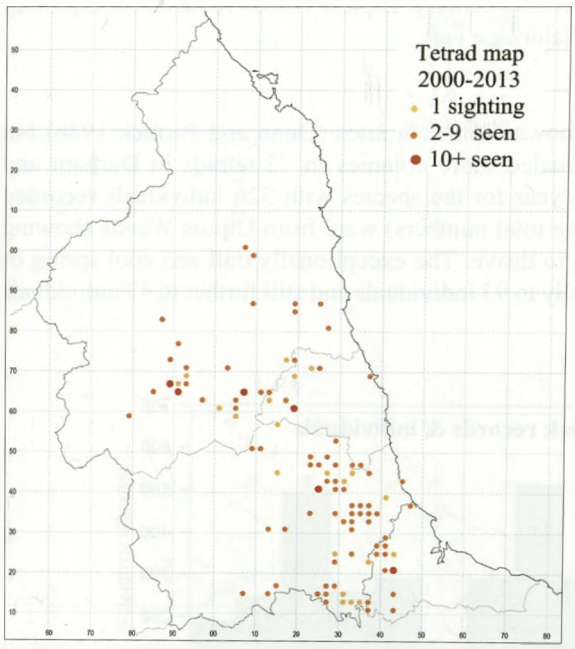
Future Outlook

Nationally, both distribution and population trends show a decline and it is classed as medium priority in the North East Regional Action Plan. Monitoring the fortunes of any butterfly depends on a sufficient supply of records and as the graph above shows there are typically only around 20-30 records per year for the region and more would be welcome to help with assessing both numbers and distribution.

The Green Hairstreak is a rare species, forming distinct colonies which can be as small as a few dozen individuals. As it is usually to be found in moorland areas of the North East region its future status will depend on the continued management of these areas to regenerate or maintain the heather moorland. Hotter drier periods resulting from climate change increases the risk of wild fire on heather moorland and with it the destruction of the butterflies' habitat.

White-letter Hairstreak *Satyrium w-album*

Butterfly Conservation Priority: High
NERC Status: Section 41 species of principal importance
Regional Status: Local, recorded in 5% of tetrads



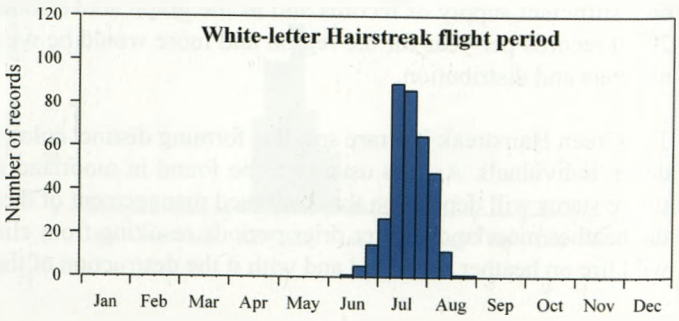
Distribution

Our region encompasses the northern limit of the White-letter Hairstreak's range in Britain and sightings are weighted towards the south of Northumberland and Durham. It was spotted at Bedlington and Morpeth in 2006 and ova were found near Rothbury in 2007, but so far no sightings have been made any further north. There have been a significant number of reports from the Tyne valley between Gateshead and Wylam, from the Castle Eden Walkway in Durham and from Hardwick Dene in Stockton.

Habitat

Woodland edges and hedgerows where elm *Ulmus* spp, especially Wych Elm *Ulmus glabra* is present. In the 1970s Dutch Elm Disease devastated the mature trees on which the butterfly once thrived, and it survives mainly on relatively young unaffected trees (elm typically succumbs to the disease at about 12-15 years). The butterfly's occurrence is very localised, often centred on a single tree. It spends much of its life in the tree canopy, but can also be seen in the early morning or late afternoon on the flowers of such plants as Creeping Thistle *Cirsium arvense*, Bramble and Ragwort *Senecio* spp., often after rain.

Life Cycle



There is one brood each year. Eggs laid typically in mid-July to early August do not hatch until the following April. Larvae feed on the flower buds, flowers and then leaf buds and young leaves of Wych Elm, occasionally English Elm *Ulmus procera* or Small-leaved Elm *Ulmus minor*. In 1871 eggs were stated to have been found on Red Currant *Ribes rubrum* and Hop *Humulus lupulus* as well as elm (Newman 1871). The larvae pupate from late May and emerge as butterflies from mid-June. Numbers peak in

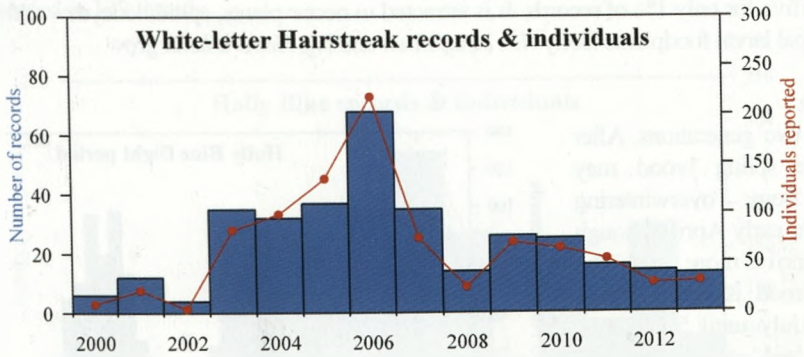
mid-July and the flight season may last until mid-August. The butterfly feeds on honeydew deposited on leaves by aphids high in the tree tops, where it appears to spend most of its life with occasional visits to flowers to top up with nectar. In the dry summer of 2006 it was seen nectaring longer and more often than usual, presumably as aphid numbers were low.

History

The White-letter Hairstreak is not mentioned in the works of either Robson (1899) or Bolam (1925). Although reasonably common in Yorkshire it became less common there after 1908 but recovered in the 1960s and 1970s and spread into areas where it had not previously been recorded (Frost 2005). It is possible this expansion in Yorkshire pushed it northwards into our region, where it is thought to have arrived in the late twentieth century. The first reported sighting north of the Tees was in 1982 near Thorpe Thewles and was followed by another near Spennymoor in 1984 (Dunn and Parrack 1986). As a canopy feeder the butterfly is difficult to observe and has probably been under-reported since it seldom descends from the tree tops, meaning that binoculars are normally required to see it.

Present Status

The White-letter Hairstreak is now well established in the south and east of County Durham. The first record from Northumberland was from Wylam in 1996. Since then many more colonies have been discovered along the Tyne valley towards Hexham and further north. It was recorded at Morpeth and Rothbury in 2007 and at Redesmouth on the North Tyne in 2009, the latter two sites being discovered by egg searches in winter. It is possible these colonies had remained undiscovered for some time as many have been found recently as a result of greater effort focused on searching for them. There have been over 500 records of sightings in our region since the year 2000, the majority still south of the Tyne. The number of records has shown a decline since a peak in 2006, which corresponds to the national trend.

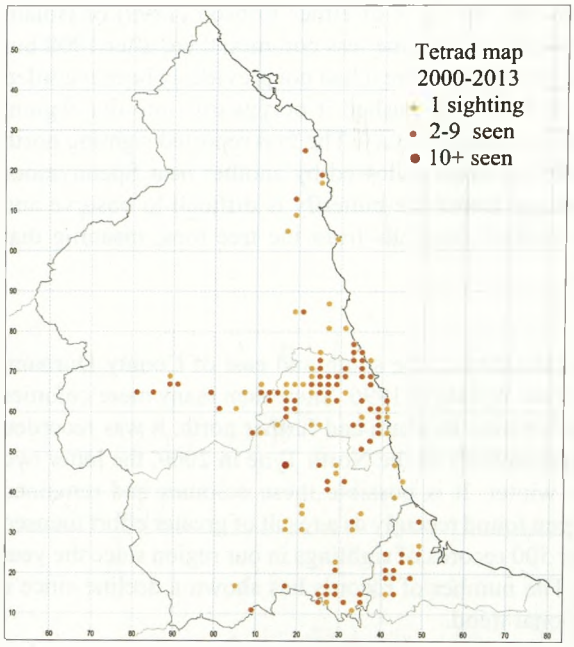


Future Outlook

In 1986 this butterfly was thought to be expanding its range northwards, possibly due to the slower spread of Dutch Elm Disease in the north; climate change may also be playing a significant part in extending suitable habitat allowing it further into Northumberland. Efforts to revive the elm stock with disease-resistant strains should also assist colonisation. The White-letter Hairstreak is a much under-recorded butterfly and there are probably more colonies around the region to discover.

Holly Blue *Celastrina argiolus*

Butterfly Conservation Priority: Low
Regional Status: Local, recorded in 7% of tetrads



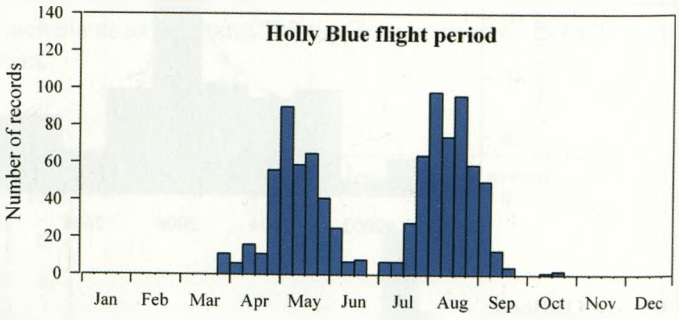
Distribution

The Holly Blue is uncommon in Northumberland and Durham. Records suggest it is most likely to be seen in Tyne and Wear and further south, especially in the Darlington and Stockton-on-Tees districts. It becomes less frequent in the north and west with very few records north of the River Coquet and the most westerly regional record being near Haydon Bridge.

Habitat

The Holly Blue wanders widely without forming true colonies and individuals may be encountered in woods, gardens, parks, churchyards, cemeteries and along the hedgerows of bridleways, dismantled railways and waggonways, and even suburban roads. The majority (80%) of records relate to a single individual, with two accounting for 14%, three to four for 5% and more than five for only 1% of records. It is attracted to nectar plants, aphid honeydew and wherever the two principal larval foodplants Holly *Ilex aquifolium* and Ivy *Hedera helix* grow.

Life Cycle



There are two generations. After winter the spring brood may emerge from overwintering pupae from early April although mid-late April is more usual. The summer brood is on the wing from mid-July until September. Ova are laid at the base of unopened flower buds of various shrubs, but the commonest host plants are Holly in the spring and Ivy in the summer; the Holly Blue is the only British butterfly to use a different foodplant for each brood. Larvae from the spring brood pupate giving rise to the summer brood; pupae from the summer brood overwinter. It often flies and rests high in bushes and trees.

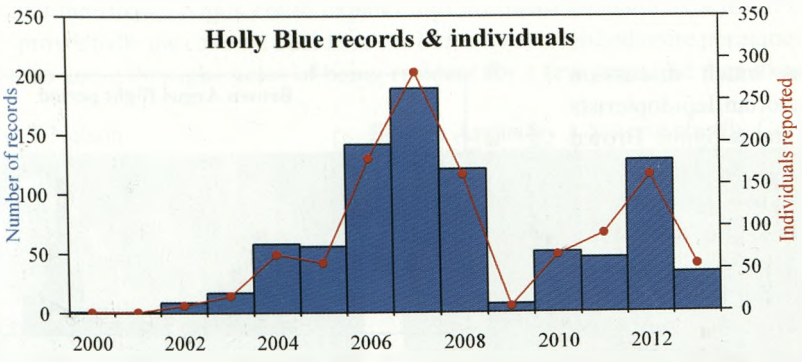
History

Robson (1899) refers to earlier nineteenth century records and states it had been "tolerably common fifty years ago in the county of Durham." The species was then known as the Lilac Blue or Azure Blue. There is also a record of two females at Chopwell, seemingly in 1871 (Bold 1872). Subsequently it became infrequent and disappeared from its former Durham haunts (Bolam 1925). Dunn and Parrack (1986) describe its "rediscovery" by J W Heslop-Harrison in Lambton Park, Chester-le-Street in 1948 and in the same year it was seen in a Sunderland garden. In 1950 it appeared again in Lambton Park and was also noted by J P Robson at Barnard Castle. There were no further records and Dunn and Parrack (1986) considered that it was again extinct.

Forty years elapsed before it was again recorded; in August 1990 H A Ellis sighted it in two gardens in Tynemouth (Ellis 1990). This was the first record for Northumberland. The following spring one was found by T C Dunn in Hermitage Woods, Chester-le-Street and additional adults were recorded in Tynemouth and further north in Northumberland by S Sexton and by B Dodd in her garden at Embleton. Also in 1991 ova and larvae were recorded on Ivy in North Shields. 1992 proved to be an unprecedented year with at least 19 butterflies reported in 15 tetrads by 12 observers and ova and larvae found on Ivy at seven different locations (Ellis 1993). Collectively the records indicated that the Holly Blue was breeding and becoming more widespread in the region.

Present Status

Following the upsurge in 1992, disappointingly few or none were recorded in each of the years 1993 to 1997. There was a little improvement in 1998 and 1999, followed by another fall to one to three in each of the years 2000 to 2002. From 2003 onwards annual sightings have varied with a notable peak in 2007 (284 in 58 tetrads) and a marked but temporary fall in 2009 (seven in seven tetrads). Such fluctuations are recognised nationwide and are probably due to changing weather conditions and parasitisation of the larvae by the Ichneumon Wasp *Listrodomus nycthemerus*. In spite of these fluctuations overall the Holly Blue has become more widespread throughout Northumberland and Durham since the millennium and has been recorded in 133 tetrads.

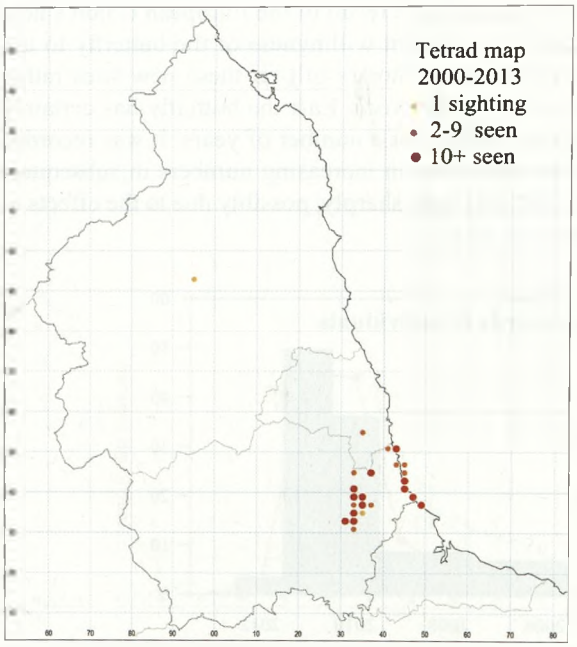


Future Outlook

Given that the larval foodplants Holly and Ivy are widespread in gardens, parks and the general countryside it seems likely that the future prospects for the Holly Blue depend on climate amelioration in the North East and the cycle of larval parasitism, the latter leading to fluctuations in both range and abundance.

Northern Brown Argus *Aricia artaxerxes*

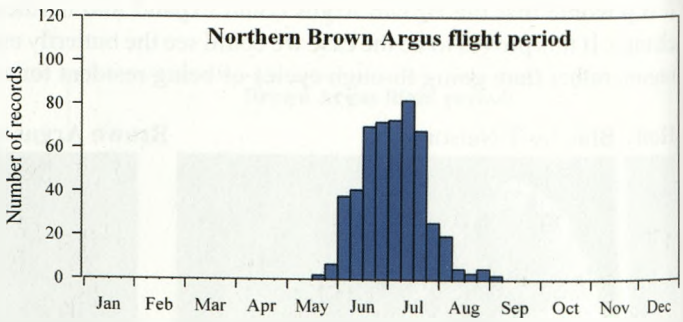
Butterfly Conservation Priority: High
NERC Status: Section 41 species of principal importance
Regional Status: Rare, recorded in 1% of tetrads



Distribution

In our region this small butterfly is almost entirely restricted to sites overlying the Magnesian Limestone plateau. The species is strongly colonial and is rarely seen away from its preferred calcareous grassland habitat. Occasional modern-day Northumberland records are believed to derive from undocumented releases, although the species was formerly known from a number of sites in this county. In VC66 there are two distinct colony networks: one inland, extending from Bishop Middleham Quarry and Thrislington Plantation in the south to Hastings Hill in the north, and one coastal, extending northwards from Hart Warren to Ryhope Dene.

Habitat



The species is almost entirely restricted to Magnesian Limestone grassland in which the larval foodplant Common Rock-rose grows abundantly. The Northern Brown Argus is known to be intolerant of heavy grazing, particularly if this occurs during the adult and egg phases. Conversely, ungrazed sites are often susceptible to scrub encroachment and development of tall swards which may outcompete the larval foodplant.

Life Cycle

There is one generation. At inland sites, the first butterflies (usually males) are normally seen in early June (occasionally late May in advanced years) and the flight period sometimes extends into early August. In recent years, there have been several late-August records submitted: these may have been Brown Argus, a double-brooded species which has extended its range northwards. The flight period at coastal sites is usually some three weeks later. Eggs are laid on the upper sides of

leaves, are highly visible, and normally hatch within 10-14 days. Larvae feed on the undersides of leaves and enter diapause in either the second or third instar. Feeding recommences in spring and pupation normally occurs in May.

History

This species has been the subject of more research than any other in our region. Initial interest focused upon the butterfly's taxonomy and can be summarised as follows: two *Aricia* species, *agestis* (the Brown Argus) and *artaxerxes* (the Northern Brown Argus), were believed to be present in Britain, with all populations in northeast England believed to be *artaxerxes*. Their separation at species level was proposed after a series of breeding experiments suggested that the two were incapable of interbreeding despite an almost complete overlap of morphological characteristics (Jarvis 1976; Høegh-Guldberg 1979). Several sources, for example Heath *et al.* (1984), used voltinism as a means of demarking each species, with univoltine populations, such as those in County Durham, determined to be Northern Brown Argus and bivoltine ones to be Brown Argus.

The Northern Brown Argus *A. artaxerxes* was believed to be represented by two nominate subspecies: *A. artaxerxes artaxerxes* and *A. artaxerxes salmacis*, the former being characterised by a white discoidal spot on each upper forewing (although a small proportion of *salmacis* also displayed this trait). However when Aagaard *et al.* (2002) investigated the phylogenetic relationships between *Aricia* species and subspecies using mitochondrial DNA and nuclear markers, they found that previous species and subspecies assignments were only partially correct. Their findings indicated that the Brown Argus and Northern Brown Argus were indeed distinct species but that the subspecies division within populations of Northern Brown Argus was not supported. Interestingly, their analysis also determined that at least three of the populations they examined (in the Peak District and in Yorkshire) possessed genetic characteristics that indicated past inter-breeding. Given the recent northwards expansion of the Brown Argus it seems probable that similar interbreeding between the two species will occur here (as indeed it may have already: in recent years relatively fresh individuals have been reported from our sites in mid-late August, perhaps indicative of a second brood).

Present Status

Counts of Northern Brown Argus at principal sites, such as Bishop Middleham and Thrislington, appear to indicate relative stability. However since 1995 at least four smaller inland colonies have been lost, mainly through lack of management, although one was subsequently recolonised, as was a further site at which the butterfly had not been seen since 1982. Populations at coastal sites, although small, appear to be stable.

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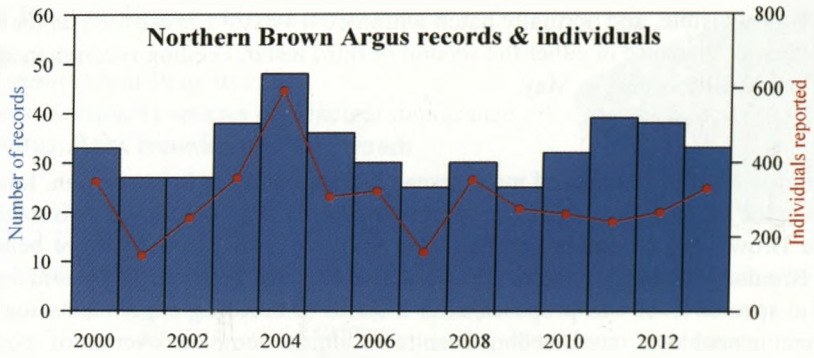


Future Outlook

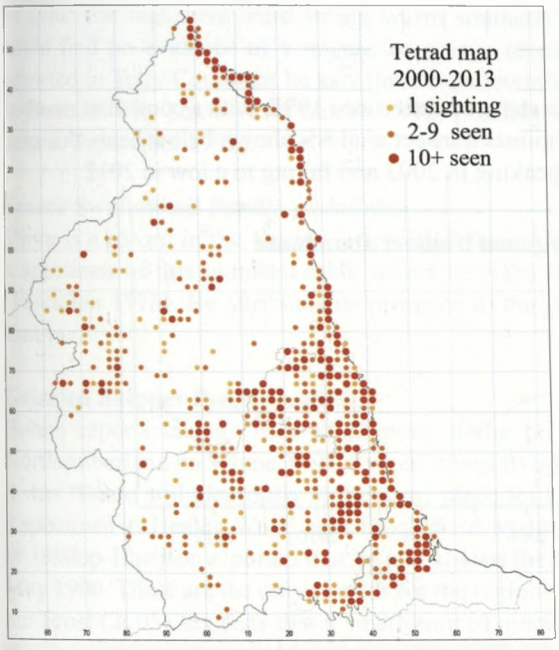
The Northern Brown Argus is listed as a Priority Species in the *UK Biodiversity Action Plan*. It is afforded partial protection (sale only) under the Wildlife and Countryside Act (1981). Any significant expansion of the Northern Brown Argus in Durham is unlikely, as there are few suitable sites to which it could spread. Much more probable is that the butterfly will be lost from further inland sites, particularly those that are small and unmanaged. Extensive research by Ellis (1995) identified the habitat needs of the species and the grazing regimes that best deliver them; however small site size and other constraints mean that grazing of most of our sites will never be feasible, rendering a significant proportion vulnerable to vegetation succession.

The prognosis for the species on the coastal sites is more positive. Here it seems that periodic erosion promotes regeneration of Rock-rose. Furthermore, the coastal colonies are, by and large, less isolated than the inland ones, so that any colony extinctions are less likely to be permanent.

Northern Brown Argus by R Mawson

Common Blue *Polyommatus icarus*

Butterfly Conservation Priority: Low
Regional Status: Common, recorded in 31% of tetrads



Distribution

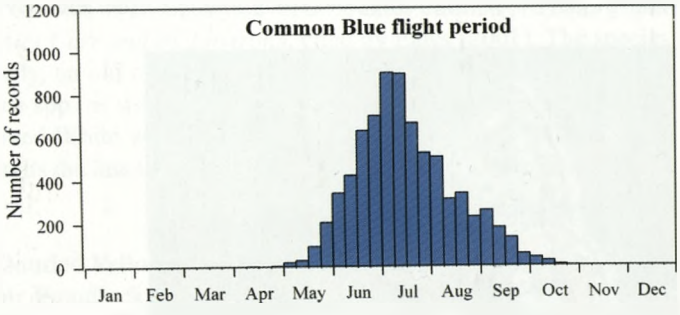
Both common and widespread, the species can be found in rural, semi-rural and urban locations. It is most abundant on the east coast and in the central and southern parts of the region. The sparser records in the north and west of the region may be due to it living at much lower densities in this more exposed upland habitat rather than to a lower number of recorders.

Habitat

Sunny sheltered spots on coastal dunes, roadside verges, parkland, and the region's network of disused railway lines are all likely to hold the Common Blue. The Magnesian Limestone grasslands of County Durham provide excellent habitat for it and brownfield sites are also extremely important and can hold high numbers in good years. The caterpillar foodplant is mainly Common Bird's-foot-trefoil, but other trefoils and vetches are sometimes used.

Life Cycle

The species spends the winter in its larval stage. The first adult insects appear on the wing from late April peaking in mid-July. It is either single brooded each year in our region or double brooded on brownfield sites and in quarries, giving an extended flight season with overlapping generations, and lasting until the middle of October.



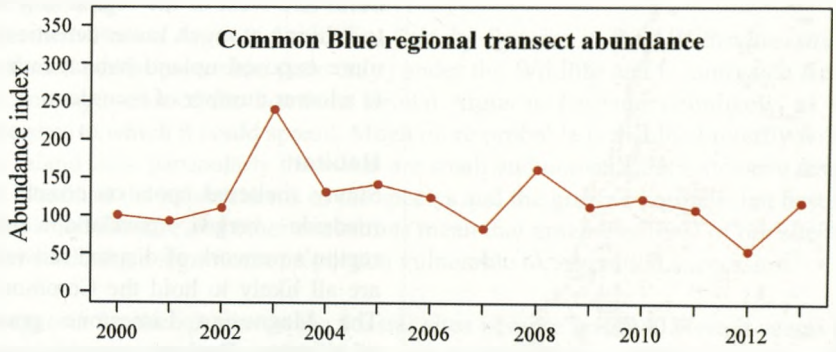
History

Neither Robson (1899) nor Bolam (1925) have much of note to say about the Common Blue, reflecting its abundance and widespread distribution. However both make reference to how variable the markings of the Common Blue can be. Robson notes that a variation that is "without

the spots on the underside, between the base and central spot, is not uncommon at Black Hall Rocks". Dunn and Parrack (1986) describe the Common Blue as being widely distributed throughout Northumberland and County Durham. As now, the Common Blue's population density was greatest at the coastal sand dunes of Northumberland and the Magnesian Limestone grassland of Durham. Dunn and Parrack (1986) also note that populations of Common Blue had been falling for the last 50 years in the west of the region. Their suggested reason for this was changes in farming practices.

Present Status

The status of Common Blue appears to have changed little since 1995, with a consistent number of records being received each year. The regional transect analysis shown below bears this out, showing the abundance index to be stable, peaking in 2003 and falling to a low in 2012.



Future Outlook

Both nationally and regionally, the species is the most common of the UK's blue butterflies. As it is most abundant on the coastal dunes and Magnesium Limestone grassland of County Durham, the protection and management of these habitats will be of vital importance in ensuring its stability. Brownfield sites can also hold good colonies of Common Blue and the redevelopment of such sites is a potential threat. In the western areas of the region, where it lives at a much lower density, increased monitoring and study would further identify the species' habitat requirements.

Common Blue by G Beckwith

EXTINCT AND VAGRANT SPECIES

Swallowtail *Papilio machaon britannicus*

Dunn and Parrack (1986) report two remarkable records of single sightings in Durham City on 5 and 11 June 1982 by Dr P R E Evans and Dr P MacDougall. A dead specimen was then found in Sunderland on 1 July 1983. They report that the East Anglian population was very numerous in 1982 and that there were strong warm southerly winds at the time of the sightings. They could find no evidence of a release or escape to explain these unique events. Alec Goundry reported to Terry Coult that he saw three Swallowtail on rotting vegetables in allotment gardens in Durham City some years before 1992, possibly part of the 1982/83 invasion (Coult, pers. comm. September 1992).

Scarce Swallowtail *Papilio podalirius*

There is a record in the *Vasculum* for 1918 from J W Heslop-Harrison which states: "I chased a specimen of this unmistakeable insect near the New Pit, Birtley without success in June" (*Vasculum* 1918). He attributes its presence to the great immigration of various *Vanessids* that summer.

Grizzled Skipper *Pyrgus malvae*

Bolam reports taking Grizzled Skipper at the old tileworks near Chathill Station in north Northumberland on 9 June 1898, "when it was flying in some numbers". He further reports that it was "found still plentifully at the same place for the next year or two". Mr J S T Walton took a specimen at Healey Wood near Stocksfield when numbers were on the wing in May 1918. J W Heslop-Harrison reported that he had known the insect at the old quarry at Birtley (VC66) in May 1900. These are the only records for the region. Our region is to the north of its current range but Frost (2005) suggests that a smattering of nineteenth-century records up the east coast into southern Scotland may have been due to "hitch-hiking along railway lines". A report from the Durham Wildlife Trust reserve at Witton-le-Wear for 20 May and 8 June 1975 is now considered to be a misidentification of Dingy Skipper.

Black-veined White *Aporia crataegi*

The single local reference to this species is to be found in a booklet entitled *A History and descriptive account of Prestwich (sic) Carr and its Environs*, cited by Eales (2001). The species was listed as The Hawthorn Butterfly, an old name for this species, alluding to the fact that the larvae feed on Hawthorn *Crataegus* spp. as well as other bushes and trees. While there may be doubt about this record, Black-veined White was reported occasionally in parts of Yorkshire in the earliest days of recording, when its decline towards eventual extinction in Britain had already started.

Pale Clouded Yellow/Berger's Clouded Yellow *Colias hyale /C. alfacariensis*

One was taken around 1919 by Mr Proudlock at Seaton Sluice and identified by J W Heslop-Harrison as being Pale Clouded Yellow, but Dunn and Parrack (1986) state it should now "more properly be relegated to joint status".

Monarch *Danaus plexippus*

Dunn and Parrack (1986) record two examples of this stunning American butterfly. One was caught near Darlington in 1928 by F O D Sibson and the second in Hawthorn Dene in September 1933 by a student of King's College, Newcastle, and misidentified as Painted Lady. It was subsequently found in a store box and correctly identified by J W Heslop-Harrison (1934). In

addition Wade (1947) reported one in the fields to the east of Satley, County Durham on 16 August 1947. A report in the *Vasculum* in 1934 is probably a duplicate reporting of the 1928 Darlington record (Garrett 1934).

Although most UK records are thought to be transatlantic migrants, colonies in the Canaries and the Azores were established in 1860 and 1864 respectively and since 1980 southern Spain and Portugal, Madeira and Gibraltar have been colonised.

Scotch Argus *Erebia aethiops*

The only record we have for County Durham is for Castle Eden Dene in the nineteenth century. First recorded there by William Backhouse, Robson (1899) describes it as still abundant there and extending to Edderacres Wood, which is a few miles inland from the coast. This appears to have been a very localised and now extinct population, since we have no subsequent records from this site or elsewhere for County Durham. Collecting in the nineteenth century could have contributed to the loss of this population.

In Northumberland, Bolam (1925) reported that his great-uncle, Isaac W Bolam, who died in 1860, recorded the butterfly near Eslington. A few miles to the south, one was photographed by Steve le Fleming at the upper lakes at Cragside in the 1970s. There is also a report of it being "in considerable numbers" near Elsdon in 1925 by Hilda Finch. This record has however never been repeated. It was reported as The Northern Brown, a name that could apply just as easily to the Large Heath. Harry Eales found it near Cornhill on the banks of the Tweed on 14 August 1974 but the population apparently did not survive as a visit the next year failed to find it. The butterfly is present in the Scottish Borders and only a few miles to the northwest of Carter Bar so it may yet be refound in the county.

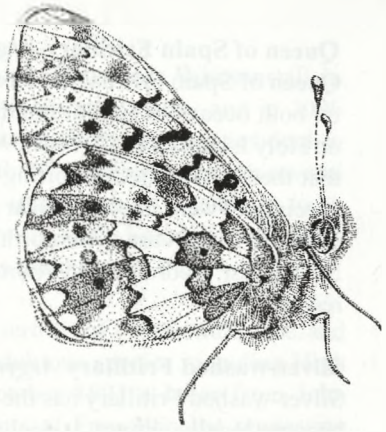
Fritillaries

Introduction

The fritillaries are named from the Latin word *fritillaria*, meaning a chequerboard, and referring to their chequered wing patterns (Macleod 1959). Most are woodland clearing or woodland edge dwellers, depending to varying degrees on sheltered clearings where the caterpillars feed on violets, the exception being Marsh Fritillary *Eurodryas aurinia*, a butterfly of lightly grazed wet grasslands where the caterpillar foodplant is Devilsbit Scabious *Succisa pratensis*. With the newly developed species order adopted here, the text for Marsh Fritillary has been placed after that for Camberwell Beauty and Large Tortoiseshell.

Seven fritillary butterfly species have been recorded in the two counties of Northumberland and Durham: Queen of Spain Fritillary *Argynnis lathonia* as a rare migrant, High Brown Fritillary *Argynnis adippe* as a vagrant or introduction, Silver-washed Fritillary *Argynnis paphia*, Marsh Fritillary and Pearl-bordered Fritillary *Boloria euphrosyne* as former resident breeders, Small Pearl-bordered Fritillary and Dark Green Fritillary as resident breeders. All have declined markedly in the last 150 years due principally to habitat degradation caused by the decline in traditionally managed coppice woodlands, land drainage and the advent of intensive farming and silviculture. An additional contributory factor in the decline seems to have been a series of harsh cold and wet weather years in the nineteenth century particularly in the latter half. These combined with industrial air pollution had a strong adverse effect on some northern butterflies such as Gatekeeper, Comma and Speckled Wood and contributed to the rapid local extinction of both Silver-washed and Marsh Fritillary (see Bedford in Frost 2005).

Pearl-bordered Fritillary *Boloria euphrosyne*



Pearl-bordered Fritillary was described by Wailes (1846) as "abounds at the end of May and early July"; Robson (1899) wrote that "this certainly was the commonest of the Fritillaries in our district, and though it is no longer abundant as formerly, it has not entirely disappeared".

Records for Northumberland were always sparse. Robson (1899) reported it from Jesmond; Dunn and Parrack (1986) add the Sneap, Dilston, south of Riding Mill, Blanchland and the west Tyne area. The latter location recorded by F W Gardner may have been somewhere on the Devil's Water, his known collecting patch. There are a handful of other Northumberland locations: Wheelbirks at Stocksfield (Anonymous 1928), Dilston and Swallowship (Anonymous 1931), Healey and Dipton Bank (Anonymous 1946), Dipton Woods, Healey Woods and Staward Peel (Bolam 1925). The species has not been recorded in Northumberland since Gardner's 1962 west Tyne record.

In Durham sightings were more abundant with the earliest records from G Ornsby (1846) from Horden Dene, Castle Eden Dene, Brancepeth and Stanley Pastures (Esh Winning). Subsequent records are scattered across the county, as widely spaced as Forrest-in-Teesdale to Darlington and Birtley, with concentrations in the Derwent valley, the upper Browney valley and in upper Weardale around Hamsterley Forest near Wolsingham.

Records indicate that the butterfly may have been lost earliest from the east of the county, retaining a presence in the west; Robson (in Page 1905) records that it disappeared from Castle Eden Dene and the coastal sites in the 1860s. The Browney valley seems to have been the butterfly's last stronghold; Thomas Gatiss (in Fawcett 1911) records collecting Pearl-bordered Fritillary at Boggle Hole and Knitsley near Woodlands and in Humber Hill Road between Browney Bank and Donley Ford (west of Lanchester) around 1900. In August 1934 J W Heslop-Harrison and J R Johnson (1934) report a 1 July visit to the Browney valley near Lanchester where Pearl-bordered and Small Pearl-bordered Fritillaries were described as: "Thousands must have passed before our eyes, some ovipositing on violets *(Viola palustris* and *V. riviniana)* and others visited Ragged Robin flowers. One small plant supported over thirty of the butterflies".

Sad to say, spectacles such as this were never repeated and within 30 years the Pearl-bordered Fritillary was extinct in both counties. It was last reported in 1964 in the Black Wood near Satley (Dunn and Parrack 1986), close to the above locations; no-one has reported it since.

The Pearl-bordered Fritillary has gone into a severe national decline during the twentieth century and is now highly threatened in England and Wales. In the whole of northeast England it is confined to just three linked colonies on the southern edge of the North York Moors. It seems unlikely that this butterfly will ever return to the North East without extensive and probably impractical amounts of landscape scale habitat re-creation.

Queen of Spain Fritillary *Argynnis lathonia*

Queen of Spain Fritillary, a rare migrant from continental Europe, has been recorded only twice, on both occasions in Northumberland: a single specimen captured in 1834 (Standish 1834) and on Holy Island in 1981 (Ball 1987). Harry Eales (2001) reviewed the Standish record, concluding that there are some supporting circumstances suggesting that the record is genuine in that two specimens were captured near Carlisle at about the same time and that the butterfly has been recorded in the east as far north as the Scottish Borders. Richard South (1906) provides a further North East record for Scarborough in 1868. No further detail is available for the Holy Island record.

Silver-washed Fritillary *Argynnis paphia*

Silver-washed Fritillary has the dubious distinction of being the first of our resident fritillaries to become locally extinct. It declined during the late nineteenth and most of the twentieth century across the whole of northern and eastern England, retreating to strongholds in the southwest. This woodland butterfly is shade tolerant and it seems unlikely that its initial decline was due to changes in woodland management practices; the nineteenth century cold years are generally believed to have been the cause.

In the North East it was first recorded by Ornsby (1846) from Castle Eden Dene. Wailes (1858) records it from Gibside, Castle Eden Dene and Dilston. Robson (1899) adds Jesmond to the Northumberland locations but can only provide two actual dated records, specimens he saw himself labelled Castle Eden Dene 1855 and a reference in the diary of John Sang for Hartford on 21 August 1853. Sang was a butterfly collector resident in Darlington, collecting in the south Durham/north Yorkshire area; Porritt in his list of Yorkshire Lepidoptera (1904) records a Richmond location for this butterfly under John Sang's name. There is no Hartford in south Durham but there is a Hartforth in north Yorkshire just north of Richmond which may well be the location of Sang's specimen and the source of both Porritt and Robson's records, a simple transcription error being the cause of confusion. Bolam (1925) provides evidence that the butterfly once occurred as far north as the Scottish Borders with records from Hawick and near Berwick-upon-Tweed.

The Environmental Records Information Centre (ERIC) North East along with Butterfly Conservation maintain three records of Silver-washed Fritillary dated 1 July 1948 which have appeared in national distribution atlases. These three records, from F D Burk, are for Dilston, Gibside and Castle Eden Dene. Searches by the author and others have failed to find the source of these records, which if they were true would mean that in one day Burk visited the three most frequently quoted historical locations for the butterfly almost 100 years after the species was last recorded in the North East and managed to find a specimen at each, despite all other twentieth-century recorders failing to do so. It seems most likely therefore that 1948 is a publication date which has been wrongly ascribed to a species-presence date.

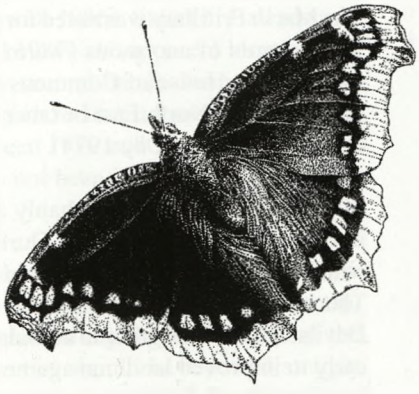
In recent years the Silver-washed Fritillary has increased its range, spreading back to recolonise old haunts in the north and east of England. Very recently there have been a number of records of Silver-washed Fritillary in North Yorkshire including from the southern edge of Dalby Forest around Dalby village in 2010 and 2011 (Graham Jackson, pers. comm. 2013) and from the north of Dalby Forest at Deepdale and Swairdale in 2011 and 2012 (Allan Rodda, pers. comm. 2013). If this represents a true resurgence of the butterfly and is not the result of illicit releases then it may not be long before the Silver-washed Fritillary is once again to be found in the woodlands of Durham.

High Brown Fritillary *Argynnis addipe*

High Brown Fritillary has been reported three times in the North East: near Whittonstall in 1878, near Heselden and Castle Eden Denes at the end of the nineteenth century and in 2006 in Hamsterley Forest near Wolsingham. Calvert (1884) mentions the butterfly as a resident in Durham but gives no locations. Robson (in Page 1905) recounts that "*A. adippe* has been several times recorded as occurring in the Wear Valley" but that on his inspection all turned out to be Dark Green Fritillary. The nearest colonies of this butterfly are in south Lakeland and north Lancashire, to the north of Morecambe Bay some 70 km away as the butterfly flies.

On 17 October 1891 J W Fawcett published a list of "The Butterflies of Northumberland and Durham" in *The Newcastle Weekly Chronicle* containing some dubious species including High Brown Fritillary which he classified as "frequent". On 31 October 1891 a letter from John Robson FES, doyen of local lepidopterists, challenged elements of Fawcett's list requesting corroborating evidence. In response on 5 December 1891 an anonymous letter from "Electron" of Shotley Bridge was published claiming to have captured High Brown Fritillary in August 1878 near Whittonstall. Ensuing editions contain bickering correspondence between the various lepidopterists but there is no evidence that Robson ever gained his corroborating proof. Ball (1987) reports High Brown Fritillary as a rarity in the Hesleden/Castle Eden area at the end of the nineteenth century with no corroborating evidence. The final sighting of High Brown Fritillary, in this case a single specimen photographed in Hamsterley Forest in August 2006 by Malcolm and Jennie Gallimore, is the only proven record to date (O'Brien *et al.* 2006). No further specimens have been found in the forest and the question remains as to whether this was a vagrant from the west or a released specimen. Interestingly Frost (2005) provides some evidence that continental European High Browns occasionally migrate and speculates that migration may be the source of the rare northeast England records. If it were possible to prove vagrancy or migration then perhaps "Electron" did catch his High Brown Fritillary at Whittonstall after all and the Hamsterley Forest butterfly got there unaided.

Camberwell Beauty *Nymphalis antiopa*



This is a migrant species which arrives in the region from the east, occasionally in large numbers. The first record we have is of a massive arrival in 1820 when "vast numbers were washed up on the sands at Seaton Carew" reported by William Backhouse who noted that some were still alive (Robson 1899). There were perhaps four or five records between 1846 and 1858. There was then another noticeable arrival in 1872 noted by several observers with records up and down the coast and as far inland as Rothbury and Hexham. The arrival was between 20-31 August 1872 and about 20 were taken with many more on the wing in the two counties. Another six records completed the nineteenth century account. In the twentieth century there were four records up to 1935 when there were five recorded. Four individuals were reported in 1976 and then 11 in 1995. In recent times most years see either none or perhaps only a single record, with 2006 standing out as five or possibly six were recorded in that year. Records typically tend to be near the coast and usually in late summer or into autumn. In the 1872 influx it was reported that several hibernating individuals were found in different localities in autumn and winter. We have two remarkable spring records, one at Riding Mill in April 1948 and another by Hew Ellis near Pegswood on 8 March 1997.

Large Tortoiseshell *Nymphalis polychlorus*

Although apparently present in the region in the eighteenth century, it appears to have been an extremely rare vagrant for the last 200 years or so. John Hancock took one in a house at Whitburn (no date), C Adamson studied one closely in a garden at Jesmond in September 1857 and M Henderson captured one in a semi-dormant state on the floor of the chapel of All Saints Cemetery in Newcastle on 28 March 1874. The last record in the region appears to be that by Mr Wasserman who found one on his garden palings which had been smeared with sugar to attract moths. This was at Cullercoats on 12 September 1877. Bolam recorded an individual just over the county boundary at Alston on 9 September 1919 feeding in company with a number of other *Vanessids*. The identity of Wallis's (1769) records for the Large Tortoiseshell as "not unfrequent" are discussed in the account for Dark Green Fritillary.

Marsh Fritillary *Eurodryas aurinia*

The Marsh Fritillary became extinct in the North East in the second half of the nineteenth century; the last recorded specimen was taken by Mr Henderson at Chopwell, in the Derwent valley, in 1872 (Robson 1899). In Durham the butterfly was first recorded by Ornsby (1846) in "fields near Flass" and at Castle Eden Dene; subsequent authors repeated these locations assuming that Flass is in Durham City. A careful reading of Ornsby's text however shows that the Flass referred to is just east of Esh Winning on the river Deerness. Dunn and Parrack (1986) repeat Robson's nineteenth-century records for Flass, Castle Eden Dene, High Force in Teesdale, the Derwent District and at Hamsterley with no additions, but there were other records. The species was recorded at another Derwent valley location, Lintzford, in May 1859 (Anonymous 1860-1862) and Calvert (1884) reports taking two pairs at West Hoppyland near Hamsterley, just south of Wolsingham in the Wear valley. Neither Dunn and Parrack (1986) nor Robson (1899) provide any Northumberland records, but Bolam (1925) states that he saw a specimen in 1922 which was said to have been captured near Staward; if the claim was genuine then this would be on the River Allen in Northumberland.

The Marsh Fritillary was noted for sporadically increasing its larval numbers to plague proportions with records of enormous swarms of caterpillars, on one occasion resulting in questions being raised in the House of Commons (Thomas and Lewington 2010). The author knows of no such plagues in the North East but there is a report from near Carlisle in 1933 of fields in April being black with larvae (Day 1934).

Marsh Fritillaries were probably always local in their distribution and the paucity of locations in both Northumberland and Durham indicates an early species decline, the primary causes of which were agricultural improvements, land drainage and to some extent colder wetter weather. The butterfly primarily inhabited wet and marshy grasslands where the caterpillar foodplant Devilsbit Scabious grew in abundance and where grazing was unintensive. Such fields were lost early to improved land management and intensification in farming. Thomson (1980), discussing how the Marsh Fritillary in Scotland reacted to the wet and cold summers between 1860 and 1870, records a decline to extinction of the eastern form of the butterfly with the western form - in his opinion better suited to deal with wet weather - persisting. In the north of England a similar pattern emerges with the butterfly disappearing early in the North East but persisting in the Cumbrian populations until 2003 before becoming functionally extinct. As a sedentary species which requires suitable habitats at a landscape scale, it is very unlikely that the Marsh Fritillary will ever recolonise the North East unaided.

Long-tailed Blue *Lampides boeticus*

A single individual of this Mediterranean and North African species was found by S J Ellis resting on a kitchen wall on 12 March 2009, and subsequently identified by H E Ellis. It was released into the garden where it was found the next day. It was thought to have arrived in the region via imported foodstuffs rather than as a real migrant (Ellis and Ellis 2009). On 23 July 2013 a further single individual was photographed in a garden at West Cornforth in County Durham by Lynne Kennedy. Most Long-tailed Blues are considered to have arrived as larvae accidentally imported in fruit and vegetables, and it is likely that this was also the case for this individual. However breeding was reported on the south coast of England in 2013, so this might have been a genuine vagrant.

Small Blue *Cupido minimus*

In the nineteenth century there was a wide scattering of records in Durham for Marsden, Witton-le-Wear, Castle Eden Dene, Ragpeth near Flass and in the Derwent valley. Mr Gatiss records collecting specimens at South Field Farm, Hamsterley (near Gibside) in 1887 and 1896 (Fawcett 1911). Robson found it was in great abundance two or three miles north of Blackhall Rocks in 1885. In Northumberland it was recorded from Tynemouth in 1827 by the Hancock brothers, at Twizell in 1839 by Selby and at an old coal heap opposite Wylam in 1857 by G Wailes. Bolam (1925) states that "about Berwick, it is fairly common and often abundant, especially along the railway banks on both sides of the Tweed: and the same may be said of the sea-banks from Scremerston to Fast Castle". He also refers to records for a number of sites in the north of Northumberland, ranging from near Hedgeley to Bamburgh, Belford, Kyloe, and Berwick. His comments probably span both the nineteenth and the early twentieth century.

There are then later twentieth-century records for Rowlands Gill, Tyne valley, South Shields and Bishop Auckland (Garrett 1934). In May 1936 it was reported by John Greenwell that he found the "Little Blue, Cupido minimus in a fresh place between Tow Law and Consett". He also reports that "The Little Blue used to be a certain find in the Linburn valley near Hamsterley" (near Witton-le-Wear), but not post the First World War (Greenwell 1936). Stuart G Ball records it as present before 1948 at Gibside in the Derwent valley (Ball 1987). An apparent location just south of Berwick reported by J W Heslop-Harrison (possibly second-hand) during the 1939-1945 war period was never subsequently refound. Natural England's Invertebrate Site Register has an entry for NU1934, just south of Bamburgh Castle, between 1970 and 1982 but no further details are available. A few reports deemed unlikely have also not been included by the editors in the above summary.

Certainly the sand dunes in the Cocklawburn area hold the foodplant Kidney Vetch *Anthyllis vulneraria* and Small Blue is present just over the Scottish Border a few kilometres to the north. Dunn and Parrack (1986) also suggest searching the railway line along the south bank of the Tweed especially around Norham and Tillmouth. Any discoveries should be reported straight away so that they can be verified.

WHAT OF THE FUTURE?

Dr David Wainwright, Senior Regional Officer, Butterfly Conservation

I moved to County Durham in 1988, two years after the publication of Tom Dunn and Jim Parrack's *The Moths and Butterflies of Northumberland and Durham*. For a newcomer, these two well-researched volumes were an absolute godsend in terms of clarifying both the history and the then-current fortunes of all the species recorded as having occurred in our region. And when asked to write a prediction of what the future holds for our butterflies, two thoughts crossed my mind: firstly, that there was no more logical way to start than by looking at the changes that occurred prior to and subsequent to the publication of these excellent works. And secondly, having read and re-read the 1986 Atlas, no-one but a fool would try to predict the future in terms of the fortunes of our counties' butterflies!

I begin my prediction by looking at two species that had never been recorded in the counties prior to 1986, the Brown Argus and the Marbled White. The former species has colonised a number of brownfield sites immediately north of the Tees and there seems little reason why it should fail to spread. The Marbled White was released at Wingate Quarry in 2000 by researchers from Durham University. It remains confined to the quarry, albeit in reasonable numbers, but it may be that reinforcements from the south will be required if it is to establish itself on a more widespread basis.

Dunn and Parrack's list includes a number of species now extinct from our region. Some, such as the Marsh and Pearl-bordered Fritillaries, will surely remain extinct due to lack of suitable habitat. Contrastingly, there are others for which suitable habitat exists in reasonable quantities. It is not out of the question, for example, that the Small Blue could colonise Kidney Vetch-rich quarries and brownfield sites and the Silver-washed Fritillary semi-shaded violet-rich woodlands such as those of the Derwent valley, Hamsterley Forest or the coastal denes of Durham.

It is unlikely, but not impossible, that our surviving habitat specialists will vanish from our counties. Dingy Skipper and Northern Brown Argus may become increasingly scarce on inland sites as brownfield site strongholds of the former are redeveloped and, perhaps, if Magnesian Limestone grassland fragments currently occupied by the Northern Brown Argus succumb to encroachment of scrub or inappropriate management. Both are, however, likely to survive on the Durham coastal cliffs where their habitats are maintained more by erosional processes than by the activities of man. Both the Large Heath and Small Pearl-bordered Fritillary remain sufficiently abundant in Northumberland to suggest that they are unlikely to disappear entirely unless wholesale changes to habitat or climate occur. As for our other fritillary, the Dark Green, this species appears capable of dramatic numerical declines but seems to bounce back apparently unaffected. Even if it were to disappear from our counties, its mobility and abundance elsewhere suggest that it would one day return. And it seems impossible to imagine our more floristically-rich grasslands without those long-term stalwarts, the Meadow Brown, Small Heath, Small Copper and Common Blue. Transect data (a resource unavailable to Dunn and Parrack) indicates that all these species experience wide and dramatic fluctuations in annual abundance yet seem to possess sufficient resilience to suggest that none will be lost any time soon. The same can be said of others, such as the Large, Small and Green-veined Whites and the Small Tortoiseshell, all of which have enjoyed a prolonged and uninterrupted period of relative abundance, albeit with wide annual fluctuations.

However it may be that such confidence is misplaced. Historical records indicate that many species that we currently recognise as being widespread and relatively common have undergone sweeping range expansions and contractions that have been quite sufficient to see them disappear entirely from, or colonise rapidly, much of our entire region, almost invariably for reasons that remain entirely obscure. Once-common species known to have experienced massive and unexplained declines only to recover, often many decades later, include the Orange Tip, Peacock, Comma, Speckled Wood, Wall and Ringlet. Similarly, others less common, such as Holly Blue and Purple Hairstreak, also experienced periods of extreme scarcity or extinction only to recover to what are, by historical standards, fairly healthy levels.

It is amongst these currently widespread species that I feel that the greatest changes may occur – and given that many are probably somewhere close to maximum habitat occupancy, these changes will probably be for the worse, although maybe only temporarily. However, it is likely that range retractions may be offset by expansions of other species not yet widespread in our region – Gatekeeper, Silver-washed Fritillary and Marbled White to name but three.

These predictions are not based on science, rather from a gut feeling that many changes that have happened before are likely to happen again. They may well be wrong. But bear in mind that predicting the future for our butterflies is a near-impossible task. Writing as I am during the depths of winter, I am unable even to forecast whether the coming year will be a good one for Green Hairstreak, Painted Lady or any other species. I doubt if anyone else can either. It would perhaps diminish the wonder and fascination of observing the flight season unfold were any of us able to do so.

Common Blues by Joe Finlay

NOTABLE BUTTERFLY SITES

Northumberland and County Durham have a wide range of habitats attractive to butterflies and these are listed below with Ordnance Survey grid references.

The Tyneside conurbation may seem unpromising for butterfly watchers, but has brownfield sites on which good numbers of species such as Dingy, Large and Small Skipper may be seen. **Havannah Nature Reserve** (NZ225719), **Rising Sun Country Park** (NZ302695) and **Weetslade Country Park** (NZ260723) are typical. In Northumberland the coast north of Lynemouth is characterised by extensive sandy dunes inhabited by, among others, Dark Green Fritillary, Grayling and Wall. **Holy Island** (NU104433) and **Druridge Bay** (NZ276960) are excellent areas. Inland, the county's mainly agricultural lowlands are intersected by river valleys with wooded banks (the Tyne, Wansbeck and Coquet valleys), which provide good habitat for White-letter Hairstreak and others. Examples are **Bywell Bridge** (NZ051620) and the **Spetchells** (NZ094640). **Dipton Woods** (NY976614) south of Corbridge is woodland containing a good population of Green Hairstreak. Further west are the Cheviots and North Pennines; about one third of the county consists of moorland, and there are large conifer plantations including the vast Kielder Forest complex. Where forest rides and stream sides open up the canopy, species including the Dark Green and Small Pearl-bordered Fritillary are regularly recorded, for example at **Debden Plantation** (NU067033). Within the Kielder complex lie the Border Mires which are important for our only wetland butterfly, the Large Heath such as at **Falstone Moss** (NY708860) and **Bell Crag Flow** (NY777727).

In the east of County Durham lie old Magnesian Limestone quarries, now nature reserves of interest to botanists and birders as well as lepidopterists, in particular **Bishop Middleham Quarry** (NZ331326) and **Wingate Quarry** (NZ371373). The limestone plateau also produces grassland and flora hospitable to butterflies including Northern Brown Argus and Dingy Skipper at sites such as **Thrislington** (NZ310325), **Raisby Hill** (NZ333354) and **Littlewood** (NZ342380). The coast, where not densely urbanised, includes stretches of grassland and heath which have served as corridors for the recent northward spread of species such as Speckled Wood and Comma, for example the **Durham Coast Path** (NZ4347) and **Blackhall Rocks** (NZ4639). At the southern end at Teesside is a flat area of reclaimed marsh, including **Saltholme** RSPB reserve (NZ515232) where Brown Argus and Grayling have been seen. The coast is penetrated by a number of steep-sided wooded denes, such as **Hawthorn Dene** (NZ424459) and **Castle Eden Dene** (NZ4540); species here include White-letter Hairstreak. Further inland are areas of managed moorland like **Hedleyhope Fell** (NZ138408) and **Strawberry Hill** (NZ047493), home to Green Hairstreak amongst others, while further up the dales in **Teesdale** (NY883284) and on the **Waskerley Way** (NZ067444) are good sites for Dark Green Fritillary. Urban areas need not be shunned and parks such as **Preston Park** (NZ428153) on Teesside and the **Derwent Walk** (NZ186607) near Gateshead can yield a good range of butterflies.

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Speckled Wood by P Fawcett

Small Tortoiseshell by O Taylor

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Butterflies of North East England describes the status, distrubution, habitats, life cycle, conservation and future outlook for 33 species of butterfly resident in the northeast of England for the period 1995-2013. Additional information is provided for 17 extinct or vagrant species. Species accounts are accompanied by maps, graphs, photographs and artwork.

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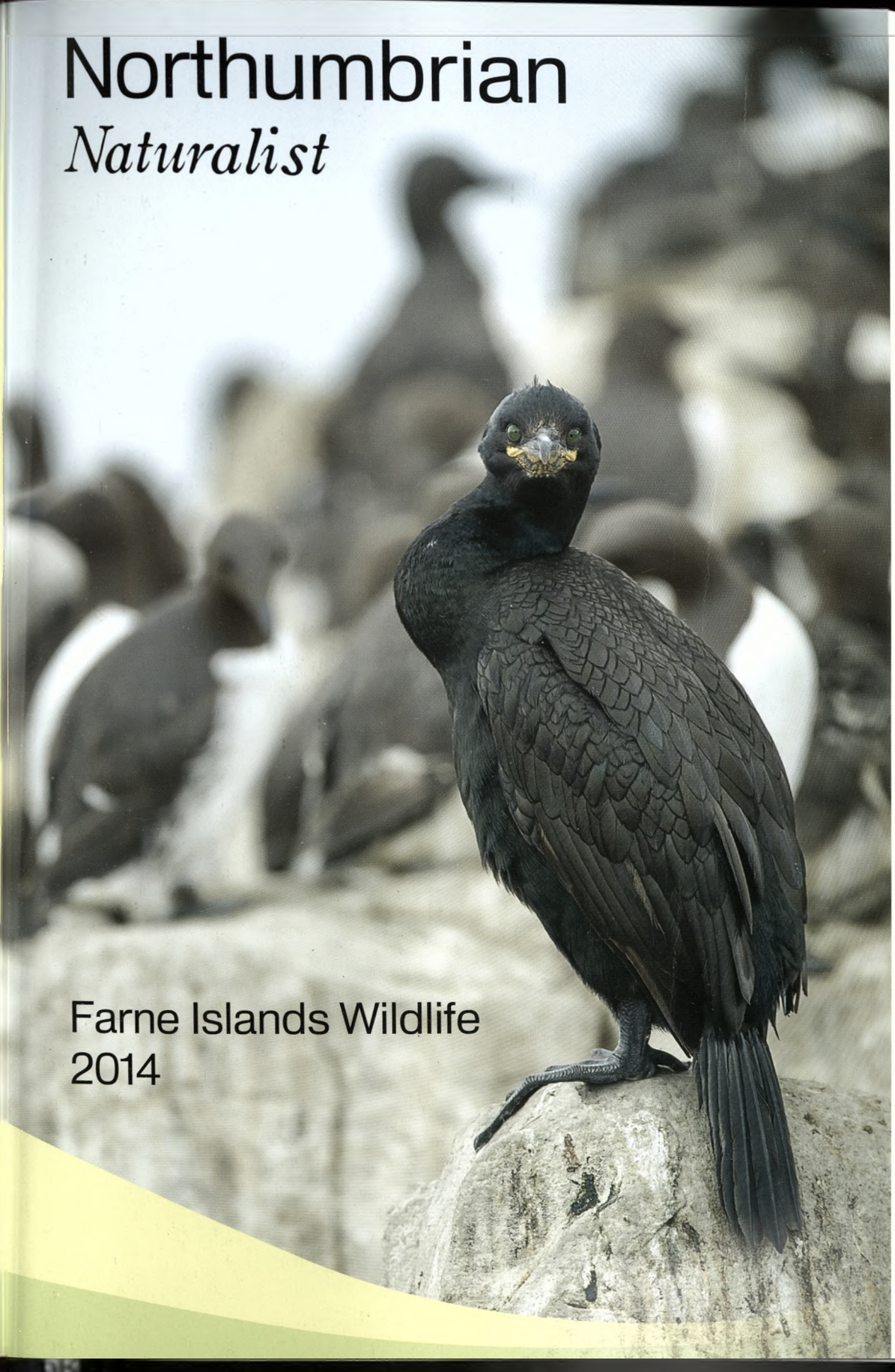

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Natural History Society of Northumbria

National Trust

PREFACE and ACKNOWLEDGMENTS

The National Trust Ranger team sailed on 21 March and manned the islands for 261 days until 6 December. In total, 180 bird species were recorded with 24 species breeding. Overall, 86,956 pairs of birds bred on the islands during 2014. Throughout this report, numbers shown in brackets are the figures for 2013.

Thanks go to the 2014 Ranger team of Paul Baker, Lana Blakely, Nick Covarr, Andy Denton, David Kinchin-Smith, David Roche, Laura Shearer, Edward Tooth and Emma Witcutt who, with the author, provided most records from the islands during the year.

Thanks also go to several observers for submitting records to help complete this report, including John Dawson, Andy Douglas, Graeme Duncan, Ciaran Hatsell, the late Bill Holland, Liz Morgan, Bex Outram, Bobby Pearson, Craig Pringle, Chris Redfern, William Shiel, John Walton and Anne Wilson amongst others.

All the photographers who have supplied their images for use in this publication are to be thanked, along with David Roche for his artwork (www.davidrocheartwork.co.uk). Final thanks go to the unseen work of Tracey Dornan, James Littlewood, Chris Redfern, Margaret Patterson, Joan Williams and Anne Wilson for advice, support and editing the report.

This year saw the retirement of John Walton after an association with the Farne Islands spanning 35 years. John was first employed as a Farnes Seasonal Warden for five seasons from 1979, and managed the seal team each autumn for several years afterwards. He was appointed Head Warden from 1990 and promoted to Property Manager some years later. For the past two years he left the business aspects behind to focus on conservation with a role as Coastal & Marine Officer. John has been a steadying influence on all things Farnes over the years and his knowledge, expertise, good judgement and wise counsel will be greatly missed. We wish him a long and happy retirement!

Sadly, Bill Holland, a member of the *Glad Tidings* crew, died suddenly on 23 January 2015 at the age of 66. Bill had spent the past 14 years working on the Farne Islands boats; his insight and friendly banter will be sorely missed.

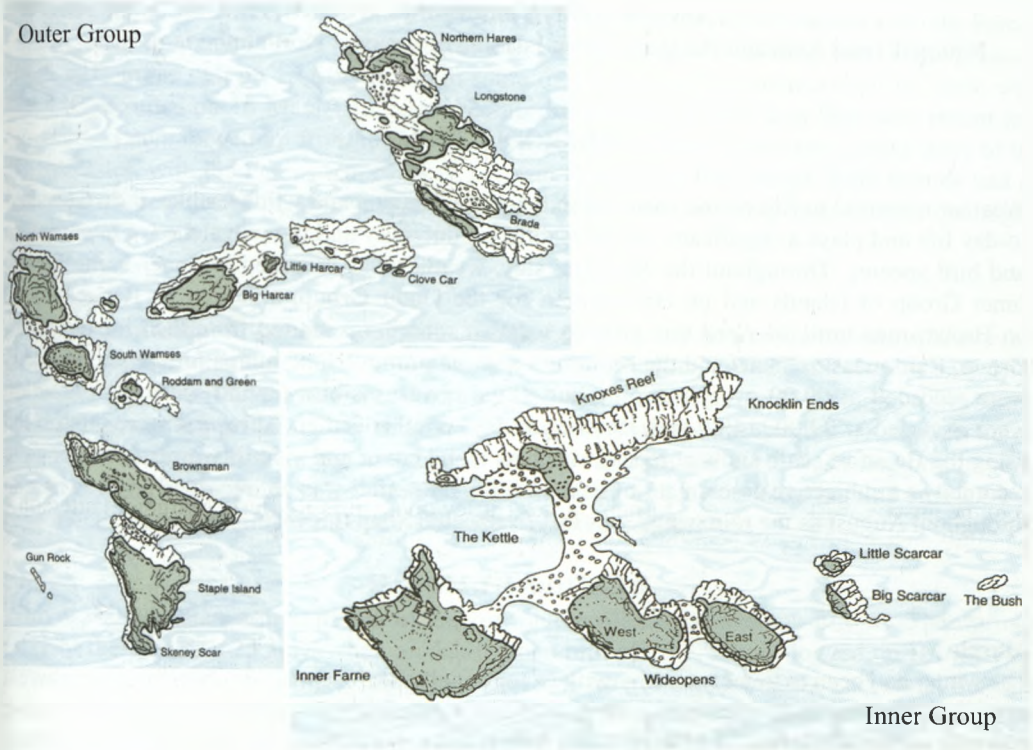
David Steel, Lead Ranger, National Trust

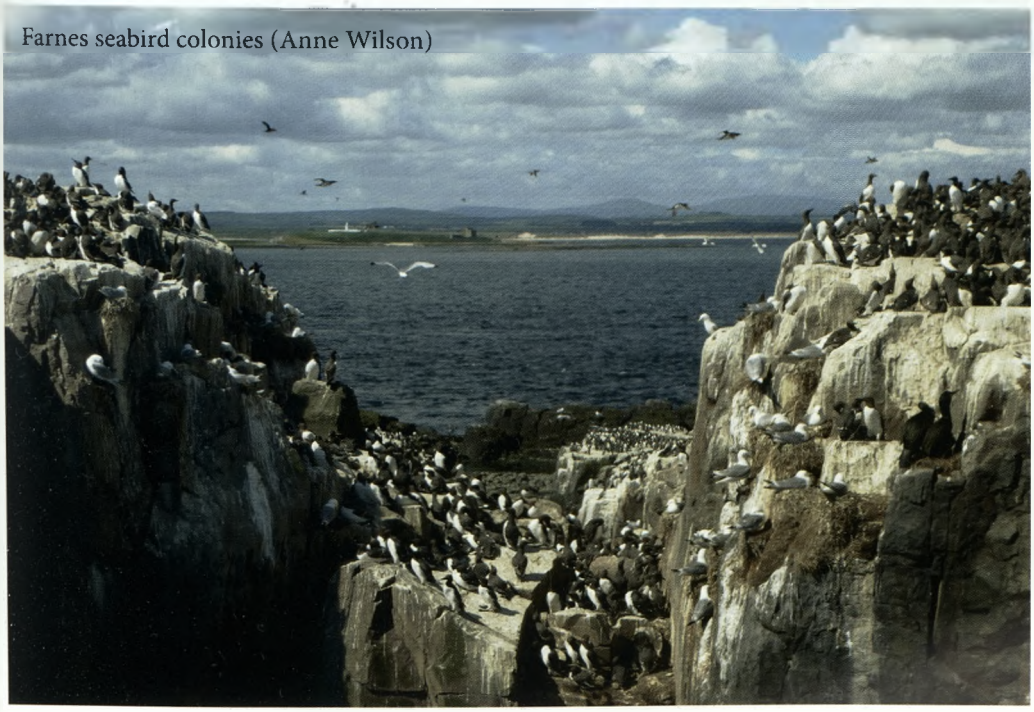
ADDENDUM

After 14 years as head Ranger on the Farne Islands, David Steel has taken up a new appointment with Scottish Natural Heritage as Reserve Manager for the Isle of May. Throughout his time on the Farne Islands David played a leading role in organising and directing the wildlife monitoring work, ensuring an excellent visitor experience, encouraging and facilitating research on the islands and in raising the profile of the Farnes through his work with the media. David has shown excellent judgement in assembling the Ranger teams each year and is held in high regard by all who worked with him. We wish him every success in his new challenge!

Chris Redfern

The Farne Islands





Farnes seabird colonies (Anne Wilson)

WEATHER ON THE FARNE ISLANDS IN 2014

Andrew Denton and Emma Witcutt
National Trust Assistant Rangers, Farne Islands, Seahouses, Northumberland NE68 7SR

INTRODUCTION

Weather is central to life on the Farne Islands for the Rangers and wildlife alike. It dictates day-to-day life and plays a significant role in seabird productivity and the prevalence of *Lepidoptera* and bird species. Throughout the Rangers' stay, weather was recorded on Inner Farne for the Inner Group of islands and on Brownsman for the Outer Group, although no Rangers lived on Brownsman until 14 April this year so weather recordings started from then for the Outer Group. Rain measurements and the minimum and maximum temperatures for the previous day were recorded at 09.00 every morning and cloud cover, visibility, wind speed and direction were recorded at 09:00, 14:00 and 19:00 each day. Wind speed and direction were interpreted using the Beaufort scale and a compass, whereas cloud cover and visibility measurements were recorded as a subjective assessment of the conditions. Rainfall was not recorded on Brownsman throughout August as the rain gauge was lost (suspected Shag thievery).

WEATHER BY MONTH

March

The winter had been extremely stormy with exceptionally deep depressions hitting the southwest of the UK, but thankfully there was no repeat of last year's seabird wreck on the North Sea coast. Arriving on the islands on 21 March, it was found that the weather was much more settled than last year, and it was apparent that the winter storms had not had too much effect as Shags were present and busy nest building. However there was still a bite in the March air and during the month overnight temperatures regularly dipped below a chilly 5 °C with a minimum temperature of 3.7 °C. Low pressure systems were never far away and periods of strong winds were common throughout the latter part of the month, exacerbating the chilly feel.

April

April was a mixed month as there was often a north-south divide in the weather across the UK with the Farne Islands often on this border. As a result, conditions on the Farnes were frequently cloudy and dank throughout the month. When the rain moved away and the winds died down, fog often encroached from the sea. At the start of the month high pressure tried to approach from the south forcing Atlantic weather fronts further north, leaving most of Scotland wet and windy while much of England enjoyed some spring sunshine and higher than average temperatures. The Farnes were situated far enough north sometimes to get the tail end of the weather fronts resulting in a couple of days of drizzle. Low mist and fog were common on the Farnes during this time. A brief stormy period on 13 April led to gale force winds on the islands but little rain, and then a return to calmer conditions, which prevailed for the remainder of the month as the jet stream moved south of the UK and high pressure built across Scotland. The Farnes were once again gloomy as light southeasterly/easterly winds introduced mist and fog to the islands. April had a total monthly rainfall of 46.5 mm, and due to the thick cloud cover temperatures were often a little above average particularly towards the end of the month.

May

Weather in May was much more settled and pleasant. The first part of the month was characterised by weak frontal systems crossing the UK producing sunshine and drizzly showers. On the Farnes this resulted in many days of benign, pleasantly warm weather with little rain. High pressure built in from the east on 15 May bringing some of the warmest temperatures of the year, with 19.8 °C recorded on 16 May. This high pressure broke down a few days later as a potent low pressure system moved up from the continent bringing thundery heavy rain across parts of the British Isles, with the Farnes recording heavy rain throughout this period. Both islands had an average temperature of 12.4 °C with the temperature at times dropping considerably overnight, to a low of 4.3 °C.

June

Early in the month the weather was quite unsettled. The Farnes suffered two bouts of heavy rain on 4 and 7 June totalling over 25 mm as low pressure systems moved from west to east. High pressure then built from the northwest and extended over the whole country bringing warm settled conditions with a high of 21.2 °C recorded on 18 June. With hot air over the UK thunderstorms became widespread later in the month with intense rainfall leading to flash flooding in some areas of the UK. The Farnes also received their fair share of heavy rain during this time. Overall the month was warmer than normal with an average temperature of 15.9 °C.

July

July was by far the warmest month of the year on the islands, on average 17.6 °C. The warmest day of the year was 25 July, when a peak temperature of 25.1 °C was logged on Brownsman. This prolonged spell of warm weather may go some way to explaining the successful breeding season had by many of the bird species which return here every summer to raise their young. July was also a relatively wet month, with a total rainfall of 53.1 mm. However the rain often fell in short sharp bursts with much of the rest of the time being sunny, dry and warm. These warm wet conditions caused plant life on the islands to flourish, leaving the Rangers with plenty of work controlling the vegetation to maintain suitable habitat for the breeding birds, especially the Arctic Terns. In particular 4 July was memorable: the pleasant conditions were interrupted when the heavens opened in the early evening, giving 17.6 mm of rainfall in a very short time on Brownsman and causing the Rangers to spend their evening bailing out the Arctic Terns around the cottage.

August

Two extreme weather events hit the islands in August, with the Rangers weathering the remnants of Hurricane Bertha on 10 August and then Hurricane Cristobal on 29 August. The month started calm enough with slack wind and some sunshine, quickly replaced by low pressure systems moving through and bringing moderate rainfall and gusty winds culminating in Hurricane Bertha. Both hurricanes moved northwest across the Atlantic losing strength, transitioning to extra tropical cyclones as they came into contact with cooler waters in higher latitudes. However they still packed quite a punch, arriving to the islands with strong westerly winds up to force 8 and heavy rain. These storms provided the majority of August's total rainfall: Bertha deluged us with 37.9 mm in 24 hours, but areas of north Scotland recorded well over 100 mm in the same period. August was also notably cool on the Farnes and across the UK, as low pressure often resided to the northeast introducing a cool northerly flow over the whole of Britain. Areas as far south as Dorset experienced unseasonably cold nights, with temperatures dipping to 2 °C. August was the wettest month of the year, with 94.2 mm on Inner Farne during the month, considerably

more than was recorded for Seahouses on the adjacent mainland (Table 1). The poor weather forced the Rangers indoors for days on end, but the majority of the breeding seabirds had left by this time so the effect on their productivity was negligible.

September

An Indian Summer was predicted for the UK, and it certainly felt that way in September on the islands, with high pressure resulting in settled conditions and unseasonably warm temperatures, a maximum of 22.5 °C recorded on Inner Farne on 29 and 30 September. In contrast to August, September was also the driest month on the islands, with an average total monthly rainfall of just 10.1 mm. Most of the rainfall fell over two days between 5 and 6 September as a cold front sank southeast across the country. From then on high pressure moved in and became stuck across the country from 8 September onwards. This brought fine dry conditions but the slack winds sometimes allowed fog to build from the North Sea, keeping temperatures at a constant level. High pressure moved away around 20 September for a brief period allowing a weather front to drop some patchy rain on the islands. High pressure then again built from the west and conditions returned to being fine and dry until the end of the month.

October

October brought with it a dramatic change in conditions. On 6 October a large area of low pressure which was travelling across the UK arrived on the Farnes, bringing Gale Force 8 southeasterly winds and heavy rain. The middle of the month calmed somewhat but was still quite wet as the odd weather front descended across the UK, bringing patchy and sometimes persistent rain to the islands. Towards the end of the month it became unsettled and stormy once again. The remnants of Hurricane Gonzalo brought gusty winds and heavy rain on 21 September. Weather during the last week of the month was dominated by a huge storm system spanning the Atlantic, which stalled and decayed just off Ireland. This brought strong winds, copious rain and difficult conditions across the whole of the UK. Winds over the islands remained strong, resulting in many days on which the seas were too rough for visitor boats to land. This storm system resulted in a record-breaking end to the month as it pumped up long-fetch winds all the way from the Azores, raising temperatures and resulting in the hottest Halloween since records began with thermometers in the south of the UK hitting just shy of 25 °C. While the Farnes thermometer did not get this high it was still an unseasonably warm period.

November

November began bright and pleasant, with continuing warm air from the Azores bringing abnormally high temperatures for the time of year. This was followed by a spell of cold temperatures as the flow from the Azores was cut off and a ridge of high pressure nudged up to the North Sea. On 5 and 6 November a day of strong northerlies was followed by a complete and very unusual 180° change in wind direction, caused by a storm in the Atlantic which swept away the high pressure system. Turbulent weather continued throughout the month, with strong southeasterly winds prevailing due to large strong weather systems in the Atlantic, fuelled by a powerful jet stream resulting from severe cold in North America. After a slow start the Grey Seal breeding season was very successful despite the rough seas and wild conditions as most mothers managed to keep their pups safely out of harm's way.

December

The cold snap in North America relaxed somewhat, cutting off the fuel for the jet stream and giving the UK a break from powerful depressions. Low pressure systems passed across the UK from northwest to southeast, introducing cool polar maritime air and reducing the temperatures, so that the Rangers could see the first snowfall across the Cheviots. Despite the cooler temperatures the weather was largely fine for the last week, allowing the Rangers to leave on 6 December under sunny skies and moderate wind.

Table 1. Rainfall variations between Inner Farne and Seahouses average.

	April	May	June	July	Aug	Sept	Oct	Nov	Total
Inner Farne Rainfall (mm)	52.8	46.5	42.4	53.1	94.2	10.3	40.9	69.5	409.7
Seahouses Average (mm)	54	44	62	52	67	48	52	63	442

COMPARISON OF INNER AND OUTER GROUP WEATHER

For a second year weather was recorded on both Inner Farne and Brownsman, and the same variations were noted with differences in rainfall being explained by the showery nature of some days. When more organised bands of rain moved across islands the totals were very similar. Temperature variations were also as expected with Inner Farne remaining warmer in the summer months due to its proximity to the hotter mainland, while Brownsman remained cooler due to the cold North Sea. This effect was observed in reverse in the autumn and winter as the North Sea acted as a blanket on Brownsman, keeping it milder than Inner Farne which is one mile closer to the cold mainland. Birds such as Robins and Wrens use these islands to winter as they remain milder than the mainland and often free from frost and snow, allowing the birds to forage for worms and insects much more often.

SUMMARY

The UK appeared to be caught in the middle of a battleground for most of the year. Blocking high pressure was standing firm across much of Scandinavia. Occasionally the Atlantic would win, resulting in wet and windy weather with the associated storms. Then high pressure would fight back and become the dominant weather system across the UK bringing fine and dry weather. This was seen in August when the Atlantic was the driving factor, producing the wettest month of the year. This was followed by September when high pressure moved in and the Farnes experienced their driest month in three years with just 10.1 mm of rain. The season was overall warmer than average, and with benign weather conditions for much of the spring and early summer the breeding birds had another good year. Thankfully, the wettest weather occurred late in the season when most chicks had grown large enough to cope with the persistent heavy rain.

BIRDS ON THE FARNE ISLANDS IN 2014

David Steel
National Trust Lead Ranger, Farne Islands, Seahouses, Northumberland NE68 7SR

SEABIRD OVERVIEW 2014

It was another outstanding breeding season following that of 2013. A combination of good weather during the crucial summer months, backed up by a sustained supply of food, especially in the form of sandeels, resulted in bumper seabird productivity. There was a similar story at the majority of other seabird colonies along the east coast, resulting in one of the best breeding seasons for seabirds for over a decade.

Settled weather during the early spring resulted in a quick start for both Shags and Cormorants; both species were on eggs by late March. As usual the breeding season was protracted over the following weeks and by mid-May the majority of species were on eggs.

Wildfowl were well represented; Mallard nested in record numbers, Shelduck were again successful, the loyal pair of Red-breasted Mergansers returned and there were indications of an additional pair. The total number of nesting Eider increased again and resulted in large numbers of young leaving the islands. Most surprising was a nesting pair of Shoveler, the first ever breeding attempt on the islands.

After the significant decrease (almost 45% decline) in the population of Shags the previous winter, it was very encouraging to see numbers bounce back with a 37% increase. This was matched with their best ever breeding season by respect to the total number of Shags fledged. Their bigger relative, the Cormorant, halted the run of recent declines as the population remained stable this year.

As usual, the auks continued to dominate the Farnes; Guillemot nested in record numbers, while numbers of breeding Razorbill and Puffin remained high. Other species faring well included Sandwich Tern which increased in number to almost 1,000 pairs. Small numbers of Common Tern nested while Arctic Tern increased again to a very healthy 2,200 pairs.

The Kittiwake population increased by 21% compared to last year and breeding success was good, but would have been better if but for an unsettled August. The large gulls maintained a stronghold across the islands while Black-headed Gull reached record numbers with 610 pairs nesting. In general then, an excellent breeding season with some seabird populations showing increases, a welcome change from declines of the past decade; long may it continue.

MIGRATION OVERVIEW 2014

A reasonably good year with 180 species recorded on the islands (166 for the Outer Group and 162 for the Inner Group). The impressive Bridled Tern appeared for its second consecutive summer whilst a Bonaparte's Gull was seen for the second November running. The passerine of the year was arguably a first-winter Golden Oriole which graced Brownsman in mid-September.

Although there were no noticeable 'falls' during the year, there were some 'highest counts' for several species including Goosander, Gannet, Kestrel, Little Gull and Fieldfare and the second highest ever day counts for Whooper Swan, Barnacle Goose, Common Sandpiper, Pomarine Skua and Carrion Crow. An impressive movement of thrushes occurred on 30 October involving over 20,000 birds, including a record Fieldfare count. As usual, a few birds were noticeable by their absence including Glaucous Gull, Long-tailed Skua and Long-eared Owl.

Although the islands failed to produce a 'first' this year, there were still some very noticeable highlights including (in order of status): returning Bridled Tern (1st for the islands last year); returning Bonaparte's Gull (2nd for the islands last year); **3rd** Golden Oriole; **6th** Citrine Wagtail and Rustic Bunting; **6th-8th** Little Egret; **7th** Dusky Warbler; **8th** Fea's Petrel and Red-throated Pipit; **9th** Olive-backed Pipit; **11th** Nightjar; **13th-14th** Great Shearwater; **17th** Cory's Shearwater and Hen Harrier; and **18th** Osprey.

Other highlights included (number of individuals in brackets): Balearic Shearwater, Quail (2), Leach's Petrel (3), Storm Petrel (24), Corncrake, Water Rail (3), Moorhen (2), Coot (first since 2007), Spotted Redshank, Little Stint, Curlew Sandpiper, Wood Sandpiper, Grey Phalarope (2), Black Tern (2), Iceland Gull (3), Wryneck (3), Red-backed Shrike (2), Great Tit (first since 2005), Yellow-browed Warbler (11), Barred Warbler (3), Bluethroat (1), Red-breasted Flycatcher (4), Tree Sparrow (first since 2011), Common Rosefinch (3), Ortolan Bunting and Little Bunting (2).

SYSTEMATIC LIST

The status of each species is classified using the following categories:

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

Where relevant, numbers for the previous year are given in brackets.

Mute Swan *Cygnus olor*. An uncommon visitor.
The majority of Farnes reports involve local movement through Inner Sound and all records this year were from that area. Three immatures flew north on 16 May with another three north on 9 October. The only other record was of four adults north on 11 October.

Whooper Swan *C. cygnus*. An uncommon winter and passage visitor.
As in recent years, early spring passage was very evident. Two herds totalling 67 flew north on 21 March (the second highest ever island count) with six north on 24 March. All other records were in autumn with three east over Inner Farne on 10 October, three north through Inner Sound on 30 October and six south through Staple Sound on 4 November.

Pink-footed Goose *Anser brachyrhynchus*. A well represented winter and passage visitor.
As usual, well represented on autumn passage with a handful of spring records. Late March produced three south through Inner Sound on 30 and a single south on 31 March. The first autumn returnees involved three north over Knoxes Reef on 6 September with 165 north on 22 September. Thereafter 1-107 were recorded on a further seven dates with peaks of 400 north on 10 October, 315 south on 16 November and 307 south on 23 November.

Greylag Goose *A. anser*. An uncommon passage and winter visitor.
Movements around the Farnes involve feral and wild birds. There were only three records this year, a single north through Inner Sound on 6 June, nine north over the inner group on 24 June and four west from Brownsman to the mainland on 22 October.

Greater Canada Goose *Branta canadensis*. An uncommon passage visitor.
The bulk of records usually involve birds on passage in early June heading north to moulting grounds in northern Scotland. Small skeins of 3-12 were noted on four dates from 2-18 June with a peak of 33 north on 6 June. Intriguingly two moved north with a skein of Barnacle Geese through Inner Sound on 23 September but could not be identified to sub-species (a good time of year for American race birds on the move), while 17 flew west over Inner Farne on 27 September.

Barnacle Goose *B. leucopsis*. A well represented passage and winter visitor.
It was an excellent year and as usual late spring produced an easterly movement of birds including an impressive 290 in one skein on 25 April, 185 over Staple Island on 1 May and one sitting on West Wideopens for several hours on 18 May. Autumn passage began in spectacular fashion as a total of 1,740 were counted in 14 skeins heading north on 22 September representing the second highest ever Farnes count and falling just short of the record 1,802 counted in October 2011. Thereafter 295 were counted the next day with 8-98 noted on a further five dates until last seen on 12 October.

Brent Goose *B. bernicla hrota*. A well represented passage and winter visitor.
Birds returning to wintering grounds on nearby Lindisfarne were seen during September-October with records of 1-7 north on five dates with 15 north on 9 September. The peak during this period involved 28 north on 22 September. 'Dark-bellied' (subspecies *bernicla*) individuals are starting to increase in number in the local area and the islands produced a single on 16 April and 1-8 on 8 and 11 October, 5, 16 and 23 November and 2 December.

Shelduck *Tadorna tadorna*. A well represented visitor and occasional breeder.
As usual, birds were evident around the islands from late March, with breeding behaviour seen throughout the spring. It was thought that only one pair attempted to breed (two pairs last year), although up to three pairs were present (six adults seen on Brownsman pond on 30 May). Despite the discovery of a dead adult female on Brownsman on 2 July, the breeding season was a success: an adult with four medium-sized chicks were noted around the islands from 13 July. The last record was a juvenile on Inner Farne on 11 August. Passage produced 1-2 on five dates from 8 September-3 December with a peak of six north through Inner Sound on 30 November.

Wigeon *Anas penelope*. A common passage and winter visitor.
Spring passage was light with 1-3 on four dates from 22 April-9 May. The first autumn record involved eight west over Inner Farne on 29 August, and thereafter birds became regular on passage or stopping over on favoured areas including Knoxes Reef and Brownsman. Numbers generally involved 1-76 with peak passage involving 425 north on 5 October and 201 north on 30 October. As usual up to 50 were wintering on Knoxes Reef.

Teal *A. crecca*. A common passage and winter visitor.
Reasonable numbers were present on Knoxes Reef, Brownsman, Staple Island and North Wamses during the autumn and winter months with passage through Inner and Staple Sounds. Light spring passage produced 2-4 on nine dates from 27 March-28 May while the first autumn birds were recorded from 23 July with three north through Staple Sound. Thereafter passage produced 1-90 with peak counts of 106 north on 3 October, 129 north on 15 November and 103 north on 23 November. As usual, Knoxes Reef attracted up to 120 during the early winter while Longstone produced a flock of 125 on 3-5 December.

Mallard *A. platyrhynchos*. A common winter and passage visitor and well represented breeder.
It was a good season as the population showed an increase although breeding success was limited by predation. The first eggs were discovered on 3 April and 21 (15) pairs nested as follows: Inner Farne 9 (6), West Wideopens 1 (2), East Wideopens 2 (0), Knoxes Reef 0 (1), Staple Island 2 (2), Brownsman 6 (1), North Wamses 1 (1), South Wamses 0 (1), Big Harcar 0 (1). The first chicks hatched from 18 April but as usual predation from large gulls was substantial. Eleven chicks from numerous attempts fledged by late summer. Numbers built up in late autumn with 18 on Knoxes Reef on 11 October increasing to 32 on 25 November and 40 present in December. On the Outer Group up to 20 were resident on North Wamses in November.

Pintail *A. acuta*. An uncommon passage and winter visitor.
Reported on four dates with the first record involving two north over Brownsman on 17 September. All other records referred to northerly movement through Inner Sound with three north on 19 September, two north on 4 October and eight north on 5 October.

Shoveler *A. clypeata*. A well represented passage and winter visitor.
An astonishing year with confirmed breeding: a pair arrived on the Top Meadow pond on Inner Farne on 18 April and remained throughout the spring. In early May the female disappeared and was suspected to be attending a nest nearby while the male remained loyal to the pond. On the evening of 27 May the female arrived with five ducklings, but with very little cover at that time of year all five chicks were predated by large gulls by the following afternoon. The pair remained until last seen on 29 June. This was the first confirmed breeding for the Farnes. The species is a scarce breeder within Northumberland and only one site in the county has regular breeding birds. Passage began on 14 July with a female on Brownsman pond, while 1-2 were recorded on six dates from 19 September-2 December with peaks of four north through Staple Sound on 22 September and five north on 29 and 30 November through Inner Sound.

Pair of Shoveler with ducklings, Inner Farne 29 May (David Kinchin-Smith)

Tufted Duck *Aytha fuligula*. A well represented visitor.
Another quiet year with only one spring record: a male north through Inner Sound on 14 April. All other records occurred during the autumn with individuals north through Staple Sound on 22 September and Inner Sound on 5 and 29 November.

Scaup *A. marila*. An uncommon passage and winter visitor.
There were three records; a male flew north off Inner Farne on 28 April representing only the third spring record in a decade. Autumn produced a male north through Inner Sound on 4 October and a flock of seven (four males) flew north through Staple Sound on 2 December.

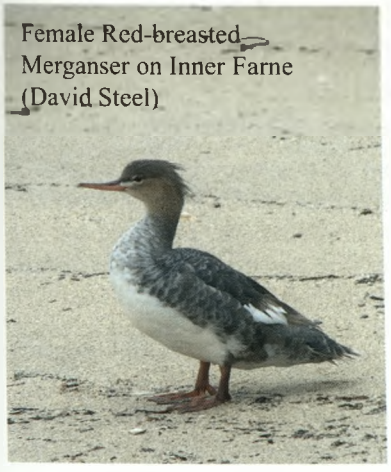
Eider *Somateria mollissima*. A breeding resident.
Small numbers were present throughout January-February with courtship displays observed from March. The first prospecting birds were on the islands from 19 April with the first eggs discovered on Inner Farne and Brownsman on 25 April. A total of 639 (552) pairs nested as follows: Inner Farne 394 (318), West Wideopens 18 (30), East Wideopens 6 (7), Knoxes Reef 3 (4), Staple Island 34 (37), Brownsman 159 (130), North Wamses 7 (7), South Wamses 8 (7), Big Harcar 2 (5), Longstone 3 (1) and Longstone End 5 (6). The first chicks started hatching from 20 May and thereafter large crèches formed across the islands. The population showed a 16% increase and 353 monitored nests produced 916 young with an overall productivity of 2.59. Late breeders were noted in early July and as usual good numbers remained around the islands during the autumn with typical counts of 230 on 30 September and 320 on 2 October.

Long-tailed Duck *Clangula hyemalis*. A well represented passage and winter visitor.
Small numbers winter around the islands and this was indicated by three behind West Wideopens on 15 January and a male near Brownsman on 17 February. A single female was around the inner group from 27 March-3 April while 13 flew north through Inner Sound on 5 April. The first returning birds were seen from 5 November with 1-3 until the end of the year.

Common Scoter *Melanitta nigra*. A common passage and winter visitor.
Well represented throughout the year with records on 76 dates. Small numbers were recorded around the islands, although Inner Sound again attracted the largest flocks with 250 on 5 May increasing to 282 on 16 May; numbers declined soon after with 130 on 23 May. This area continued to produce records throughout the year and the next most noticeable gathering was 302 on 22 July. Records of passage birds peaked at 377 north on 26 June, 165 north on 8 July and 191 north on 17 July.

Velvet Scoter *M. fusca*. A well represented passage and winter visitor.
Well represented with all records from the autumn months. Two males flew north through Inner Sound on 23 September with 1-4 on ten dates until last seen on 2 December. During this period passage peaked with ten north through Inner Sound on 5 November and five south through Staple Sound on 1 December.

Goldeneye *Bucephala clangula*. A common passage and winter visitor.
A quiet year with small numbers overwintering around the Inner Group. Autumn passage produced 1-2 on seven dates from 30 October-30 November with peaks of 23 north through Inner Sound on 5 November and nine on 26 November.


Female Red-breasted Merganser on Inner Farne (David Steel)

Red-breasted Merganser *Mergus serrator*. A well represented passage and winter visitor and rare breeder.
Passage during the spring was very light with two north through Inner Sound on 5 April. The breeding pairs returned to Farnes waters from 11 May and were regularly reported until 8 July. The female was seen heading to a nest site on Inner Farne on several occasions (in one of the areas she has nested previously), but due to access difficulties surrounding other breeding birds the nest could not be located. Breeding was confirmed but the outcome was unknown. During this period a second female was noted in another area of Inner Farne on three dates, which may suggest future expansion. Autumn passage produced 1-2 on three dates in September-October with four north through Inner Sound on 5 November.

Goosander *M. merganser*. An uncommon passage visitor.
Despite being regarded as predominately an inland waterways bird, it was an exceptional season. An unusual record concerned a female on Brownsman pond on 30 June before departing west. During the autumn 1-2 were recorded on nine dates from 13 July-1 December with Staple Sound producing three notable records, possibly relating to birds from the nearby moulting flock at Lindisfarne, with 16 north on 31 July, 19 north on 21 September and 15 north on 30 September. These represent the largest ever counts from the islands, eclipsing the old record of 11 on 8 August 1977.

Red-throated Diver *Gavia stellata*. A common winter and passage visitor.
The Farnes produce 70-80 records annually with wintering numbers bolstered by spring and autumn passage. This year produced records on 74 dates (19 spring, 2 summer and 53 autumn records). Spring passage was light with just two midsummer records through Inner Sound involving two north on 9 June and a single north on 22 June. The bulk of passage occurred during the autumn with peaks of 42 on 5 November (27 north, 15 south), and 18 north on 29 October.

Black-throated Diver *G. arctica*. A well represented winter and passage visitor.
A standard year with five records referring to sightings during the autumn months. A partial summer-plumage adult flew north through Inner Sound on 14 October, with another north on 30 October. A winter-plumage adult was on the sea in Staple Sound on 16 November, and it or another was in the same area of the islands on 21-22 November.

Great Northern Diver *G. immer*. A well represented winter and passage visitor.
This bulky diver was seen on 11 autumn dates, the first returnee being a single south through Inner Sound on 14 September. Thereafter 1-2 were noted wintering around the islands with peak passage involving three south on 13 October and seven (2 north 5 south) on 5 November.

Fulmar *Fulmarus glacialis*. A common breeder, abundant on passage.
Birds were present throughout January-March with breeding behaviour noted in late April. The first eggs were discovered on 15 May on Staple Island and the population showed a slight decrease but remained healthy, and 298 (316) pairs nested as follows: Inner Farne 23 (27), West Wideopens 15 (13), East Wideopens 21 (21), Knoxes Reef 22 (20), Staple Island 55 (58), Brownsman 67 (80), North Wamses 38 (37), South Wamses 40 (38), Big Harcar 14 (16) and Longstone End 3 (6). The first chicks hatched from 7 July with the first fledglings on the wing by 21 August. Breeding success was the best in three years as 151 chicks fledged from 281 monitored nests. The majority of juveniles and adults had departed the islands by the first week of September. As usual good numbers returned around the islands from mid-November and were present throughout December.

Fea's Petrel *Pterodroma feae*. An extremely rare visitor.
The series of records in recent years has been exceptional as this rare 'Gadfly' petrel was once again recorded from the Farnes. A bird originally discovered at 08:15 on 21 September off Flamborough Head (East Yorks) was tracked as it moved north up the east coast and was observed flying north through Staple Sound at 17:55. The bird was eventually seen by 107 different observers from 16 different sites including five on the Farne Islands. This represents the eighth Farnes record and the fourth in the past five years, maintaining the islands as one of the best places in the country to see them!

Cory's Shearwater *Calonectris diomedea.* A scarce visitor.
A good number of large shearwaters had penetrated the southern North Sea during late summer and it was no surprise when one was seen from the Farnes. On the evening of 24 August an individual was watched as it flew north past the south end of the islands before eventually disappearing behind Longstone. Although this represents the seventeenth Farnes record there has been an increase in records in recent years and this represents the seventh in the past ten years.

Great Shearwater *Puffinus gravis.* A rare visitor.
This large oceanic wanderer was recorded twice as part of an influx of the species into the southern North Sea. An individual was noted flying north through Staple Sound on 19 August having been originally seen further south at Newbiggin earlier in the day. Another individual flew north through Staple Sound on the morning of 21 September and was later seen further up the coast. These represent the thirteenth and fourteenth Farnes records but the first since four were recorded in September 2007.

Sooty Shearwater *P. griseus*. A well represented to common passage visitor.
It has been three years since any noteworthy passage and this year followed recent trends with only small numbers reported. The first sighting of the year involved six north on 20 August followed by 1-15 north on 16 dates from 24 August-23 October. During this period passage peaks were 57 north on 21 September, 40 north on 22 September and 29 north on 13 October. A late individual was noted flying north on 5 November.

Manx Shearwater *P. puffinus*. A common passage visitor.
After the first of the year, one north through Staple Sound on 18 April, spring passage was typically light with 3-6 on four dates from 22-28 May with a peak of 17 north on 23 May. Thereafter 1-94 were seen on eight June, seven July, eleven August, eight September and eleven October dates. Peak counts are shown in Table 1 with an impressive 507 north on 20 August. As last year, there was a build up on the sea of a loafing flock, numbering 250 in Inner Sound on 16-17 September, although the flock did not linger as long as last year. The final record of the year was one north through Staple Sound on 6 November.

Table 1. Peak Manx Shearwater counts on passage, Farne Islands 2014.

Date	5 July	10 July	20 Aug	25 Aug	8 Sept	9 Sept
Count	241	115	507	164	107	147

Balearic Shearwater *P. mauretanicus*. An uncommon passage visitor.
The islands produced annual records from 1993-2010 but two years elapsed before three records in 2013. However the species appears to be back on track as this year a single was noted flying north off the south end of Brownsman on 17 September.

Storm Petrel *Hydrobates pelagicus*. An uncommon passage visitor.
All records were of birds captured during nocturnal sound-luring sessions for ringing purposes. A total of 24 birds (21 ringed and 3 'controls') were caught from 20 July-1 September (eight night-time attempts) with a peak catch of six on 20 July.

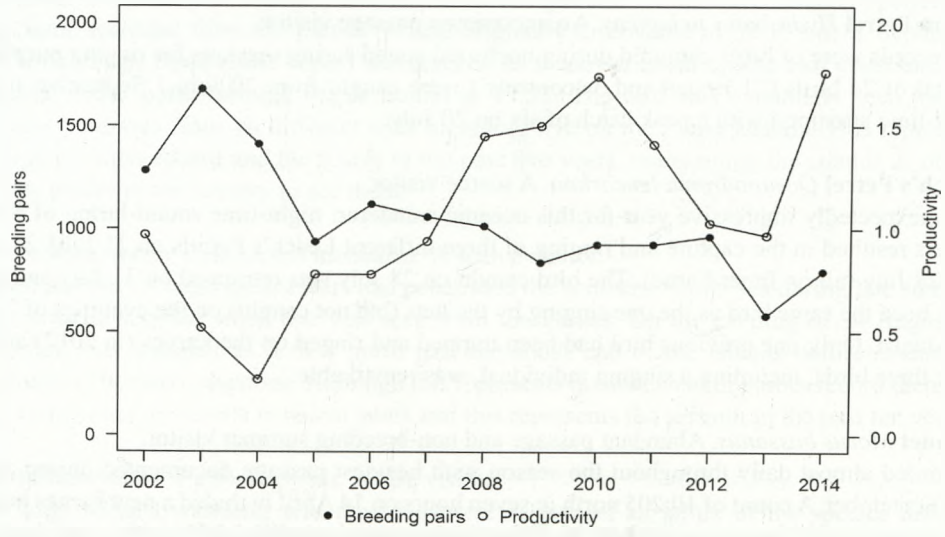
Leach's Petrel *Oceanodroma leucorhoa*. A scarce visitor.
An unexpectedly impressive year for this oceanic wanderer: night-time sound-luring of Storm Petrels resulted in the capture and ringing of three different Leach's Petrels on 21 July, 23 July and 28 July (all on Inner Farne). The bird caught on 28 July was retrapped on 31 July and may have been the same bird as the one singing by the nets (but not caught) on the evenings of 7 and 20 August. Only one previous bird had been trapped and ringed on the Farnes (in 2012) and to have three birds, including a singing individual, was remarkable.

Gannet *Morus bassanus*. Abundant passage and non-breeding summer visitor.
Recorded almost daily throughout the season with heaviest passage documented during April and September. A count of 10,205 north in seven hours on 14 April included a new Farnes hourly record with 4,585 between 17:30-18:30. Other high counts included 1,045 north in one hour on 15 April, 850 north in one hour on 18 April and 527 north in one hour on 21 September. Good numbers lingered around the islands during August-September while individuals were found sitting on Inner Farne on 17 June (which later died), Staple Island on 22 July and Inner Farne on 30-31 July.

Cormorant *Phalacrocorax carbo*. A breeding resident.
It proved to be an encouraging season as the startling decline in the population (which has been dropping annually for over a decade) was apparently arrested. Nest building was seen from 22 March and birds were on eggs by early April; a total of 93 (87) pairs nested as follows: East Wideopens 48 (52), North Wamses 38 (15) and Big Harcar 7 (20). As disturbance must be kept to a minimum it is difficult to confirm first egg and chick dates but large chicks were seen from 15 May on East Wideopens. The first fledglings were seen from 4 June and thereafter small numbers remained around the islands during autumn and early winter.

Shag *P. aristotelis*. A common breeding resident.
It was an exceptional breeding season as the population showed an impressive 37% increase and breeding success was the best on record (Figure 1). Nest building began in mid-March and the first eggs were found on Inner Farne on 30 March with good numbers of nests with eggs from 8 April. A total of 795 (582) pairs nested as follows: Inner Farne 279 (181), West Wideopens 62 (58), East Wideopens 80 (50), Megstone 16 (12), Skeney Scar 43 (35), Staple Island 110 (93), Brownsman 76 (61), North Wamses 31 (29), South Wamses 35 (17), Rodham and Green 7 (6), Big Harcar 40 (25) and Longstone End 16 (15). After the crash in the population last season (of 45%) it was obvious that although many birds had died, others had just taken a year off. The first chicks hatched on Inner Farne on 6 May and Staple Island on 10 May and the first fledglings were on the wing from 28 June. From 378 monitored nests 665 fledged young were produced, an overall productivity of 1.76 and the highest in Farnes recorded history. Thereafter large rafts of fledged young were seen with a typical report of 450 on 31 July. Late breeders were fledging young in early October while good numbers remained to winter around the islands.

Figure 1. Shag breeding pairs and productivity 2002-2014.



Little Egret *Egretta garzetta*. A scarce visitor.
This once very rare visitor is now becoming an annual caller as numbers increase in Northumberland and breeding was confirmed in the county for the first time. The year produced three records with an individual north over the Outer Group on 22 July and singles north through Inner Sound (local coastal movement) on 3 September and 25 November. These are the sixth-eighth Farnes records and the fourth consecutive year the species has been recorded.

Grey Heron *Ardea cinerea*. A well represented visitor. Bred in 1894.
The islands continue to attract good numbers with a presence throughout the year, especially on the undisturbed islands of Knoxes Reef and Longstone. The season produced records on 62 dates with the majority during the autumn (only four spring records). Most records involved 1-2 individuals although four were seen on 27 August and 11 October, six on 22 September and seven west (including a flock of five) on 9 September.

Red-necked Grebe *Podiceps grisegena*. A well represented winter and passage visitor.
The species is in decline as a local wintering species and the islands produced only two records; a partial summer-plumage bird was noted near Gun Rock off Staple Island on 14 January and another flew north off Brownsman on the unseasonal date of 22 May.

Slavonian Grebe *P. auritus*. An uncommon winter and passage visitor.
The species remains a scarce visitor (despite good numbers wintering in north Northumberland) with just two confirmed records; two were seen on the sea in Inner Sound on 25 November.

Hen Harrier *Circus cyaneus*. A scarce visitor.
One of the highlights of raptor passage during the year as a 'ringtail' flew northwest over Brownsman on 30 September. This represents the seventeenth Farnes record and the first since an individual flew over the islands in October 2011.

Sparrowhawk *Accipiter nisus*. An uncommon visitor.
The British population is augmented by migrants from northern Europe during the autumn and the islands produced two records; an immature flew low west over Inner Farne on 20 August and another immature was on Brownsman on 30 October. This was the poorest showing since 1982.

Osprey *Pandion haliatus*. A scarce passage visitor.
An individual was watched being mobbed by gulls as it approached the Wamses on the Outer Group on the morning of 17 October. The bird then drifted along the west face of Brownsman and Staple Island before continuing west over the Wideopens and through Inner Sound, eventually reaching the mainland. This was the latest of the 18 records for the Farnes (nine of which have occurred since 2008) and the eighth autumn record overall.

Kestrel *Falco tinnunculus*. A well represented passage visitor. May have bred in 1916.
As normal, spring passage was light with three individuals noted on 21 April, 2 and 4 May. The first autumn returnees were seen from 11 August when one flew over Brownsman. Thereafter 1-3 were recorded on 26 dates until last seen on 1 December. During this period there was a surge of records in late September as five were present across the islands on 18-22 September. However at least 11 birds were present on 19 September as various islands supported birds including five on Longstone, and it was possible that even more were present. This represents a new 'highest count' for the islands.

Merlin *F. columbarius*. A well represented passage and winter visitor.
It was a quiet spring period as only one individual was seen, a female on Knoxes Reef on 6 April. The first autumn returnees arrived on 22 September and thereafter birds became resident on the islands until the end of the year, preying on weak and tired migrants. At least three individuals were present throughout; one bird was tame enough to allow close approach while another was wearing a ring but was not close enough for the ring to be read. Various migrants were


Merlin 15 October (David Steel)

predated, including Turnstone, Rock Pipit, Starling, Song Thrush, Blackbird, Redwing and Goldcrest.

Peregrine *F. peregrinus*. A well represented passage and winter visitor; may have bred around 1925.
As usual, birds were resident from January-April and July-December, with up to five individuals involved. Late spring records included a female over Inner Farne on 7 May and Brownsman on 14 May. After a juvenile over Knoxes Reef on 29 July, birds became more noticeable on both island groups throughout the autumn, including three together (a female and two immatures) on 22 October.

Quail *Coturnix coturnix*. A scarce visitor.
This small migratory game bird was recorded twice in late May. An individual was flushed from Longstone on 20 May and another was flushed from the east side of Brownsman on 24 May. These represent twenty-second and twenty-third Farnes records and the first since one on Inner Farne on 11 September 2011.

Water Rail *Rallus aquaticus*. An uncommon passage visitor.
A good year for this secretive migratory rail with four confirmed records. An individual was found by the north-facing window of the Pele Tower on Inner Farne on 1 April before eventually disappearing into the vegetable garden. This represents only the third spring record in over a decade, and the first since 2010. Autumn produced three records: an individual was flushed on Brownsman on 18 October near the south cliff, another was seen disappearing near the solar panels on Inner Farne on 30 October and a third was caught in a small store cupboard on Brownsman on 20 November (which was ringed and released).

Corncrake *Crex crex*. An uncommon passage visitor.
An individual was flushed from vegetation on West Wideopens on the evening of 14 September but disappeared soon after. Numbers on passage appear to be increasing as this represented the fifth in five years with only 12 in the past 30 years.

Moorhen *Gallinula choropus*. An uncommon passage visitor. Bred in 1901, 1947 and 1948.
Although a scarce visitor, they remain almost annual with this year producing two records. A very elusive adult was discovered on Brownsman on 25-26 April; it was considered to be the same individual seen on the adjacent Staple Island on 2 and 4 May. The autumn produced a juvenile found hunkering down in a gully during an easterly weather front on Brownsman on 30 October but it disappeared soon after.

Coot *Fulica atra*. An uncommon passage visitor.
The species still remains 'rare' on the Farnes. An immature was discovered in 'Cairngorm Hole' off Staple Island on 30 July and was seen swimming with young Shags close to the island but was soon lost in choppy seas. This represents the twenty-fourth Farnes record and the first since an adult was on the sea off Inner Farne on 27 March 2007. Interestingly the months of July-August have accounted for 50% of all records from the islands. Although not 'countable' due to the uncertainty of the record (whether or not the bird had been alive in Farnes waters), a badly decomposed corpse was brought on to Inner Farne north rocks by gulls on 4 April.

Oystercatcher *Haematopus ostralegus*. A common winter and passage visitor and well represented breeder.
Numerous throughout the season with passage birds supplementing the breeding population. Courtship displays were noted from early April with the first eggs discovered on 14 May on both Inner Farne and Brownsman. The population showed a slight decrease but remained in good health as 39 (41) pairs nested as follows: Inner Farne 7 (7), West Wideopens 4 (3), East Wideopens 1 (1), Knoxes Reef 2 (1), Staple Island 6 (6), Brownsman 11 (12), North Wamses 1 (1), South Wamses 1 (2), Big Harcar 1 (1), Northern Hares 1 (2), Longstone 1 (2) and Longstone End 3 (3). The first chicks hatched on 13 June with the first fledged on 18 July. Overall an improved breeding season with good numbers of chicks fledged and low predation by large gulls. Passage is shown in Table 2.

Table 2. Monthly peak counts of Oystercatcher, Farne Islands 2014.

	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
Inner Group	76	8	10	34	165	111	135	100
Outer Group	12	8	16	20	24	54	93	83

Golden Plover *Pluvialis apricaria*. A well represented passage visitor.
Spring produced five records with a single on Inner Farne on 30 March-2 April and on 25 April and 25 north on 4 May. As usual a post-breeding build up gathered on Longstone Island on the Outer Group with a peak of 1,200 on 3 September (as shown in Table 3). The final record was of one on Longstone on 3 November.

Table 3. Golden Plover peak counts on the Farne Islands during autumn 2014.

July		August			September				October	
22	**26**	**14**	**23**	**25**	**3**	**19**	**29**	**30**	**14**	**30**
140	230	320	249	220	1,200	880	123	83	45	2

Grey Plover *P. squatarola*. A well represented passage visitor.
There were no spring records, but after the first of the year over Inner Farne on 5 September individuals were seen on a further eight dates from 30 September-27 November. The exceptions were four south over Inner Farne on 17 October and two on Brownsman flats on 7 October.

Lapwing *Vanellus vanellus*. A well represented passage visitor; sporadic breeder in the past, last attempt in 1962.
A scattering of records with one in spring: an individual circled Inner Farne on 4 April before heading west. Autumn was represented by 1-2 over the islands on eight dates from 18 October-29 November with three west on 30 October and 29 November.

Ringed Plover *Charadrius hiaticula*. A common passage visitor, uncommon and declining as a breeding species.
Displaying birds were evident from late March and the first eggs were discovered on Inner Farne on 18 April. The population remained stable and 6 (6) pairs nested as follows: Inner Farne 2 (2), Brownsman 3 (3) and Longstone 1 (1). The first chicks hatched on Brownsman on 25 May and Inner Farne on 23 June and three fledged from the Inner Farne beach on 15 July and remained in the area until early August. The Outer Group produced two fledged chicks from two different nests. A post-breeding flock gathered on the Inner Group in August-September with peaks of 12 on 31 August and 13 on 3 September.

Whimbrel *Numenius phaeopus*. A well represented passage visitor.
This migratory wader was recorded on nine spring and 32 autumn dates. The first of the year arrived on Inner Farne on 26 April with 1-2 noted from 29 April-10 June. Autumn returnees started arriving from 30 June with 1-6 throughout the summer months and an impressive 24 over Inner Farne on 7 August. Other noticeable counts included eight on 10 and 27 August with the final record on 8 October.

Curlew *N. arquata*. A common passage and winter visitor.
Present throughout the year with the majority of records involving roosting birds on Knoxes Reef on the Inner Group. The peak count (Table 4) of the year was 484 on 15 November.

Table 4. Monthly peak Curlew count on Farne Islands, 2014.

	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Inner Group	33	15	16	6	175	145	85	180	484	285
Outer Group	4	6	2	4	6	4	3	30	40	32

Black-tailed Godwit *Limosa limosa*. An uncommon passage visitor.
A quiet year with two records: a flock of 35 flew south through Staple Sound on 3 July (the fourth highest count for the Farnes) and two were on Longstone on 3 September.

Bar-tailed Godwit *L. lapponica*. A well represented passage visitor.
Well represented with 1-10 on 17 dates during the season (three spring and 14 autumn dates) with a peak of 16 west over both the Outer and Inner Groups on 23 July.

Turnstone *Arenaria interpres*. A common passage and winter visitor, uncommon in summer.
Present all year (Table 5) with counts of 337 on 11 October and 304 on 3 November being typical of wintering numbers across the islands.

Table 5. Peak monthly Turnstone counts, Farne Islands 2014.

	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
Inner Group	24	11	14	10	115	205	176	174	120
Outer Group	30	25	12	12	156	190	167	163	184

Knot *Calidris canutus*. A well represented passage visitor.
This high-arctic breeder can be found on the islands in good numbers during the summer although this year was below average. Records of 1-12 were noted on 35 dates from 5 July-27 November with modest peaks on Knoxes Reef of 19 on 27 July and 20 on 31 July.

Ruff *Philomachus pugnax*. A well represented passage visitor.
There were three records: four juvenile/female types west over Inner Farne on 20 August, a juvenile on Brownsman pond on 16 September and one west over the Outer Group on 30 October.

Sanderling *Calidris alba*. An uncommon passage visitor.
An impressive season with records on 15 dates: three were located on Inner Farne on 27 May with one still present the following morning. Further records included 1-3 on five July, three August, two September and one October date. The exception to this was six north over the Inner Group on 27 July and 15 on West Wideopens on 4 August.

Little Stint *C. minuta*. An uncommon passage visitor.
For the third consecutive year the islands produced records with a confiding juvenile noted daily on Brownsman pond from 3-6 September which then reappeared on 9 September.

Juvenile Little Stint on Brownsman by David Roche

Curlew Sandpiper *C. ferruginea*. An uncommon passage visitor.
Recorded for the third time in four years (having not been recorded for the previous seven years before that): a first-winter bird was present on Brownsman flats for most of 17 September.

Purple Sandpiper *C. maritima*. A common passage and winter visitor.
Present in all months apart from June with peaks in early spring and late autumn. A count of 312 on 3 December (Table 6) was typical of the numbers wintering on the islands.

Table 6. Peak counts of Purple Sandpipers on the Farne Islands during 2014.

	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Inner Group	115	10	0	16	8	14	110	150	150
Outer Group	43	9	0	45	29	25	103	136	162

Dunlin C. *alpina*. A common passage and winter visitor.
Well represented with light spring passage producing 1-4 on 20 spring dates from 21 April-4 June. During this period a flock of 25 graced the Inner Group on 7-8 May. Returning birds started arriving on the islands from 21 June with numerous reports throughout the summer and autumn months including the first juvenile on 14 July. Peak counts included 22 on Longstone on 15 July, 45 on Knoxes Reef on 31 July and 39 on Inner Farne on 12 August.

Jack Snipe *Lymnocryptes minimus*. A well represented passage visitor.
An individual flushed on Inner Farne on 31 March was the first spring record since April 2008 of this secretive passage wader. Autumn passage was confined to October with singles on Inner Farne on 3, 17 and 20 October and individuals on Brownsman on 11, 14 and 16 October. The only multiple sighting was two on Inner Farne on 18 October.

Snipe *Gallinago gallinago*. A well represented passage visitor.
Well represented with 1-3 on 16 dates from 22 March-2 May with a peak of four on Inner Farne on 31 March. Autumn passage commenced from 6 August with two on Brownsman and thereafter 1-5 on 45 dates until last seen on 3 December. Peaks during this period included six on 18 September and 12 on 30 October.

Woodcock *Scolopax rusticola*. A well represented passage visitor.
Typical light spring passage produced singles on 22 March, 2 and 3 April. The first autumn records were singles on Brownsman on 7-8 October and Inner Farne on 26 October. Thereafter good numbers were reported with 1-5 on 25 dates until last seen on 1 December. During this period passage peaked at 32 on 30 October (Table 7).

Table 7. Peak Woodcock counts, Farne Islands 2014.

	October		November				
	30	**31**	**6**	**7**	**8**	**9**	**10**
Inner Group	20	2	10	2	8	3	5
Outer Group	12	2	2	3	6	3	2
Day Total	**32**	**4**	**12**	**5**	**14**	**6**	**7**

Common Sandpiper *Actitis hypoleucos*. A well represented passage visitor.
This migratory wader was recorded on four spring and 32 autumn dates. The first bird of the year was on Brownsman on 22 April with further singles on 25 and 27 April and 30 May. After one on Brownsman on 4 July, 1-4 were noted on a further eleven July and nineteen August dates. During this period a flock of 18 were seen together on Ladies Path, Inner Farne on the evening of 6 August, the second highest ever count for the islands. Late passage birds were recorded on Inner Farne on 3 September and Brownsman on 16 September.

Green Sandpiper *Tringa ochropus*. An uncommon passage visitor.
A reasonable showing with as usual the majority of records occurring in August. An individual over Brownsman on 27 April was only the tenth spring record in the past 30 years. After two on Brownsman on 6 August, singles were seen on a further ten August dates. The final record was an individual which landed on Staple Island on 9 September.

Immature Spotted Redshank on Brownsman 2 September (David Steel)

Spotted Redshank *T. erythropus*. A scarce visitor.
An immature of this scarce passage visitor was discovered on Brownsman pond on 2 September before eventually flying off calling towards nearby Staple Island. This was the first record since September 2011 and the seventh in the last ten years.

Greenshank *T. nebularia*. A well represented passage visitor.
An individual on Ladies Path on Inner Farne on 28 April was only the fifteenth spring record in the past 30 years. More typically a single lingered on Brownsman from 10-12 August and 16-22 August with two on Longstone on 23 August. Late passage birds were noted on Brownsman on 3 September, Inner Farne on 14 September and a late individual west over Inner Farne on 16 October.

Wood Sandpiper *T. glareola*. An uncommon passage visitor.
Since 2000 the islands have produced annual records apart from 2004. This pattern continued with an individual which flew over Staple Island calling before landing on the east side of the island on 27 July.

Redshank *T. totanus*. A common passage and winter visitor; bred in nine years 1901-1943.
Present all year with the exception of four weeks from late May to late June. Peak passage was 57 on 17 April and 52 on 20 August (Table 8).

Table 8. Peak monthly counts of Redshank, Farne Islands 2014.

	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
Inner Group	57	20	1	15	26	27	32	15
Outer Group	6	2	5	24	26	8	16	19

Grey Phalarope *Phalaropus fulicarius*. An uncommon autumn passage and winter visitor, extremely rare in spring.

This specialist surface feeder was recorded for the sixteenth consecutive year with two records (the last blank year was in 1998). A first-winter bird was seen flying along the north rocks of Inner Farne, landing briefly in the Kettle and then eventually settling on the sea just to the south of Inner Farne on 15 October. Another was discovered on the sea in Inner Sound before relocating briefly in the Kettle on 17 November.

Pomarine Skua *Stercorarius pomarinus*. A well represented passage visitor, common in some years.

An excellent year with an impressive day count in mid-November. The first of the year involved a dark-phased adult north through Staple Sound on 20 August followed by an individual north with full 'spoons' on 22 August. After an adult north on 22 September, there were 1-6 north on four dates from 10-15 October with 12 (all juveniles) north on 5 November. This was the prelude to an impressive showing in mid-November with a peak of 104 north on 17 November (64 north Inner Sound, 40 north Staple Sound). These were all juveniles with the largest flocks totalling 16 and 11. This is the second highest ever count for the Farnes, although far behind the record 488 on 9 October 1992. The following two days produced eight north and one north respectively, with late passage birds on 26 and 29 November (the latter bird was eating carrion on the sea).

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

There was a lack of spring records; the first of the year arrived in June with singles noted on 15, 25 and 26 June. Thereafter numbers gradually increased with 1-3 on six July dates and 1-6 on seven August dates. Passage increased in late August with eight north on 20 August and seven north on 25 August. September produced 1-9 on 17 dates with a peak of 11 north on 17 September, while 1-8 were noted on ten October dates. The last record of the year was of two north on 5 November.

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

Spring produced three records, an individual eating a juvenile Herring Gull on the sea off Inner Farne on 26 April and singles north on 3 May and 14 June. Thereafter 1-9 were recorded on five July, thirteen August, thirteen September, nine October and seven November dates. Peak passage included 15 north on 22 September, 30 on 13 October (13 north, 17 south), ten north on 14 October and 15 north on 5 November. The last record of the year was of three north through Staple Sound on 18 November.

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

Breeding proved to be as good as last year. Good numbers had returned to the islands by 25 March with 'spring cleaning' noted from 7 April. Copulating was observed on 12 April and the first eggs were discovered on Inner Farne on 19 April and Brownsman on 21 April. A full census of the population was carried out in 2013 so there were no counts made this year (the next full census is due in 2018). Of 100 monitored nests 92 chicks fledged. As in recent years a bird with white wings was seen throughout the summer on Inner Farne. The first chicks hatched from

26 May with the first fledgling noted walking down the boardwalk on Inner Farne on 3 July. Thereafter good numbers fledged throughout July with a noticeable decrease of adults from 23 July. The majority had left the islands by early August, but late fledgers were noted on 9 and 17 August. As usual, small numbers returned to winter around the islands during the early winter.

Black Guillemot *Cepphus grylle*. A well represented winter and passage visitor; bred in 17th and possibly 18th centuries.
Small numbers continue to winter around the Farnes with occasional midsummer records including a summer-plumage adult on the sea off North Wamses on 3 June. The first autumn returnee was a partial summer-plumage adult north through Inner Sound on 12 October. An individual was observed daily around the Outer Group from 5 November, favouring the sea area near Gun Rock off Staple Island. It remained present until the Rangers departed in early December. During this period two were recorded on 15 and 18 November with three present on 17 November suggesting small numbers were once again wintering around the Farnes.

Razorbill *Alca torda*. A common breeding resident and passage visitor.
The first main arrival of birds occurred on 6 April and copulating pairs were observed from 20 April. The first eggs were laid in early May and the population remained very healthy. A total of 501 (505) pairs nested as followed: Inner Farne 213 (244), West Wideopens 96 (99), East Wideopens 38 (25), Skeney Scar 19 (17), Staple Island 60 (58), Brownsman 22 (20), North Wamses 12 (13), South Wamses 19 (15), Big Harcar 22 (12) and Longstone End 0 (2). The first chicks started hatching on 30 May with the first 'jumplings' (chicks fledge at just 18 days) on the sea on 25 June. Thereafter good numbers departed the cliff tops and the majority had gone by mid-July. Monitoring revealed 16 chicks fledged from 26 pairs with a return of 0.62 (about average for recent years). As usual, small numbers returned to winter around the islands from late September.

Little Auk *Alle alle*. A well represented winter and passage visitor.
The first bird of the year was discovered on the sea in Inner Sound on 27 October and thereafter 1-14 were recorded daily from 7 November-4 December. Passage peaked on 5 November when the islands recorded a total of 2,921 north during the day (as shown in Table 9). As usual small numbers fell to Peregrines and Great Black-backed Gulls, while one was caught and ringed on 4 December.

Table 9. Northerly passage of Little Auks in November 2014.

	5 Nov	6 Nov	17 Nov
Inner Sound	198	2	52
Staple Sound	1,317	402	798
South End	1,406	0	12
Day Total	**2,921**	**404**	**862**

Guillemot *Uria aalge*. An abundant breeding resident and passage visitor.
The first main arrival of birds on to the cliffs was on 25 March but it was not until 16 April that birds eventually settled. The first eggs were discovered on Staple Island on 20 April and Inner Farne on 21 April and the population continued to go from strength to strength with a 4% increase overall. A total of 51,883 (50,048) individuals nested as follows: Inner Farne 7,167 (6,891), West Wideopens 2,038 (2,101), East Wideopens 3,125 (2,540), Megstone 280 (280), Skeney Scar 2,462 (1,658), Staple Island 24,800 (24,225), Brownsman 9,527 (8,978), North

Wamses 1,130 (1,960), South Wamses 562 (657), Roddam and Green 180 (138) and Big Harcar 612 (620). The first chicks hatched on 30 May with the first 'jumpling' noted on the sea off Staple Island on 15 June. After a very good breeding season the majority of the cliffs were bare by 2 July, and all birds were gone by 23 July. As is usual, small numbers returned to winter around the islands from mid-September.

Bridled Tern *Onychoprion anaethetus*. An extremely rare visitor.
The star of last year returned! This extremely rare visitor to the UK (only the twenty-fourth record) was originally discovered (by ex-Farne wardens!) on Fair Isle on 16 June and left there on 19 June; the following morning it was discovered on Inner Farne. As with the previous year, it became loyal to the south rocks on Inner Farne and was seen daily from 20 June-6 July (17 days) and then again on 12 July. It will be interesting to see if the bird continues to return to the islands in future years as some rare terns can show site loyalty. Regardless, it was a stunning highlight and a welcome return visitor!

Bridled Tern (David Kinchin-Smith)

Little Tern *Sternula albifrons*. A well represented passage visitor.
The majority of records refer to the traditional evening roost at St Cuthbert's Cove, Inner Farne, which peaks in mid-May before birds disperse to nearby breeding grounds. After the first record of 12 on the evening of 28 April, the roost attracted birds throughout May with a peak of 68 on 9 May (Table 10).

Table 10. Little Tern evening roost counts, Farne Islands 2014.

	April		May							June
Date	**28**	**30**	**2**	**4**	**5**	**6**	**9**	**15**	**17**	**2**
Count	12	14	40	51	54	62	68	31	16	2

Black Tern *Chlidonias niger*. An uncommon passage visitor.
There were two records of this marsh tern on the islands during the year. An adult in summer plumage was discovered on the east rocks of Brownsman on the afternoon of 5 June and later that evening it was found in the large tern roost on Inner Farne. The only other record was of a first-winter bird north through Inner Sound on 1 October.

Sandwich Tern *Sterna sandvicensis*. A breeding summer and passage visitor.
The first bird of the year arrived on Knoxes Reef on the early date of 23 March with another present on 27 March. Thereafter the traditional evening roost on the Inner Group attracted some large numbers as shown in Table 11. Following vocal displays birds settled on Inner Farne. The first eggs were found on 11 May and the populations showed a slight increase (of 16%) with 959 (824) pairs nesting. Three distinct colonies were established: two on Central Meadow and one on Top Meadow. The first chicks hatched in early June and the first fledglings were seen on 29 June. Thereafter family parties began gathering in St Cuthbert's Cove. There was a gradual decrease in numbers from early August, with a complete absence by 20 August. Small numbers were recorded in September with late passage birds including a single on 29 September and two on 1 October.

Sandwich Tern colony on Inner Farne (David Steel)

Table 11. Sandwich Tern evening roost counts in March-April 2014, Farne Islands.

	March		April						
Date	**28**	**29**	**2**	**5**	**7**	**8**	**12**	**16**	**17**
Count	2	4	7	45	75	131	175	372	420

Common Tern *S. hirundo*. A breeding summer and passage visitor.
The first arrivals (involving four birds) were noted on Ladies Path on Inner Farne on 23 April with numbers increasing thereafter in the evening roost. Prospecting at traditional nesting locations on Inner Farne was observed from 3 May and the first eggs were found in mid-May. A total of 88 (94) pairs nested (all on Inner Farne) and the first chicks hatched on 14 June. The first fledglings took to the wing on 6 July and the nesting areas were abandoned by 3 August. There was a surge of records of 23-45 from 5-16 September with the final record of two through Staple Sound on 8 October.

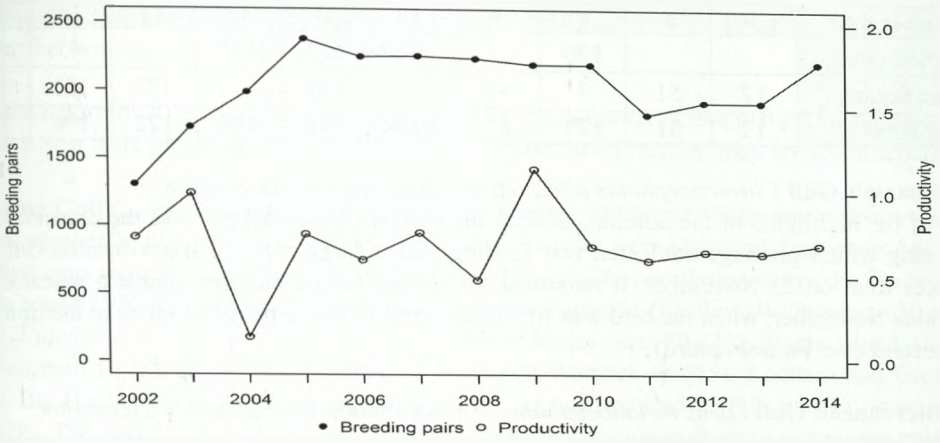
Roseate Tern *S. dougallii*. A well represented summer and passage visitor, uncommon breeding species.
The first bird of the year was discovered on Inner Farne on 10 May and thereafter at least one pair was present throughout late May to July. Despite encouraging signs, with displaying and copulating observed, there was no breeding attempt (the last was in 2009). The first family parties from nearby Coquet Island started arriving on 14 July with two adults and a juvenile. As with last year there was an impressive build up in the roost on Ladies Path, Inner Farne in early August (Table 12) with a peak of 69 on 14 August. Numbers declined rapidly in late August although 15 roosted on Longstone on 3 September. Late passage included two on 16 September and four were feeding in Inner Sound on 1 October.

Table 12. Roseate Tern roost counts in July-August 2014, Farne Islands

	July		August								
Date	**28**	**31**	**3**	**4**	**6**	**9**	**14**	**16**	**19**	**20**	**21**
Adult	5	7	15	20	37	22	43	-	-	-	-
Juvenile	4	4	6	7	15	4	26	-	-	-	-
Total	9	11	21	27	52	26	69	35	18	22	8

Arctic Tern *S. paradisaea*. An abundant breeding summer and passage visitor.
The first bird of the year was discovered roosting on Knoxes Reef on 13 April and two were present on 15 April. Thereafter numbers steadily increased with aerial displays over the island by late April. An impressive 9,000 were counted on Ladies Path on 12 May. The first eggs were discovered on 15 May on Inner Farne and Brownsman and the population showed a welcome increase of 15% (Figure 2). A total of 2,212 (1,921) pairs nested as follows: Inner Farne 1,422 (1,201), Staple Island 3 (21) and Brownsman 787 (699). The first chicks started hatching on 6 June and the first fledglings took to the wing on 2 July. The Rangers monitored 1,061 pairs which produced 737 fledged young with overall productivity of 0.69, the best since 2009. After the breeding season numbers dwindled in August and September. Late passage included 1-3 daily from 1-14 October and a late single north through Staple Sound on 27 October.

Figure 2. Arctic Tern breeding pairs and productivity 2002-2014.



Kittiwake *Rissa tridactyla*. An abundant breeder and passage visitor, well represented in winter. It was an excellent year with the population increasing and good numbers of young fledging from nests. Some nest building commenced from 9 April though more active nest building by the majority of pairs did not start until late April. The first eggs were discovered on 19 May and the population showed a very welcome 21% increase. A total of 4,175 (3,443) pairs nested as follows: Inner Farne 1,442 (1,079), West Wideopens 215 (159), East Wideopens 230 (229), Skeney Scar 141 (129), Staple Island 961 (868), Brownsman 1,083 (940), North Wamses 30 (11), Roddam and Green 7 (0) and Big Harcar 66 (28). The first chicks hatched on 12 June and the first fledgling was seen on 12 July. The Rangers monitored 602 nests which produced 515 fledged young, an overall productivity of a very healthy 0.86. After the breeding season small numbers were recorded on passage with 260 north on 21 September and steady northerly passage all day on 17 November.

Black-headed Gull *Chroicocephaleus ridibundus*. A well represented breeding species from 1972 onwards and common visitor.
The evening roost on Knoxes Reef again attracted good numbers in early spring with counts of 343 on 25 March, 460 on 28 March and 461 on 30 March. Vocal courtship displays began in early April with birds settling down on the traditional colony on Inner Farne from 3 April. The first eggs were discovered on 29 April, and the increased population of 610 (565) pairs nested as follows: Inner Farne 609 (565) and Brownsman 1 (0). This is the first attempt on Brownsman since 2011. The first chicks hatched on 26 May with the first fledgling on 21 June and good numbers went on to fledge. As usual, birds were evident throughout the autumn months with up to 100 regular in November.

Little Gull *Hydrocoloeus minutus*. A well represented passage and winter visitor.
It was an exceptional year for this species with some impressive numbers reported on autumn passage including a new record day count. Early records were a first-summer bird feeding in the Kettle on 6 April, an adult off Staple Island on 7 May and 1-2 on seven dates at roost from 25 June-4 July. The autumn produced individuals on 6 and 28 September, but numbers started to increase from early October with a new Farnes record count of 2,184 north on 10 October. Peak counts are shown in Table 13 with 1-85 present daily around the islands thereafter into November. November showed a slight decrease in records although further high counts included 405 on 4 November and 142 on 5 November. Numbers declined gradually to the final record of two adults through Inner Sound on 30 November.

Table 13. Northerly movement of Little Gulls in October 2014, Farne Islands

October date	**1**	**5**	**8**	**9**	**10**	**11**	**13**	**12**	**14**	**16**
Staple Sound			170		2,184	623	175		45	4
Inner Sound	17	51	7	87		168		172	151	166
Day Total	**17**	**51**	**177**	**87**	**2,184**	**791**	**175**	**172**	**196**	**170**

Bonaparte's Gull *Chroicocephalus philadelphia*. An extremely rare visitor.
One of the highlights of the autumn, as with the summer Bridled Tern, was the discovery of a returning winter-plumage adult that was feeding with a large party of Black-headed Gulls off Knoxes Reef on 23 November. It remained for several hours and was almost a repeat of the previous November, when the bird was first discovered in the same area (which at the time was the second ever Farnes record).

Mediterranean Gull *Larus melanocephalus*. An uncommon passage and winter visitor.
A very impressive year commenced with the appearance of an adult summer-plumage bird in the evening roost on Knoxes Reef on 23 March. On 17 May an adult and first-summer were at the Black-headed Gull colony on Inner Farne but there was no evidence of breeding. All other records were autumn sightings with adult winter-plumage birds (possibly involving the same adult) noted around the inner group. The bird was often seen feeding with Black-headed Gulls and was recorded on five October and four November dates while a first winter bird was off Brownsman on 19 November. The concentration of large gulls on Knoxes Reef attracted three individuals (two adults and a first-winter) on 5 December with the young bird sporting an orange 'darvic' ring, but it was too far away to read.

Great Black-backed Gull *L. marinus*. An uncommon breeder, common winter and passage visitor.
Pairs in territorial dispute were observed from early April and the first eggs were discovered on 9 May. The breeding population showed another slight increase with a total of 17 (15) pairs which nested as follows: West Wideopens 3 (2), East Wideopens 4 (3), Knoxes Reef 1 (1), Staple Island 1 (1), Brownsman 2 (2), North Wamses 3 (3), South Wamses 2 (2) and Big Harcar 1 (1). Two nests contained chicks by 19 May suggesting an earlier egg-laying date with fledged young present from mid-July. As usual birds were seen to predate fledged Arctic Terns and Puffins. After the breeding season numbers increased during the autumn with a typical count of 273 on 3 December.

Common Gull *L. canus*. A common visitor; bred in four years 1910-14 and probably in 1916, with attempted breeding in 1974.
The early spring evening roost on Knoxes Reef built rapidly with five on 22 March increasing to 67 on 31 March before peaking at 125 on 6 April. Numbers declined rapidly thereafter as birds moved off to breeding grounds with just five present by 25 April. The first returnees arrived on 9 August and small numbers were present around the islands until the year end. Peak counts included 62 on Knoxes Reef on 23 November and 15 on Brownsman on 16 November.

Lesser Black-backed Gull *L. fuscus*. A common breeding summer and passage visitor.
The Farnes population migrates south for the winter and good numbers were back on the breeding colonies by 7 April. The first eggs were discovered on 2 May on Staple Island and the population showed a 4% increase. A total of 799 (765) pairs nested as follows: Inner Farne 21 (18), West Wideopens 215 (215), East Wideopens 132 (124), Knoxes Reef 8 (13), Skeney Scar

18 (30*), Staple Island 45 (34*), Brownsman 28 (22), North Wamses 92 (97), South Wamses 142 (134), Roddam and Green 5 (3), Big Harcar 90 (70) and Longstone End 3 (5). The first chicks hatched on 22 May with the first fledging seen on 5 July. As usual birds departed south in August-September with no records from the autumn.

[*In the report for 2013 (Northumbrian Naturalist **76**, p33), data for Lesser Black-backed Gulls on Skeney Scar were included in the total for Staple Island. In this report, they are given separately]

Herring Gull *L. argentatus*. A common breeding species, abundant winter and passage visitor.
It was another good year for the species. Territorial disputes were observed from early April and the first eggs were found on West Wideopens on 30 April. The population showed a 7% increase and a total of 937 (874) pairs nested as follows: Inner Farne 42 (8), West Wideopens 150 (145), East Wideopens 120 (150), Knoxes Reef 97 (110), Skeney Scar 30 (24), Staple Island 46 (55), Brownsman 10 (8), North Wamses 176 (168), South Wamses 48 (45), Roddam and Green 18 (20), Big Harcar 150 (100), Longstone Main 4 (2), Longstone End 15 (17) and Northern Hares 31 (22). The first chicks hatched on 25 May and numerous young fledged across the colonies. As usual good numbers remained throughout the autumn and winter and were supplemented by northern-race birds.

Iceland Gull *L. glaucoides*. An uncommon winter and passage visitor.
An excellent year with reports on five spring dates involving three different age groups and possibly five different individuals. A first-winter bird was at roost on Knoxes Reef on 28-29 March, while an adult was present on 7 April before flying over Inner Farne. A first-year bird was discovered feeding in the Kettle on 15 April while a second-winter bird was in the Kettle on 23 April. The final record was a first-year bird roosting on West Wideopens on 2 May.

Short-eared Owl on the Farnes by David Roche

Feral Pigeon *Columba livia.* A common breeding resident.
Abundant throughout the year, breeding in small numbers, with large flocks forming during the autumn months. A number of predators, including Peregrine and Great Black-backed Gull, take advantage of old, weak, and slow individuals.

Wood Pigeon *C. palumbus.* An uncommon passage visitor.
Uncommon on passage, singles were recorded on 12 spring dates between 31 March-6 June with two on the south rocks of Inner Farne on 12 May. The only autumn record was of one which landed briefly on the Brownsman tower on 17 October.

Collared Dove *Streptopelia decaocto.* An uncommon passage visitor.
In common with recent years, there was just one record: an individual was discovered in the vegetable garden on Inner Farne on 20 May before departing west.

Short-eared Owl *Asio flammeus.* An uncommon passage visitor.
Still rare on spring passage, one was seen being mobbed over the Inner Group before landing on Knoxes Reef on 1 April. Autumn passage commenced with one west over Inner Farne on 14 September followed by singles on eight dates 7 October-26 November. The only multiple sighting was of three on the Outer Group on 16 October.

Nightjar *Caprimulgus europaeus.* A rare passage visitor.
Three in three years! The hat trick of sightings was completed with the discovery of a roosting male on Brownsman beside the solar panels on 2 June. The bird only paused briefly before flying off and disappearing on to the island. This is the third bird in three years after individuals in October 2013 and June 2012, although only the eleventh record overall.

Nightjar on Brownsman 2 June (David Kinchin-Smith)

Swift *Apus apus.* A well represented summer and passage visitor.
After the first of the summer over Brownsman on 26 May, 1-5 were recorded on 15 dates until 29 August. Peak passage involved 21 south through Staple Sound on 14 July with 11 south the following morning. The final record was of eight west over Inner Farne on 23 September.

Wryneck (Ed Tooth)

Wryneck *Jynx torquilla.* Uncommon passage visitor.
Three individuals were recorded on the islands this year. A bird was seen on Ladies Path on Inner Farne on 21 April with another on Brownsman on 28 April. The only autumn record was one on Brownsman on 14 September which moved to nearby Staple Island.

Golden Oriole *Oriolus oriolus.* Extremely rare visitor.
One of the birds of the year was discovered in vegetation surrounding the pond on Brownsman on 17 September. The individual, a first-winter, remained around the artificial tree for the next few hours and showed well for all Rangers present. This was only the third ever Farnes record after an immature on Inner Farne on 22-26 May 1992 (which died on the last date) and another on Brownsman on 22 August 1976.

Red-backed Shrike *Lanius collurio.* An uncommon passage visitor.
The islands produced two records this year: a female was present on the afternoon of 4 June on Longstone, and an elusive first-winter bird took up residence on Brownsman from 16-19 September and during its short stay was seen to prey on a number of passerines. The islands have now boasted more than 90 records in the past 40 years.

First-winter Golden Oriole on 17 September (David Roche)

Jackdaw *Corvus monedula.* A well represented visitor. Former breeder, last in 1966.
A typical year for this species with just four records: two spring and two autumn. Two were noted east over Inner Farne on 22 and 24 April with three west over the Inner Group on 22 September. The only Outer Group record was of one west over Brownsman on 16 October.

Rook *C. frugilegus.* A well represented visitor.
Spring passage produced 1-2 on seven dates 22 March-9 May, all from the Inner Group. As usual autumn was less productive with one west on 22 September, four west on 5 October and three west on 10 October.

Carrion Crow *C. corone.* A well represented visitor and rare breeding species.
Present throughout the year and for the second consecutive season a nesting attempt was made in the old tower on Brownsman. Peak passage occurred during the spring with 10-12 recorded on five dates with 13 on 6 April, while an impressive 56 flew west on 5 May (in three flocks) over the Inner Group. This represents the second highest ever count for the islands after 62 in April 2005. Autumn passage was light with a maximum of 13 on 2 October.

Goldcrest *Regulus regulus.* A common passage visitor.
Light spring passage produced 1-6 daily between 25 March-6 April with a peak of eight on Inner Farne on 1 April. After the first autumn bird on Inner Farne on 19 August the islands produced records on a further 56 dates until 24 November. However numbers remained low with the highest counts being 30 on 16 October, 18 on 12 November, 33 on 20 November and 17 on 21 November.

Great Tit *Parus major.* Uncommon visitor.
The majority of our common woodland species are rare on the islands; however a male Great Tit was discovered singing on Brownsman on 1-2 April. This represents the first record in nine years after a male on Brownsman in March 2005. Interestingly the majority of Farnes birds arrive on southeasterly weather fronts suggesting a continental origin.

Skylark *Alauda arvensis.* A common passage visitor. May have bred in 1865 and around 1900.
Spring passage was light with 1-5 present on nine dates from 30 March-6 May and a peak of six on Inner Farne on 31 March. Autumn passage began on 15 September with seven recorded, followed by 1-10 on a further 27 dates until last seen on 26 November. Peak passage involved 13 on 30 September and 18 on 29 October.

Sand Martin *Riparia riparia.* A well represented summer and passage visitor.
The first record of the year was of two north over Inner Farne on 10 April and was followed by 1-3 on a further five spring dates until 16 May. Autumn passage was light with 1-3 on three dates from 11 July-29 August; one over Inner Farne on 3 September was the last sighting of the year.

Swallow *Hirundo rustica.* A common summer and passage visitor. Scarce breeder.
The first bird of the year was seen flying over Inner Farne on 7 April with seven north on 10 April. Thereafter reasonable numbers were recorded on passage with a peak of 38 north on 6 May. The breeding population remained strong and a total of 6 (5) pairs nested as follows: Inner Farne 2 (1), Staple Island 0 (1), Brownsman 1 (1), Longstone 3 (2). Most pairs were successful with buildings utilised on the islands including St Cuthbert's Chapel, the Carbide Store and the Longstone Lighthouse. A pair on Inner Farne successfully raised two broods. Autumn passage produced 107 south on 29 August, 45 west on 9 September, 40 west on 13 September, and the last of the year was seen over Brownsman on 28 September.

House Martin *Delichon urbicum.* A well represented summer and passage visitor. Six pairs attempted to breed in 1950.
The first birds of the year were two north over Inner Farne on 6 May with 1-2 on a further six spring dates until 10 June (including one caught and released in the Brownsman cottage on 26 May). Autumn passage began on 7 July with 1-4 on five dates and eight west on 7 September. The last record was of two over Inner Farne on 13 September.

Yellow-browed Warbler *Phylloscopus inornatus.* An uncommon passage visitor.
Another tremendous year with no fewer than 11 different individuals recorded (20 recorded last season). A long-staying bird remained on Inner Farne from 17-29 September (the longest stay on record) with another on Brownsman on 18-19 September. Early October produced three on Brownsman on 7 October with one still present the following day, and another on Inner Farne on 14-15 October. Further records included two on Brownsman on 15-17 October and another on Inner Farne on 20 October. The final record was of two on Inner Farne on 30 October with one still present the following morning.

Dusky Warbler *P. fuscatus.* Rare visitor.
This rare Siberian vagrant was discovered on Brownsman on 30 October and remained for three days until 1 November. Despite its vocal nature the bird could be highly elusive during its short stay and represents the seventh Farnes record following individuals in 1989, 1990, 1991, 1997, 1999 and 2003. The bird was caught and ringed on its first evening on the islands.

Chiffchaff *P. collybita.* A common passage visitor.
Favourable weather in early spring produced a single on Inner Farne on 21 March, the joint earliest ever record after one in March 2005. Birds were present daily thereafter with four by 29 March. April produced daily sightings with a spring peak of 24 on 21 April. There was a gradual decline in May with the last spring sighting on Brownsman on 13 June. Autumn passage commenced with a single on 26 August, and birds were present throughout the autumn months peaking at six on 17 September. The species is being recorded later and later, and interestingly November produced reports on nine dates with the last record on Brownsman on 2 December.

Willow Warbler *P. trochilus.* A common passage visitor.
Well represented on spring and autumn passage. The first arrived on 17 April and there was a continued presence on the islands until last seen on 7 June. Numbers usually involved 1-6 with noticeable peaks of 26 on 27 April and 18 on 28 April. Autumn records began on 25 July with 1-10 noted on 51 dates until last seen on 10 October.

Blackcap *Sylvia atricapilla.* A common passage visitor.
The first bird of the year, a male, arrived on Inner Farne on 2 April (the earliest in three years); thereafter spring passage was represented by 1-4 on 20 dates until last seen on 5 June. During this period numbers peaked at eight on 28 April. Autumn records began with the arrival of an individual on Brownsman on 14 September, and there were 1-6 on 37 dates until last seen on 28 November. The peak count of the season was on 30 October with 23 counted across the islands.

Barred Warbler *S. nisoria.* An uncommon passage visitor.
A return to form with three records during the autumn all involving first-winter birds. Two were present on Inner Farne on 6 September but one was discovered dead later that day while the second individual remained until 10 September. The third record concerned an obliging individual on Brownsman on 19 September. The past decade has produced no fewer than 40 individuals on the islands.

Barred Warbler on Brownsman (David Kinchin-Smith)

Garden Warbler *S. borin.* A common passage visitor.
Spring was quiet with one on Inner Farne on 22 April (the earliest since 2003), two on Brownsman on 10 May and a single on Longstone on 4 June. However the lack of spring records was made up for in autumn with 1-5 on 14 dates between 26 August-9 October. Peaks during this period included seven on 16 September with six still present the following day.

Lesser Whitethroat *S. curruca.* A common passage visitor.
Spring birds were seen on nine dates and after a single on Brownsman on 21 April (earliest since 2006) numbers peaked with six across the islands on 26 April. Over the following few days 4-5 were seen until last recorded on 5 May. Autumn was more productive than usual with reports of 1-2 on 16 dates between 3 September-8 October.

Whitethroat *S. communis.* A common passage visitor.
After the first arrival on Brownsman on 23 April, 1-2 were noted on a further 17 spring dates until last seen on 5 June. During this period numbers peaked at four on 20 May with two on Brownsman and singles on Inner Farne and Staple Island. Autumn produced 1-2 on 11 dates between 12 August-20 September.

Grasshopper Warbler *Locustella naevia.* A well represented passage visitor.
A desperately quiet season with just two records, both from the Inner Group, the worst showing since 2002. An individual was flushed from vegetation on the West Wideopens on 14 September with another on Inner Farne on 19 September.

Sedge Warbler *Acrocephalus schoenobaenus.* A well represented passage visitor.
The first arrived typically in early May with two present on Brownsman on 7 May and singles on a further four spring dates between 20 May-3 June including a singing male on Inner Farne. Autumn passage produced singles on five dates between 21 July-20 September.

Reed Warbler *A. scirpaceus.* A well represented passage visitor.
A very quiet year with just three confirmed records including a spring record for the second consecutive year: an individual on Brownsman on 7 May. Other records concerned singles on Inner Farne on 10-11 September and another on 18 September.

Wren *Troglodytes troglodytes.* A common visitor and passage migrant. A rare breeder.
Up to four were present on Inner Farne during the early spring with an influx bringing 13 to the islands on 30 March. Numbers gradually dwindled in April with the last spring report involving one on Brownsman from 2-4 May. The first autumn returnee was recorded on 2 September and thereafter there was a daily presence on the islands until the end of the year. It proved to be an exceptional autumn with high numbers recorded especially on Inner Farne where there were 27 on 16 October, 28 on 31 October and 27 on 15 November. Wintering numbers suggested up to ten on Inner Farne, a single on Staple Island and four on Brownsman.

Starling *Sturnus vulgaris.* A common visitor, extremely rare breeder.
Small numbers were evident in early spring with 1-8 in late March and early April and a peak of 15 on 1 April. The final spring record was on 28 April with two present on Brownsman. Family parties from the nearby mainland started appearing on the islands from 11 June and numbers increased rapidly with 46 on 28 June increasing to 85 on 9 August. Birds were present throughout the autumn including continental birds on passage with peak counts of 109 west on 14 October, 130 west on 30 October, and 250 west on 8 November.

Ring Ouzel *Turdus torquatus.* An uncommon passage visitor.
A reasonable showing with a male seen briefly near the lighthouse on Inner Farne on 5 April before departing west. Further spring sightings included singles on 22, 24 and 27 April and 1 May. The only multiple sighting during this period was a pair on Inner Farne on 25 April. Autumn passage was light with one west over the Outer Group on 30 October and two west over Brownsman on 6 November, one of which was seen later that day on Inner Farne.

Blackbird *T. merula.* An abundant passage visitor. Rare historic breeder.
Spring passage was light with 1-9 on 24 dates from 21 March-5 May and a peak of 49 west on 2 April. The first autumn returnees arrived on 7 October with six across the islands and individuals were present until the year end. During this period a substantial arrival occurred on 30 October with 1,372 counted west (Table 14). Westerly passage continued throughout November with regular daily counts of up to 70.

Fieldfare *T. pilaris.* A common passage visitor.
Small numbers were seen on spring passage with 1-11 on 13 dates from 21 March-27 April and a peak of 17 west on 25 April. A late spring straggler was on Brownsman on 2 May. The first autumn passage migrants arrived on Inner Farne on 12 September and Brownsman on 16 September. Thereafter they were well recorded on passage with a new Farne Islands record count of 8,245 flying west over the islands on 30 October (Table 14), significantly more than the previous high count of 4,980 on 22 October 2002.

Song Thrush *T. philomelos.* A common passage visitor.
Spring passage produced 1-8 on 22 dates from 22 March-3 May with a peak of ten on 30 March and 13 on 2 April. After singles on Inner Farne on 4 and Brownsman on 5 September, the islands produced regular records throughout the autumn months. Passage numbers peaked at 200 west on 30 October (Table 14) with 15-20 on four November dates.

Redwing *T. iliacus.* An abundant passage visitor.
Light spring passage produced 1-17 on nine dates from 30 March-17 April with a peak of 46 on 7 April in four flocks. The first autumn returnee was noted on 14 September with an individual on Brownsman, followed by regular passage from 6 October. During the autumn passage peaked at an impressive 9,407 west on 30 October (Table 14), the fourth largest ever Farnes count although some way off the 30,000 recorded on 9 October 1975. There were no other significant counts apart from 1,240 west on 6 November.

Table 14. Noticeable westerly thrush passage over the Farne Islands autumn 2014.

	30 Oct	6 Nov
Blackbird	1,372	378
Fieldfare	8,245	410
Song Thrush	200	23
Redwing	9,407	140

Mistle Thrush *T. viscivorus.* An uncommon passage visitor.
The species remains scarce on the islands; two flew south over Brownsman on 2 April having arrived from the nearby South Wamses. The only other record was a single west over Inner Farne with other thrushes on 20 November.

Spotted Flycatcher *Muscicapa striata.* A well represented passage visitor.
The first sightings of the year were singles on Inner Farne and Brownsman on 20 May, and were followed by 1-2 on six dates from 28 May-5 June. All the autumn-passage birds were seen on the Outer Group with singles on seven dates from 3-19 September and two on Brownsman on 18 September.

Robin *Erithacus rubecula.* A common passage visitor. Bred in 1951.
Well represented with up to four overwintering on the islands; an early spring influx produced 23 on 1 April, 25 on 2 April and 20 on 4 April. There remained a presence on the islands throughout April and early May with late passage birds on Longstone on 20 May and Brownsman on 4 June. The first autumn returnees arrived on 5 August with a daily presence until the year end. Peaks during this period included 14 on 15-18 September, 22 on 30 October and 19 on 20 November. Birds once again settled to overwinter with four on Inner Farne and three on the Outer Group.

Bluethroat *Luscinia svecica.* An uncommon passage visitor.
The Farnes remain the number one North East locality for this migrant. The only record of the year involved a stunning male on Inner Farne on 20 May which showed well in Central Meadow having been initially discovered by a visitor.

Red-breasted Flycatcher *Ficedula parva.* An uncommon passage visitor.
The real 'purple patch' for this eastern flycatcher continued as the islands produced four individuals. Spring brought an adult female to Brownsman on 27 May which was discovered on the artificial tree but soon disappeared. Autumn brought two first-winter birds together on Brownsman on 14 September, with another on Inner Farne on 18-20 September which was caught and ringed. This brought the total to 21 in the past ten years.

Pied Flycatcher *F. hypoleuca.* An uncommon passage visitor.
A reasonable showing of this attractive black and white flycatcher, including three on spring passage. An adult female was on Brownsman on 20 April (the earliest ever record) with a first-summer male on Inner Farne on 28-29 April and another male on Brownsman on 28 April. The first autumn bird arrived on Brownsman on 30 August and thereafter 1-5 were seen on 12 dates from 2-20 September with peaks of eight on 4 and six on 15 September.

Black Redstart *Phoenicurus ochruros.* A well represented passage visitor.
A good showing on passage with a single on Inner Farne on 28-31 March increasing to two on 1 April and three present on 2-4 April. At least one of these birds remained until 8 April. The only other spring record involved one on Brownsman on 25 May. Autumn passage brought singles to Brownsman on 15-16 October with five on the islands on 30 October. Thereafter there was a daily presence of 1-2 until last seen on 21 November.

Black Redstart on 30 October (David Steel)

Redstart *P. phoenicurus.* A common passage visitor.
The first bird of the year arrived on 22 April with individual males on both Inner Farne and Brownsman and three present the following day. Thereafter 1-2 were noted on six dates from 24 April-15 May. The first autumn birds were seen on 12 August with one on Brownsman. However a quiet autumn produced 1-4 on nine dates from 3-21 September with a peak of seven on 16 September.

Whinchat *Saxicola rubetra.* A common passage visitor.
As usual the majority of records occurred during the autumn with spring producing just two records. An adult female was on Inner Farne on 29 April with another on 16-17 May. Autumn passage commenced with the arrival of one on Brownsman seen on 26 and 28 August. There were two on 3 September increasing to 17 across the islands on 4 September (8 Brownsman, 4 South Wamses, 3 Inner Farne and 2 Longstone) with eight present on 5 and seven on 6 September. Thereafter 1-4 were recorded on 11 dates until the last was seen on Brownsman on 8 October.

Wheatear *Oenanthe oenanthe.* A common passage visitor. Bred in six years 1931-59.
The first bird of the year arrived on 29 March with three (male and two females) on Inner Farne and five present the following day. Thereafter 1-10 were recorded on 34 spring dates until last seen on 18 May, with peaks of 17 on 27 April and 14 on 28 April. Autumn passage commenced with two on Inner Farne on 11 August and 1-10 on 56 dates until last seen on 14 October. The autumn peak was a modest 13 on 15 September while a late individual was on Staple Island from 29 October-3 November, the latest since 2000.

Dunnock *Prunella modularis.* A common passage visitor. May have bred in the 1890s.
Small numbers overwinter and are supplemented by passage birds in spring and autumn. In spring 1-3 were noted on eight dates from 31 March-30 April, with numbers peaking at five on 2 April. The first autumn migrants arrived on 10 September and there was a daily presence of 1-6 until the end of the season with autumn peaks of nine on 12 October and ten on 30 October. As usual it was evident that two were wintering on Inner Farne and one on Brownsman.

Tree Sparrow *Passer montanus.* Uncommon visitor.
One of the more unexpected and unusual records of the year as a party of 26 was seen to arrive from the west, landing on Brownsman on the morning of 2 September. The birds, all juveniles, were observed feeding in the nettle patches on the island but were mobile and moved on soon after. However one was seen later on Inner Farne before departing towards the mainland while another remained on Brownsman for a further four days and was last seen on 6 September. Interestingly birds have been recorded in 30 years since the first recording in 1885, with the majority occurring in spring. This was also a record count for the islands, the previous being 11 in 1972.

Yellow Wagtail *Motacilla flava flavissima.* An uncommon passage visitor.
Another reasonable showing of this nationally declining species. Spring produced singles over Inner Farne on 21 and 23 April, with another over Staple Island on 4 May. Autumn records included three west over Inner Farne on 3 September with another on Longstone that day, and a single on Brownsman then Inner Farne on 16 September.

Citrine Wagtail *M. citreola.* Extremely rare visitor.
After the two individuals seen last year, the islands produced another of these rare eastern Wagtails. A first-winter bird was discovered on Brownsman 'flats' on 27 August and showed well on the nearby pond. The bird eventually departed west and was rediscovered on Inner Farne where it remained until dusk. This represents the sixth Farnes record since the first in 1989.

Grey Wagtail *M. cinerea.* An uncommon passage visitor. May have bred in the 1890s.
Passage was confined to autumn with 1-2 on seven dates from 7 September-13 October, and three west over Inner Farne on 22 September. A very late individual was noted on the Top Meadow of Inner Farne on 25 November.

Pied Wagtail *M. alba yarrelli.* A well represented summer and passage visitor and uncommon breeding species.

The breeding population remains strong, with small numbers recorded on passage. Early spring produced seven on 22 March and eight on 24 March with seven west on 10 April. Territorial disputes started in late March and nesting material was being gathered from 15 April. A total of 6 (8) pairs nested as follows: Inner Farne 3 (3), West Wideopens 0 (1), Brownsman 1 (2), Staple Island 1 (1) and Longstone Main 1 (1). The first eggs were discovered on 8 May and as usual the population appeared to have a good breeding season with plenty of fledged juveniles around the islands from 5 June. Post-breeding roosts attracted 20 to Brownsman on 30 July, 13 to Inner Farne on 5 August and 16 on 26 August, with 20 on Brownsman on 26 August. The species was scarce during the autumn with the last record involving one on Inner Farne on 31 October.

Olive-backed Pipit *Anthus hodgsoni.* A rare visitor.

The status of this once truly rare Asiatic pipit has been transformed in recent years. After the first Farnes record in 2001 (involving two individuals) birds have occurred in 2010, 2011, 2012 (three) and 2013. For the fifth consecutive year an individual graced the islands, an obliging bird being seen on Brownsman on 15-18 October, favouring the vegetation around the pond.

Olive-backed Pipit on Brownsman 16 October (David Steel)

Red-throated Pipit *A. cervinus.* A rare visitor.

A vocal bird was discovered on Staple Island on 20 May before moving to nearby Brownsman. However before it could be relocated the bird departed west and was last seen heading towards the mainland. This represents the eighth Farnes record after individuals in 1974, 1991, 1997, 2005, 2007 and two in 2009. Interestingly all records have occurred on either Staple Island or Brownsman.

Tree Pipit *A. trivialis.* A common passage visitor.
A typical year with light spring passage backed by a reasonable showing during the autumn. The first bird arrived on Inner Farne on 27 April and was followed by 1-2 on four dates until 20 May. Autumn passage produced 1-5 on 13 dates from 11 August-1 October with a peak of six across the islands on 19 September.

Meadow Pipit *A. pratensis.* A common passage visitor. Rare historic breeder.
Well represented on passage with good numbers reported. Spring produced a good influx in late March-early April with peaks of 78 west on 31 March and 50 on 1 April. Numbers dwindled during April with 34 on 30 April and the last spring record was of one west over Brownsman on 10 May. Autumn passage commenced on 26 August with good numbers reported in mid-September, including 85 on 16 September and 87 on 17 September. Smaller numbers of 1-45 were recorded daily throughout October with 1-13 in November. A late passage bird was present on West Wideopens on 3 December.

Rock Pipit *A. petrosus.* A common resident well represented as a breeding species.
Breeding birds were evident on the islands in late March with territorial behaviour observed from 22 March. Nest building commenced on 11 April with the first egg discovered on Brownsman in early May. A total of 28 (26) pairs nested as follows: Inner Farne 6 (5), West Wideopens 2 (2), East Wideopens 1 (1), Staple Island 5 (5), Brownsman 10 (9), North Wamses 1 (1), South Wamses 1 (1), Longstone Main 1 (1) and Longstone End 1 (1). The first chicks hatched on 20 May and it appeared to be another good breeding season with plenty of fledged young recorded from 27 May. Post-breeding flocks gathered with 27 on Brownsman on 18 July while autumn passage produced a count of 43 on 29 September.

Chaffinch *Fringilla coelebs.* A common passage visitor.
Spring produced 1-4 on seven dates from 31 March-6 April with a peak of eight on Inner Farne on 2 April. Autumn passage commenced with the arrival of 14 across the islands on 15 September and birds were resident for the following 12 days with up to 15 on Brownsman. Birds were recorded on 12 October dates with a peak of ten on 9 October while a male was resident on Brownsman from 12-30 November.

Brambling *F. montifringilla.* A common passage visitor.
Light spring passage produced singles on Inner Farne on six dates from 22 April-2 May; a similar pattern occurred on Brownsman with singles on three dates during the same period. The exception was eight on Brownsman on 25 April with four still present the following morning. Autumn passage commenced with four on the Outer Group on 17 September and thereafter 1-10 were recorded on seven September, fifteen October and four November dates. Peak passage occurred in late October with 41 west on 30 October. The final record of the year involved one on Brownsman on 1 December.

Greenfinch *Chloris chloris.* A well represented passage visitor.
The number of records continues to decline with only one confirmed sighting: two were discovered in Hemlock on Inner Farne on 5 October before departing west. The last Outer Group record was as long ago as October 2009.

Goldfinch *Carduelis carduelis.* A well represented passage visitor.
A reasonable year with 1-4 noted on 19 spring dates from 1 April-5 May with a peak of 13 west over Inner Farne on 5 April. Autumn passage was represented by 1-2 on 11 dates from 18 September-5 November.

Siskin *C. spinus.* A common passage visitor.
Light spring passage produced just a single record: a female on Staple Island on 21-23 May. Autumn passage commenced on 18 September with five in the vegetable garden on Inner Farne and thereafter 1-5 on 11 dates from 19 September-10 November. Peak counts included six west over Brownsman on 31 October and seven west over Inner Farne on 6 November.

Linnet *C. cannabina.* A common passage and winter visitor. Bred in the 1890s.
As usual well represented with good numbers recorded especially on the Inner Group of islands. Spring passage produced 1-8 on 29 dates from 24 Match-14 May with a peak of 20 on 1 April. A late spring passage bird was noted flying over Inner Farne on 9 June. The first autumn birds arrived on 22 September with 28 on Inner Farne and thereafter there was an almost daily presence until the end of the year. During this period numbers fluctuated with a peak count of 120 on Inner Farne on 27 October and counts of 60-80 on 11 days in November.

Twite *C. flavirostris.* A well represented passage visitor.
A reasonable showing of this northern finch: a flock of 18 gathered on Inner Farne on 12 October, feeding along the cliff tops with 15 still present the following day. Thereafter 1-3 were noted on nine dates from 14 October-7 November with four present on Brownsman on 30 October.

Lesser Redpoll *C. cabaret.* An uncommon passage visitor.
Small numbers are recorded annually: one seen on Inner Farne on 26 April increased to three the subsequent day. Autumn produced a small influx in mid-September with a single on Brownsman on 14-15, two on 16 and a peak of four on 17 September. At least two of these birds remained until 19 September. All other records referred to singles on Inner Farne on 21 September, Brownsman on 16 October and Inner Farne on 30 October.

Common Redpoll *C. flammea.* An uncommon passage visitor.
This northern Redpoll was recorded on four occasions on spring passage: a female/immature was seen on Inner Farne on 31 March-2 April with a male present on 3 April. Further spring reports included singles on Inner Farne then Staple Island and then Brownsman on 27-28 April and Brownsman on 6 May. Autumn produced singles on Brownsman on 16 October, 15 November and 27 November.

Redpoll spp.
As Common and Lesser Redpoll cannot be distinguished in flight and/or call, birds flying over the islands could not be identified to a particular species. 1-2 were recorded on 6 May, 5 and 29 October and 21 November.

Common Rosefinch *Carpodacus erythrinus.* Uncommon passage visitor.
After a lean couple of years for this east-coast drift migrant, two arrived on the islands in mid-September. A vocal bird was discovered on Brownsman on 17-19 September and was caught and ringed on its second day. At the same time a different bird was in the vegetable garden on Inner Farne on 17-18 September.

Snow Bunting *Plectrophenax nivalis.* A well represented passage visitor.
As usual spring passage was light with two on the north rocks of Inner Farne on 22 March and one lingering until 25 March. Autumn passage commenced with one west over Brownsman on 4 November. Nine were seen flying west over Brownsman on 5 November and were discovered later that day feeding on the north rocks of Inner Farne. Thereafter 1-4 were recorded on 18 days in November and three December dates, often involving birds moving west towards the mainland.

Lapland Bunting *Calcarius lapponicus.* An uncommon passage visitor.
A very quiet autumn with just one record: two flew low over Central Meadow on Inner Farne on 16 October before departing west. This was a very poor showing for this high-arctic breeder.

Yellowhammer *Emberiza citronella.* An uncommon passage visitor.
Three arrived on the islands on 30 October with singles on Brownsman, Staple Island and Inner Farne. Two were then present on 31 October-1 November on Brownsman with one lingering until 3 November. Another female-type was on Brownsman on 19-20 November. This is the best showing since 2006.

Ortolan Bunting *E. hortulana.* Uncommon passage visitor.
A first-winter bird was discovered feeding on the east rocks of Brownsman on 11 September and showed well for the admiring Rangers. This represents the first record since three were together on Inner Farne on 8-11 September 2010 and represents the 42nd Farnes record overall.

First-winter Rustic Bunting on Brownsman 15 September (David Kinchin-Smith)

Rustic Bunting *E. rustica.* Extremely rare visitor.
One of the highlights of the autumn was the appearance of one of these rare eastern buntings with a first-winter bird on Brownsman from 15-19 September. The bird was initially discovered behind the cottage and it remained loyal to that area throughout its stay, often associating with a Little Bunting. This represents the sixth Farnes record (three spring and three autumn) after individuals in 2012, 1995, 1994, 1993 and 1992.

Little Bunting *E. pusilla.* An uncommon passage visitor.
After the good showing (four records) of this small bunting last year, the islands produced only two individuals this year. A skulking bird was present on Brownsman from 14-19 September and was caught and ringed during its stay. A different individual was discovered on the afternoon of 19 September on Inner Farne, favouring Top Meadow area of the island.

Reed Bunting *E. schoeniclus.* A well represented passage visitor.
Spring passage was typically light with singles recorded on 11 dates from 27 March-1 May and two present on 22 April. Unlike the previous autumn only small numbers were recorded with 1-5 noted on 12 dates from 24 September-31 October. During this period numbers peaked at six on 8 October and ten on 9 October.

EXOTICA

Red-breasted Goose *Branta ruficollis.* First record but obvious escape.
The species remains a rare eastern visitor to the UK during the winter months, so the individual that the Ranger team noted flying over Staple Island on 8 June was somewhat unexpected! The bird, an adult, flew east over Staple Island, then over Brownsman and towards the Wamses but was not seen again. Due to the time of year and location, this bird was assumed to be of captive origin.

BIRD RINGING AND RESEARCH ON THE FARNE ISLANDS IN 2014

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INTRODUCTION

Understanding the biology of birds in the wild requires individuals to be captured, marked uniquely and safely released. The long-established use of metal rings is complemented by a range of other tools, including coloured rings that can be read without the bird being captured and electronic devices which record aspects of bird behaviour and location. All these techniques are now used on the Farnes in the context of short- and long-term research and monitoring studies. A new project was started this year by Liz Morgan, a PhD student from Leeds University, who is using GPS and other logging devices to study the foraging behaviour of Shags. This work will nicely complement Richard Bevan's previous studies on the foraging and diving behaviour of Farnes Shags and his ongoing studies into the foraging strategies of Farnes Puffins. Colour-ringing with uniquely coded plastic rings was continued with Shags, part of a large scale project led by the Centre for Ecology and Hydrology, Edinburgh, and with Sandwich Tern chicks; in addition, a new colour-ringing project on Little Terns, led by the RSPB, was initiated. Ringing with metal rings only was continued with a range of seabird species as this provides core demographic information for long-term monitoring. However, on the back of this conventional ringing, biometric data on adults and chicks of Arctic Terns, Puffins and (when time allows) Kittiwakes are collected as this allows studies on how environmental factors and visitor disturbance might affect breeding productivity, ageing and other aspects of bird biology.

RINGING TOTALS IN 2014

Ringing and recapture totals for the year are summarised in Table 1 (seabirds) and Table 2 (non-seabird species). The total seabirds ringed in 2014 (2013 in brackets) increased to 2,844 (2,120), an excellent total which reflects the importance of ringing as a monitoring tool to increase confidence in estimates of productivity, particularly of Arctic Terns, and the increased effort on the ringing of Sandwich Terns. Of the 514 Sandwich Tern chicks ringed this year, 181 were also fitted with uniquely-lettered plastic colour rings to enable detailed studies of movement patterns, dispersal dynamics and, when chicks return to start breeding, breeding site fidelity. Most of the Shags (211) were also similarly colour-ringed. As last year, a small number of other species, mainly passerines but including a Woodcock and a Water Rail, were also ringed during the autumn migration period as opportunities arose (Table 2). The ringing total for these other species was down by 67 on the total for last year, but included good numbers of migrant Goldcrests (26).

Table 1. Seabird ringing and recapture totals.

	Full Grown				Chicks	
	Ringed		Retrapped		Ringed	
	2013	2014	2013	2014	2013	2014
Storm Petrel	**12**	21	3	3		
Leach's Petrel		3		1		
Fulmar	**6**	2	2		122	157
Gannet		2				
Cormorant					9	8
Shag	**23**	38	15	12	142	175
Mallard	**4**	1				
Eider	**5**	6	14			
Puffin	**133**	70	2		96	73
Little Auk		1				
Razorbill	**2**		1		5	1
Guillemot	**3**				6	
Kittiwake	**2**	6	5		116	521
Black-headed Gull					4	50
Lesser Black-backed Gull					10	
Little Tern				1		
Sandwich Tern					120	514
Common Tern						32
Arctic Tern	**108**	106	152	132	1187	1057
Oystercatcher					2	
Ringed Plover					3	
Total	**298**	**256**	**194**	**149**	**1822**	**2588**

Table 2. Ringing and recapture totals for non-seabird species

	New	Re-trap	Total
Water Rail	1		**1**
Woodcock	1		**1**
Swallow	15		**15**
Tree Pipit	2		**2**
Meadow Pipit	1		**1**
Rock Pipit	3		**3**
Wren	13	3	**16**
Dunnock	4	1	**5**
Robin	9	3	**12**
Redstart	3		**3**
Wheatear	3		**3**
Blackbird	15		**15**
Song Thrush	3		**3**
Redwing	3		**3**
Lesser Whitethroat	3	1	**4**
Whitethroat	1		**1**
Garden Warbler	2		**2**
Blackcap	8		**8**
Dusky Warbler	1		**1**
Yellow-browed Warbler	1		**1**
Chiffchaff	6		**6**
Willow Warbler	8		**8**
Goldcrest	26	3	**29**
Spotted Flycatcher	3		**3**
Pied Flycatcher	2		**2**
Red-breasted Flycatcher	1		**1**
Red-backed Shrike	1		**1**
Starling	1		**1**
Tree Sparrow	1		**1**
Brambling	2		**2**
Siskin	1		**1**
Linnet	3		**3**
Lesser Redpoll	2		**2**
Common Rosefinch	1		**1**
Little Bunting	1		**1**
Total	**151**	**11**	**162**

RINGING RECOVERIES

The use of coded plastic rings results in a large number of sightings each year. Generally the distribution of sightings has reflected historical patterns of metal ring recoveries. For Sandwich Terns, one relatively unusual sighting was an Inner Farne chick from this year which was seen at Nimmo's Pier, Galway, Eire, in December 2014 and was presumably wintering there (with at least one of its parents) rather than on the coast of West Africa. Shags from the Farnes tend to disperse mainly north for the winter although some do go south. Over the 2013/2014 winter five Shags, mainly young birds but including one adult, were found dead in Orkney; such a concentration of recoveries of Farnes Shags so far north is unusual. In addition one young bird was found near Braintree, Essex and another was found on the west coast of the UK near Heysham, Lancashire. The recovery of a young Cormorant on Rothesay, Argyll and Bute, is also interesting and could be the result of an overland movement, perhaps along the Tyne valley or via the Firths of Forth and Clyde.

The recoveries this year included five reports of Arctic Terns from the Farnes which were controlled (caught by ringers and released) on the Ythan Estuary in Aberdeenshire. All were ringed as chicks on the Farnes in June or July (four in 2014 and one in 2013) and controlled on the Ythan in July or August a few weeks later. One of these birds was controlled on the Ythan 26 days after being ringed as a chick on Brownsman on 29 June 2014. This suggests that, at least in some years, Farnes Arctic Terns travel north after fledging, as do our Sandwich Terns.

The increased effort on Storm Petrels in 2014 (21 ringed compared to 12 last year) resulted in three birds controlled on the Farnes and three of the Farnes-ringed birds being controlled elsewhere. Most of these reflect movements between east coast petrel-ringing sites, with two of the Farnes controls coming from Eyemouth and one from North Yorkshire (Corbay), and one of the Farnes ringed birds being controlled at Eyemouth and one on the Isle of May. The other Farnes-ringed bird was controlled somewhat further away, on the island of Skokholm, Wales, 20 days later.

A new species on the capture list for this year (Table 1) was a Little Tern. One was caught on the pre-breeding roost of this species which builds up on Inner Farne in early May, before they disperse to their breeding sites on the adjacent coast (and possibly further afield). The bird was captured as part of an RSPB-coordinated colour-ringing project to find out more about their movements, dispersal and population dynamics. Unexpectedly it was already ringed: it had been ringed as a chick on the Long Nanny on 5 July 1992 and was therefore nearly 22 years old, which is a longevity record from BTO ringing but just a couple of years short of the European longevity record. Our Farnes bird is now wearing an attractive yellow coloured ring with a three-letter code and we hope that it will survive long enough to be resighted as Europe's oldest Little Tern!

Finally, two Kittiwake recoveries this year are notable: a chick ringed on Inner Farne in 1999 was found in Swedish Lapland, Norrbotten on 24 March 2014, and a chick from Staple Island in 2009 was shot in the Davis Strait off Nuuk, Greenland, on 18 September 2013; this is a further reminder of the additional hazards that our seabirds face once they leave the breeding colonies.

ACKNOWLEDGEMENTS

We are extremely grateful to all the ornithologists who have observed and photographed our colour-ringed Sandwich Terns again this year: these sightings are building up into an impressive database for the analysis of movement patterns. The National Trust Farne Rangers had a considerable input into the seabird ringing and this is invaluable: we are extremely grateful for and appreciative of their efforts. As last year, the author would like to thank the Rangers for lifts across to the islands and their generous hospitality, and to the skippers and crew of all the Farnes visitor boats for lifts back to Seahouses. Lead Ranger David Steel has enthusiastically directed and participated in the ringing studies, and made a tremendous effort to increase the Sandwich Tern ringing totals; as always, we are grateful for his support and encouragement. We also thank John Walton, Fiona Fell and the Local Management Committee for their interest and support. Francis Daunt of the Centre for Ecology and Hydrology, Edinburgh, provided the lettered plastic rings used for Farnes Shags and we are grateful for the opportunity to participate in this research project. We also thank the Natural History Society of Northumbria for the rings.

Common Rosefinch and Little Bunting
(David Roche)

Red-breasted Flycatcher
(David Steel)

SHAG RESEARCH ON THE FARNE ISLANDS IN 2014

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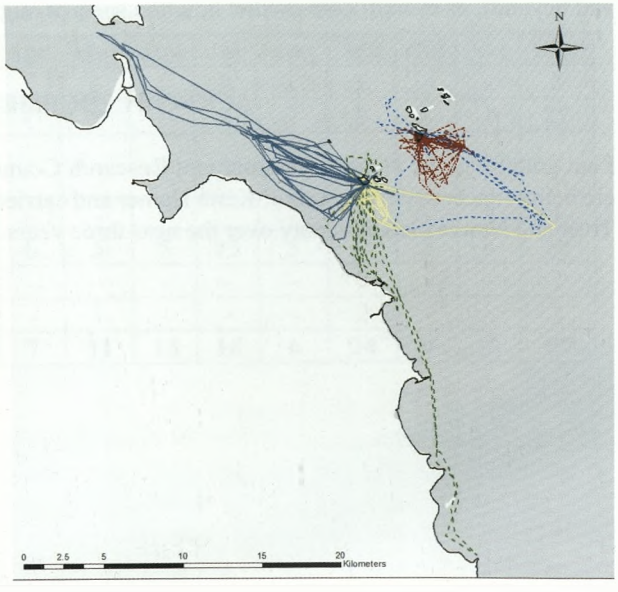
As part of my PhD research into foraging behaviours, I am fitting birds with telemetry devices to find out if individuals show repeatable behaviour in how and where they feed. It is important to understand the levels of flexibility and consistency within a population. If birds show consistent individual variation in their foraging locations (i.e. preferred foraging sites), some individuals may be at more risk than others from changes to the marine environment. The flexibility that individual birds express in their foraging behaviour will affect their ability to adapt to change. Shags provide an excellent opportunity to study this, as they forage over a relatively short range (<20 km), which lets us gather data on multiple trips from the same birds.

To build up a detailed picture of each bird's foraging tactics we fit birds with global positioning system (GPS) tags (Figure 1), which record a location every 60 seconds, along with time depth recorders to log the time and depth of any diving behaviour. These devices need to be retrieved in order to recover any data, so after 4-5 days (about the limit of battery life for the GPS tags) birds are recaptured and the tags are removed. Our first field season was in 2014, and it could not have been a better one. We deployed devices on 33 birds on Inner Farne, Staple Island and Brownsman. Thanks to some dedicated help from staff of the National Trust and Newcastle University, we successfully retrieved and downloaded data from all 33 devices. A 100% return rate is very unusual in seabird telemetry studies, especially for Shags - in fact I am not aware of any other study of the species that has had such a high return rate. Hopefully we will be just as effective next year.

Figure 1. Shag fitted with a GPS and depth recorder (underneath the tail) and map showing GPS locations from five of the Shags tracked on the Farnes in 2014. The yellow track shows the movements of the bird in the photograph over three days in June.



Preliminary results (Figure 1) show that birds made 2-3 foraging trips per day, each lasting between 2-3 hours; the maximum distance that the birds travelled was around 12 km, but many stayed within 3 km of the colonies. There were some interesting foraging patterns comparing birds from the inner and outer islands: birds from the inner islands tended to forage close to the Northumberland coastline and made relatively shallow dives to around 15-20 metres in depth, whereas birds from the outer islands tended to make deeper dives, up to 30 metres in depth, in more pelagic waters. In my final analyses I will be investigating these spatial segregation patterns in more detail.

To complement the telemetry work, I am also collecting data on what the Shags are feeding on. By collecting the mucous pellets that birds regurgitate we can get an insight into their diet; these pellets contain hard, indigestible remains of prey species such as otoliths (fish ear bones) and jaw bones which we can recover and identify. There has been very little information gathered on the diet of Shags on the islands since Tom Pearson's studies in the 1960s, so it will be interesting to see if diets have changed in recent years. In 2014 we collected over 50 pellets from birds nesting on Inner Farne. Next year we hope to collect more pellets from the outer islands to see if the birds' diets differ between islands.

We hope to continue our tracking work in 2015 and 2016, focusing on some of the same individuals to look at repeatability in successive years. We also hope to track both members of a pair simultaneously to see if pairs forage in similar locations. We would also like to see if individuals respond differently to time and tide or to particular seabed characteristics. In recent years Farnes Shags seem to have had more productive breeding seasons than many colonies in the UK, especially those further north. We will eventually compare our results to colonies elsewhere in the UK to see if differences in diet or foraging behaviour could be influencing these differences in breeding success.

Ultimately our results will be added to the seabird tracking database (http://www.seabirdtracking.org), so they will be available to a global audience. Therefore in the future information gained from this study could be used to inform marine spatial planning decisions (both in the local area and beyond), or even to help predict how the species might respond to global change.

ACKNOWLEDGEMENTS

I am grateful to the Natural Environment Research Council for funding my PhD studies, which are being supervised by Professor Keith Hamer and carried out in collaboration with the National Trust and Newcastle University over the next three years.

CETACEANS AND BIG FISH AROUND THE FARNE ISLANDS IN 2014

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INTRODUCTION

With 97 cetacean records this year, sightings were down by almost a third compared to 2013. However diversity was greater with five confirmed species (Minke Whale, Bottlenose Dolphin, White-beaked Dolphin, Risso's Dolphin and Harbour Porpoise). Two other animals have been included in this year's report (Basking Shark and Ocean Sunfish) due to their unusual occurrence in Farnes waters. As in recent years, a combination of casual sightings and regular morning surveys were the recording methods used. Reliable sightings from boat operators are also included, as their time at sea around the islands produces important records which would be missed by the Ranger team.

Surveys carried out from the islands were typically between 07:00 and 09:00, usually lasting for a minimum of 30 minutes. The majority of these 'sea-watches' were carried out from either Lighthouse Cliff or the picnic site on Inner Farne, both of which give the clearest views of Inner Sound. Although casual sightings produced the majority of records, morning surveys produced seven sightings in 38.75 hours of sea watching between 1 May and 31 July, equating to one every 5.5 hours which is slightly down on previous years.

The reduction in cetacean sightings this year was largely due to fewer records of Harbour Porpoise which usually represent the bulk of sightings (Table 2). This may have been a result of the higher number of Bottlenose Dolphins on regular passage through Inner Sound during the summer; Bottlenose Dolphins are known to be highly territorial and aggressive to other species, especially smaller porpoise.

Table 1. Cetacean (and other) sightings on the Farne Islands by month 2014.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Total
Minke Whale	-	-	-	-	1	1	2	-	1	-	-	**5**
Bottlenose Dolphin	-	-	-	1	5	7	2	2	3	6	1	**27**
White-beaked Dolphin	-	-	-	-	-	-	1	1	-	-	-	**2**
Risso's Dolphin	-	-	-	-	-	-	-	-	1	-	-	**1**
Harbour Porpoise	-	-	2	6	5	5	13	3	15	3	6	**58**
Basking Shark	-	-	-	-	-	-	-	-	2	-	-	**2**
Sunfish	-	-	-	-	-	-	-	-	2	-	-	**2**
Grand Total	-	-	**2**	**7**	**11**	**13**	**18**	**6**	**24**	**9**	**7**	**97**

Table 2. Cetacean (and other) sightings on the Farne Islands 2005-2014.

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Humpback Whale	-	-	-	-	1	-	-	-	-	-
Minke Whale	14	1	7	6	5	2	3	11	30	5
Risso's Dolphin	-	1	1	-	1	-	1	-	-	1
Bottlenose Dolphin	10	3	5	3	7	1	-	13	10	27
Common Dolphin	-	-	-	-	-	-	-	-	1	-
White-beaked Dolphin	1	2	2	2	-	-	1	2	-	2
Dolphin *spp.*	-	-	-	-	-	2	1	-	2	-
Harbour Porpoise	59	42	49	26	24	37	93	61	95	58
Basking Shark	-	-	5	-	-	-	-	2	-	2
Sunfish	-	-	1	-	-	-	-	-	-	2
Grand Total	**84**	**49**	**70**	**37**	**38**	**42**	**99**	**89**	**138**	**97**

SYSTEMATIC LIST

Minke Whale *Balenoptera acutorostrata*
It was a quiet year with only five confirmed sightings. The first record was an individual travelling north through Inner Sound, seen surfacing between Shoreston and Monks House on 6 May. This is an early record for the species and came only a week later than the first record last year. The second record occurred on 16 June when a single was seen feeding in Inner Sound before heading north.

The most interesting record of the year was of a young animal seen on three days between 22-24 July. The animal was discovered in Staple Sound and had some rope around its stomach but unfortunately disappeared before anything could be done. The only record of a young Minke last year was on exactly the same date but unlike this one it was accompanied by an adult. The final record of the year occurred on 29 September as one moved north through Inner Sound, surfacing six times before disappearing towards the Goldstone.

Risso's Dolphin *Grampus griseus*
The only record was of a single through Inner Sound on 30 September. The animal moved leisurely south, and surfaced six times before being lost in the sun. The large size and scarring apparent from head to fin indicated that it was an adult and views showed that it was almost all white at the base of the dorsal fin. The species is rare in Farne waters; this is only the sixth record after sightings in 1996, 2006, 2007, 2009 and 2011.

Bottlenose Dolphin *Tursiops truncatus*
An impressive year with regular reports in Inner Sound throughout much of the summer as pods from the Moray Firth were drawn to the Farnes by the rich feeding opportunities. The 27 sightings during the year easily surpassed the totals from any of the last ten years.

The first record was on 24 April with ten travelling south just outside the harbour and a follow-up sighting on 8 May as a pod was seen bow riding *Glad Tidings III* and breeching fully from the water. These were observed from the islands and watched as they passed beneath the lighthouse cliff on Inner Farne before moving on to the Scarcars and heading through Staple Sound. The 12 and 15 May brought sightings of a pod of 30-40 dolphins with a highlight on the latter date

as the pod was observed for much of the afternoon feeding along the tidal edge in Staple Sound. This was one of very few records of Bottlenose in the Outer Group, as they tend to favour more coastal waters.

June was the peak month for the species with seven sightings, the majority of a known pod from the Moray Firth observed on 9, 22, 23, 24 and 25 June. These animals favoured Inner Sound and comprised around 20 individuals including two immature and two calves. Over these dates it was possible to identify one dolphin from the pod known as 'Barracuda', a mature male with very distinctive tooth scrapes down his dorsal fin.

July and August brought only two confirmed sightings while September brought a further three sightings, with a more unusual record on 10 September of a small pod with a very young calf in attendance. Calves are generally born in warmer months so this animal may have been only a few weeks old.

October was a busy month for the species with six sightings. 15 October brought a mixed-aged pod of around 15 dolphins travelling south through Staple Sound; what was thought to be the same pod was seen on 20, 23 and 27 October in Inner Sound. The highlight of the month was on 29 October when a pod of around 60 was observed in Inner Sound, one of the largest pods of Bottlenose ever recorded off the Farnes. The dolphins appeared to be feeding before smaller pods separated and headed south. Concluding a good year for the species, on 30 November a pod of 12 dolphins in three loose groups was feeding outside the harbour.

White-beaked Dolphin *Lagenorhynchus albirostris*
The species is regularly found in the Farne Deeps, a rich feeding ground 20 miles to the southeast of the Farne Islands. The deep glacial tunnels of the Farne Deeps may even be breeding grounds. However White-beaked Dolphins are a rare sight around the Farnes averaging just one record a year in the previous ten years, so the two sightings in 2014 were more than average.

The first record was on 8 July, when four were seen from *Serenity II* travelling north through Inner Sound from the Carr to Stag Rocks. The second sighting was on 2 August, again through Inner Sound. Five were discovered mid-morning from Inner Farne, with video footage from *Glad Tidings IV* showing them swimming alongside and underneath the boat; bow riding is a common behaviour of this species.

Harbour Porpoise *Phocoena phocoena*
The number of sightings was down this year in comparison to 2013, possibly as a result of the increased presence of Bottlenose Dolphins around the islands. There was only one confirmed sighting of calves, so whether productivity of the species suffered may also be questioned.

The year began with two sightings in March with six observed on 10 March feeding around the Shoreston buoy in Inner Sound. There were six sightings in April followed by five in May and June. As in previous years, July was one of the peak months for the species with 13 sightings. Whether this was due to a reduction in Bottlenose Dolphins at that time compared to May and June can only be speculated. August produced just three records, but these were followed by 15 sightings in September. The highlight was on 19 September as a family group of six were observed in Inner Sound. The pod included the only record of calves for the year, with two in attendance, and they lingered for an hour, feeding along the tidal line. Almost a quarter of all Harbour Porpoise sightings this year were of feeding animals, suggesting that food was unlikely to have been a limiting factor for the species.

It was a quiet October for records with just three sightings. Again, there was an increased presence of Bottlenose Dolphins towards the end of the month which may have resulted in porpoise being more elusive. However 30 October did bring the largest group of the year with a pod of ten north through Inner Sound. The year concluded with six sightings in November, while the final two records occurred on 25 November as three and then two were seen travelling north through Inner Sound.

Basking Shark *Cetorhinus maximu*
This species remains rare in Farne waters. One was observed in Inner Sound opposite Bamburgh Castle on 9 September before gradually swimming north. A second sighting was from *Serenity II* on 23 September outside the harbour when an animal was noted travelling north through Inner Sound.

Ocean Sunfish *Mola mola*
Perhaps the strangest pelagic visitor to the islands this year was an Ocean Sunfish, the heaviest bony fish in the world. Sunfish favour warmer seas so it is highly unusual to find them in the cold North Sea at the northerly latitude of the Farnes. There have been only four previous records around the islands, in 1938, 1963, 1973 and 2007. The two records this year are likely to have been of the same animal as they came just seven days apart. Both records were some distance from the islands, but have been included in this report due to the rarity of the species.

The first sighting was made by *Glad Tidings VII* on 6 September in the Farne Deeps, but gave only brief views as the fish dived soon after being spotted. The second sighting was on 13 September by *Glad Tidings V* approximately two miles south of the Scarcars. This record saw the Sunfish displaying its characteristic basking behaviour, in which it rises to the surface on its side to absorb sunlight, allowing it to make dives to deeper, cooler waters. As with the Basking Sharks, these records came in September when the sea was at its warmest.

GREY SEALS ON THE FARNE ISLANDS IN 2014

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PUP PRODUCTION

Recent years have seen a number of bumper autumn totals with Grey Seal pup production (Figure 1) heading towards the highest annual totals since numbers peaked at 2,000 pups in the early 1970s. The season began in unsavoury circumstances as three premature stillborn births were discovered in late August and early September before the first live pup of the season was discovered on Longstone End in late September. Thereafter, numbers peaked in November and pups were born on a total of 12 different islands including an unprecedented 113 on the Inner Group.

Staple Island remained the main nursery with over 500 pups, followed by adjacent Brownsman Island with 451 (Tables 1 and 2). The inter-island changes in the colonies have been very evident on these two islands which now account for 55% of the total number of pups compared to 8% a decade ago.

Grey Seal on the Farnes
(David Noble-Rollin)

Figure 1. Farne Islands seal pup production since 2003.

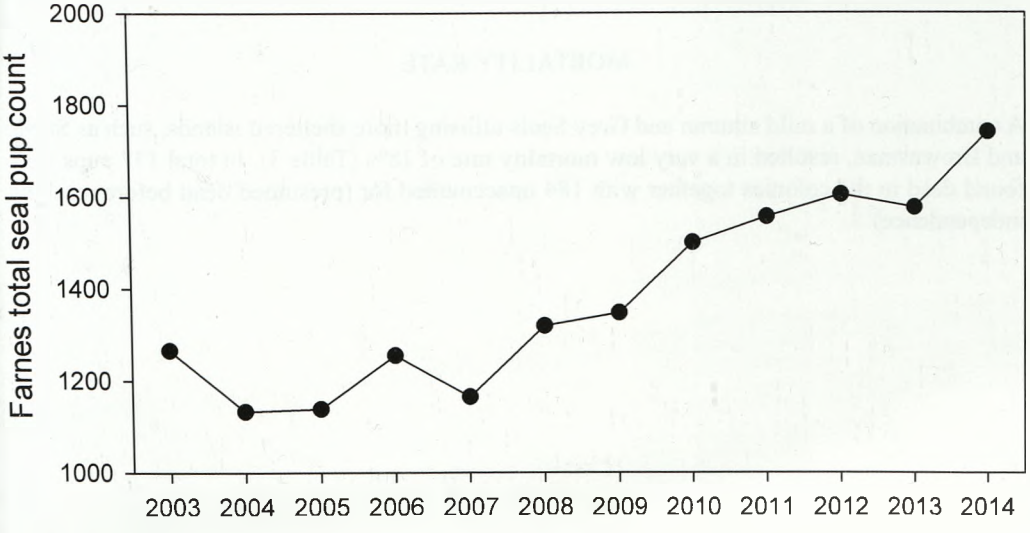

Table 1. Individual Grey Seal pup counts by month and island 2014.

	NW	SW	Staple	Br	Name	BH	NH	Lg	Kn	WW	Scar	IF
Late August	0	0	0	0	0	0	0	1	0	0	0	0
Early Sept	0	0	0	0	0	0	0	1	0	0	0	0
Mid Sept	0	0	0	0	0	0	0	0	0	0	1	0
10 Oct	4	0	0	0	0	0	0	0	0	0	0	0
16 Oct	0	0	0	0	0	0	6	0	0	0	0	0
18 Oct	0	1	1	0	0	0	0	0	0	0	0	0
23 Oct	0	0	0	1	0	0	0	0	0	0	0	0
24 Oct	49	41	14	4	0	0	0	0	0	0	0	0
28-29 Oct	33	60	29	17	0	0	3	0	0	0	0	0
3 Nov	37	80	97	33	0	0	4	1	0	0	0	0
8-9 Nov	21	75	113	96	0	0	6	0	1	0	0	0
15-16 Nov	39	51	105	107	0	0	5	0	0	0	0	0
20-23 Nov	30	45	66	51	0	1	4	0	17	15	0	0
27-28 Nov	7	21	48	36	0	0	4	0	5	19	0	1
3 Dec	5	10	16	53	0	1	6	0	9	14	0	4
5 Dec	2	5	3	10	1	0	1	0	0	3	0	1
28 Dec	0	2	21	43	0	0	0	0	1	12	0	10
Total	**227**	**391**	**513**	**451**	**1**	**2**	**39**	**3**	**33**	**63**	**1**	**16**

Table 2. Pup production on the main Farnes colonies over the last four years.

	2014	2013	2012	2011	2010
Staple Island	513	497	463	475	343
South Wamses	391	382	380	374	418
Brownsman	451	368	373	334	358
North Wamses	227	230	279	253	293
% of total	**90.9**	**93.8**	**93.2**	**92.3**	**94.2**

MORTALITY RATE

A combination of a mild autumn and Grey Seals utilising more sheltered islands, such as Staple and Brownsman, resulted in a very low mortality rate of 18% (Table 3). In total 137 pups were found dead in the colonies together with 184 unaccounted for (presumed dead before reaching independence).

Table 3. Pup mortality statistics for the last five years.

	2014	2013	2012	2011	2010
Successful	1,419	1,165	1,266	1,077	806
Unsprayed dead	71	55	54	62	56
Sprayed Dead	66	78	71	61	54
'Missing'	184	277	312	355	583
Mortality rate	18%	26.0%	27.20%	30.7%	48.2%

ENGLISH EAST COAST COLONIES

It proved to be another good year for seal pup production along the English east coast as other sites reported record numbers. Blakeney Point on the north Norfolk coast was only colonised in 1993 but this autumn it was the largest Grey Seal pup nursery in England with 2,426 pups born (National Trust 2015). Further east at Horsey 800 were born (Friends of Horsey Seals 2015) and at Donna Nook in Lincolnshire 1,798 were born (Lincolnshire Wildlife Trust 2015). Combined with the Farnes, over 6,700 pups were born along the east coast of England this year. This pup boom would suggest further population increases in the future.

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BUTTERFLIES ON THE FARNE ISLANDS IN 2014

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INTRODUCTION

This was the fifth year of conducting regular butterfly transects on the islands, which are giving us a valuable insight into species trends for the islands and how these may differ from those on the mainland. Our first 2014 transect was carried out on 22 July with the last transect undertaken on 7 October. Before and after these dates casual sightings were recorded.

It was a mixed year for butterflies with seven of the twelve species showing a decrease in abundance compared to the previous year, while the Red Admiral experienced a record-breaking year. After above average temperatures during July the weather deteriorated with August being the coldest since 1993. However the first half of August witnessed good weather and as a result the Rangers recorded their biggest counts with 484 individuals on 6 August of which 302 were Red Admirals. From 15 August the majority of species dropped in numbers; 1,727 butterflies were seen in the period 1-15 August compared with just 246 for 16-31 August when the weather turned increasingly unsettled.

The total count for the year of 3,454 individuals was a 24.5% increase on last year, with the increase due directly to Red Admirals which comprised 59% of all records compared to just 4% in 2013 (Table 1).

Table 1. Farne Islands butterfly counts for 2014 (2013 figures shown in brackets)

	Inner Group	Outer Group	Total
Large White	179 (384)	29 (24)	208 (408)
Small White	384 (598)	153 (104)	537 (702)
Green-veined White	268 (138)	63 (13)	331 (151)
Small Copper	3 (2)	1 (0)	4 (2)
Red Admiral	1856 (77)	183 (33)	2,039 (110)
Painted Lady	31 (16)	8 (8)	39 (24)
Small Tortoiseshell	207 (285)	22 (70)	229 (355)
Peacock	45 (54)	2 (8)	47 (62)
Speckled Wood	10 (0)	0 (1)	10 (1)
Wall	7 (34)	0 (3)	7 (37)
Meadow Brown	0 (4)	1 (0)	1 (4)
Ringlet	2 (10)	0 (3)	2 (13)
Total	**2,992 (2,144)**	**462 (630)**	**3,454 (2,774)**

SYSTEMATIC LIST

Red Admiral *Vanessa atalanta*
First sighting: 16 May. Last sighting: 24 September. Peak count: 302 on 6 August.
As this species is a migrant, numbers can be highly variable year to year. This year proved to be an exceptional one with the highest number of records in the five years since the butterfly transects began. Red Admirals migrate northward from the continent in the spring and an increase in numbers in mid-June indicated their arrival on the islands. The subsequent generation of young produced by these migrants emerged in August when a surge in numbers was recorded (75 on 2 August compared with 6 on 30 July), with a peak count of 302 on 6 August. This corresponds to the national trend, with the Big Butterfly Count (2014) recording a 43% increase on last years figures.

Painted Lady *V. (Cynthia) cardui*
First sighting: 11 June. Last sighting: 20 September. Peak count: 3 on 14 and 15 August.
As with the Red Admiral, it proved to be a good year with an increase from 24 in 2013 to 39 this year, although these are well below the numbers seen in invasion years (614 sightings in 1999). The Farnes records are in contrast to the national picture where a 28% drop was reported from last year (Big Butterfly Count 2014).

Peacock *Inachis io*
First sighting: 4 May. Last sighting: 28 September. Peak count: 8 on 2 August.
A decrease from last year of 62 to 47, with the majority of individuals being sighted on Inner Farne rather than the Outer Group (Table 1). The first individual was seen on 4 May, a relatively late first record for this species on the islands as in previous years individuals have been recorded emerging from hibernation in early April. As is usual for this single-brooded species, an increase in numbers from late July was recorded, with a peak count of 8 individuals on 2 August.

Small Tortoiseshell *Aglais urticae*
First sighting: 23 March. Last Sighting: 21 September. Peak count: 33 on 2 August.
The first individual was seen on 23 March in The Chapel while spring cleaning was being undertaken. Butterflies were found emerging from hibernation in the Pele Tower and Brownsman Cottage in the following weeks. They were sighted regularly until 26 May, after which there was a noticeable gap until 22 July when newly emerged butterflies started to appear (the first brood from butterflies which had come out of hibernation), with a peak count of 33 on 2 August. Despite national numbers reported in the Big Butterfly Count (2014) to have increased by 22%, on the Farnes a fall of 35.5% was recorded.

Large White *Pieris brassicae*
First sighting: 21 May. Last Sighting: 1 October. Peak count: 27 on 5 August.
Numbers of this species did not match the exceptional count of 408 last year, with a 49% decrease this year. However the total of 208 individuals is still a good one for the islands; the highest count prior to the 2013 influx was 185 individuals in 2010.

Small White *P. rapae*
First sighting: 11 May. Last sighting: 4 September. Peak count: 36 on 14 August.
Another decrease for the *Pieridae* family with the Small White reducing in numbers compared to last year. Of the whites, this was the most numerous species seen, as has been the case in previous years.

Green-veined White *P. napi*
First sighting: 2 May. Last sighting: 30 September. Peak count: 45 on 2 August.
Unlike the Small White and Large White, the Green-veined White increased on the Farnes from last year (331 compared to 151). This is in contrast to the national trend of a 47% decrease from 2013 (Big Butterfly Count 2014).

Small Copper *Lycaena phlaeas*
First sighting: 20 May. Last sighting: 30 September. Peak count: 1.
Another relatively good year on the Farnes for this sun-loving species, with an increase of two on last year to a total of four records. An individual sighted on 20 May around Inner Farne jetty was the earliest ever record for the Farnes.

Speckled Wood *Pararge aegeria*
First sighting: 25 September. Last sighting: 2 October. Peak count: 4 on 30 September.
Small numbers of this predominantly woodland species are recorded on the Farnes each year. Eleven sightings were recorded (compared to just one last year) with the majority in the period 25 September-1 October (thought to represent four individuals). A late record was one on Inner Farne on 18 October.

Wall *Lasiommata megera*
First sighting: 27 May. Last sighting: 15 August. Peak count: 1.
After the exceptional count of 37 last year this season produced seven sightings, marking a return to more typical levels seen on the Farnes in recent years. Despite the drop in numbers on the Farnes, nationally there was an increase of 19% (Big Butterfly Count 2014) so we hope that next year will see a larger influx.

Meadow Brown *Maniola jurtina*
Only sighting: 28 July.
Although this is a common species throughout the UK, the Farnes receive low numbers of this vagrant, if any at all. This year was no exception, with one individual being sighted on Brownsman on 28 July. However this is the fourth consecutive year that the species has been recorded.

Ringlet *Erebia medusa*
First sighting: 24 July. Last sighting: 25 July.
After the record count of 13 last year, only a single individual was recorded over the space of two days in July. This reflects the national trend which saw a decline of 58% from last year (Big Butterfly Count 2014).

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MOTHS ON THE FARNE ISLANDS IN 2014

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INTRODUCTION

A new 'mothing' team took up the reins for the twenty-first year of moth recording on the Farnes. Moths are vitally important to any ecosystem they inhabit, and while the Farne Islands are famous for seabirds, the small number of breeding passerines and large numbers of migrants undoubtedly rely on the presence of moths for food, and for the Rangers they add colour and beauty throughout the year. The northerly location of the islands and distance from the mainland makes them a fascinating place to study *Lepidoptera*, and the long-term dataset that is being built up will facilitate valuable studies of moths in relation to changes in vegetation and climate of the islands.

The bitterly cold winter of 2012/13 and the excellent summer that followed clearly had a very positive effect on the vagrant and breeding moths of the Farnes in 2013. The mild and very wet winter of 2013/14 had completely the opposite effect, and despite a fine start to the spring and summer, moth numbers crashed in 2014. From mid-August onwards unsettled weather or clear nights meant that conditions were unsuitable for trapping and as a result trapping became infrequent and largely unsuccessful. The stark contrast in numbers between 2014 and the previous year highlights the fragile nature of ecosystems that we take for granted, particularly in such an inhospitable place as the Farnes. During the year, 1,842 individual moths of 72 species were recorded over a period of 79 days. This represents an 85% decrease in individuals, 66 fewer species and a 63% decrease in recording days compared to 2013. Due to proximity to the mainland and greater floral diversity, Inner Farne had the greatest species abundance, with a total of 60 species, 24 more than on Brownsman.

Table 1. Moth totals for 2014, showing number of individual moths, number of species and total number of days that moths were recorded according to recording method, for Inner Farne (IF) and Brownsman (BR).

	Individual moths			**Species**			**Recording Days**		
	IF	BR	Total	IF	BR	Total	IF	BR	Total
Casual	155	82	237	19	9	24	25	5	28
125W MV Trap	40	-	40	8	-	8	6	-	6
15WActinic Trap	671	894	1565	52	36	68	23	28	45
Totals	**866**	**976**	**1842**	**60**	**36**	**72**	**45**	**28**	**79**
2013	*11,506*	*959*	*12,465*	*138*	*39*	*138*	*148*	*67*	*215*

MOTH HIGHLIGHTS IN 2014

Perhaps the best highlight this year was a **Green Silver-lines** *Pseudoips prasinana* trapped on Brownsman on 10 June, a 'first' for the islands. Another interesting find involved the remnants (a single wing) of a **Lesser Swallow Prominent** *Pheosia gnoma* found on Brownsman cottage on 23 July. It seems a Rock Pipit or Pied Wagtail had beaten us to what would have been only the second record of this species for the Farnes. Also of note, for the second consecutive year, a **Least Yellow Underwing** *Noctua interjecta* was found on 15 August, the fourth record for the Farnes. Lastly, a **Fan-foot spp**. *Herminia* was trapped on Brownsman on 22 July. The moth was badly faded, but was tentatively identified as a **Shaded Fan-foot** *Herminia tarsicrinalis* which would represent a truly exceptional record and a first for Northumberland. At the time of writing, we are waiting for confirmation of identification.

A downward trend of scarce moths this year was mirrored by a reduction in the normally common migrant moths, with only two **Diamond-back Moth** *Plutella xylostella* (104 in 2013) and 14 **Silver Y** *Autographa gamma* (154 in 2013). However it was a good year for **Hummingbird Hawkmoth** *Macroglossum stellatarum* with a single on Brownsman on 12 June and four on Inner Farne from 29 April-31 August. A list of other vagrant moths trapped is given in Table 2.

Table 2. Vagrant moths trapped on the Farnes in 2014. All records are of single individuals unless stated otherwise.

Species	Date and Location
Amblyptilia acanthadactyla	29 July, Inner Farne
Agapeta zoegana	13 June, Inner Farne
Celypha cespitana	3 August, Inner Farne (2 individuals)
Pammene Fasciana	23 June, Inner Farne
Rusty-dot Pearl *Udea ferrugalis*	14 September, Inner Farne
Eudonia Lacustrata	24 July, Brownsman
Eudonia angustea	25 July, Inner Farne
Eudonia Pallida	25 July, Inner Farne
Agriphila geniculea	29 July, Brownsman
Catoptria falsella	12 July, Brownsman
Riband Wave *Idaea aversata*	23 June & 23 July, Inner Farne
Wormwood Pug *Eupithecia absinthiata*	28 July, Brownsman
Pale Mottled Willow *Caradrina clavipalpis*	24 June, Brownsman
Crescent *Helotropha leucostigma*	12 July, Brownsman
Hedge Rustic *Tholera cespitis*	28 July, Brownsman
Nutmeg *Anarta trifolii*	13 June, Inner Farne (2 individuals)
Flame Shoulder *Ochropleura leucogaster*	22 July, Brownsman

SYSTEMATIC LIST OF BREEDING SPECIES IN 2014

Overall, 2014 was a poor season for breeding moths on the Farnes. Although recording days were down by 63%, there was also a larger relative decline in some species. Despite this, there was one new colonising species for the Farnes this year.

Noticeable by their absence this year were the following species which were all previously recognised as colonisers of the Farnes: **Map-winged Swift** *Hepialus fusconebulosa*, ***Tinea pallescentella***, ***Metzneria lappella***, ***Chrysoesthia sexgutella***, **Timothy Tortrix** *Aphelia paleana*, ***Cnephasia longana***, ***Celypha lacunana***, ***Eucosma cana***, ***Chrysoteuchia culmella***, ***Agriphila straminella***, ***Eudonia lineola***, ***Udea lutealis***, **Drinker** *Euthrix potatoria*, **Yellowshell** *Camptogramma bilineata bilineata*, **Lime-speck Pug** *Eupithedia centaurareata*, **Rosy Minor** *Mesoligia literosa*, **Square-spot Rustic** *X. xanthographa* and **Antler Moth** *Cerapteryx graminis*.

For each species in the following account the location of records is given by **IF** (Inner Farne) and/or **BR** (Brownsman) after their Latin names. This is followed by the number of individuals in 2014 and then the number of records in the previous one or two years, in the order 2014/2013/2012.

Ghost Moth *Hepialus humuli humuli*, **IF, 2/20** – A male and female trapped on 21 June represented the only appearance of these beautiful moths, and the charismatic lekking behaviour of this species was not observed this year. A lack of trapping in early July may explain this low number.

Common Swift *H. lupulinus*, **IF, 2/136/50** – Only two individuals were attracted to light this year on 13 June, representing a huge decline from the previous two years.

Nettletap *Anthophila fabriciana*, **IF, 3/32/44** – Three singles on 28 September this year, including one rescued from a rock pool, started a run of appearances for this tiny but unmistakable moth. A total of 23 were recorded, all from inside buildings.

Brown House Moth *Hofmannophila pseudospratella*, **IF BR, 22/30** – Twenty-one individuals were found in the Inner Farne moth trap with a single casual record from Brownsman, continuing the new trend of this species appearing in moth traps rather than casual sightings. Records ranged from 17 June -23 August.

***Agonopterix alstromeriana*, IF, 4/356/35** – Most observations of this species are casual records (307 from last year), and perhaps a lack of awareness of this tiny moth explains why there were so few records this year. The first record came from the trap on 1 October, compared to April last year: a worrying absence of this moth for the majority of the year.

Small Magpie *Eurrhypara hortulata*, **IF BR, 18/5** – One species to buck the downward trend this year with 13 trapped on Inner Farne, including 11 on 21 June. Undoubtedly this species has benefited from the recent boom in Common Nettle *Urtica dioica*.

***Udea olivalis*, IF, 4/41/21** – Traditionally found by dusking, this species was attracted to light on three nights between 13-23 June, a decrease on the eight nights on which it was trapped last year.

Mother of Pearl *Pleuroptya ruralis*, **IF, 2/13/3** – Two moths trapped on 23 July represented a big drop from last year. Another Common Nettle species, it surely will recover as its host plant continues to thrive on the islands.

Silver-ground Carpet *Xanthorhoe montanata montanata*, **IF BR, 32/73/19** – The population of this species continues to fluctuate, with Inner Farne taking all but two records, spanning 9-26 June, with a peak of 15 seen by day on 9 June.

Garden Carpet *X. fluctuate*, **IF BR, 10/45/10** – After a bumper season last year, this species returned to a more typical number with all but one record from the Brownsman trap. It was seen from 10 June to 29 July on Brownsman, with the single casual record from Inner Farne on 15 August.

Common Carpet *Epirrhoe alternata alternata*, **IF BR, 2/5** – This species followed its interesting pattern on the Farnes of being absent within its expected first generation season (where it is usually more numerous) with records on 29 July from Brownsman and 23 August from Inner Farne.

Dark Spinach *Pelurga comitata*, **IF BR, 98/1664/359** – With Inner Farne taking 60% of the records, this species was attracted to light from 7 June-1 August, with a peak of 28 on 23 July.

Plain Pug *Eupithecia simpliciata*, **IF, 66/1554/361** – As Orache *Atriplex* continues to be a dominant plant on the islands, this species is undoubtedly here to stay and may eventually reach Brownsman.

Common Footman *Eilema lurideola*, **BR, 2/3** – This species was recorded for its fourteenth year in a row but still only in single figures, with both records this year coming from the Brownsman trap on 12 and 22 July.

Garden Tiger *Arctia caja*, **IF, 40/64/7** – Despite the mild winter this species was trapped in good numbers again this year, seen in every trap on Inner Farne from 11 July-3 August, with 13 on 23 July beating the peak last year of nine.

Buff Ermine *Spilosoma lutea*, **BR, 17** – Apparently a new coloniser: an impressive 17 were trapped between 1-24 June, with a peak of five on 20 June.

White Ermine *Spilosoma lubricipeda*, **IF, 5/7** – Coming close to the record of seven individuals last year, four were trapped on 13 June and a single on 15 June. A larva of this species was found on 24 August, confirming its status as a breeding species.

Cinnabar *Tyria jacobaeae*, **IF, 83/28** – This now well-established Ragwort *Jacobaea vulgaris*-loving moth was again found in good numbers on West Wideopen. Around 80 individuals were noted on 3 June while three appeared in the trap on Inner Farne between 13-23 June. Larvae of this species were also noted on Inner Farne this year.

Garden Dart *Euxoa nigricans*, **IF BR, 13/25/18** – From a very healthy 203 in 2011, this species has suffered a big decline and this year again showed no sign of recovery. All but one were trapped on Brownsman between 22 July-1 August, interestingly appearing in groups of four on three nights.

Flame *Axylia putris*, **IF BR, 188/49** – One species that thrived this year: 183 individuals were seen on Brownsman between 13 June-1 July, with a peak of 36 on 24 June. Despite its rapid colonisation of Brownsman, this species still remains scarce on Inner Farne, with only five trapped between 11-26 June. A sixth and very late record came from the basement of the Pele Tower on 1 October. A possible explanation for this pattern is interspecific competition, with Inner Farne having higher species diversity.

Large Yellow Underwing *Noctua pronuba*, **IF BR, 41/124/120** – A poor year for this species after a record number last year. Twenty individuals were seen on Inner Farne, with the rest from Brownsman, spanning 23 June-9 September.

Lesser Yellow Underwing *N. comes*, **IF, 5/107** – A dramatic drop in numbers this season with only two individuals attracted to light on 1 and 24 August and three casual records on 10 August.

Lesser Broad-bordered Yellow Underwing *N. janthe*, **IF, 1/24** – Only one individual was trapped this year on 1 August.

Cabbage Moth *Mamestra brassicae*, **IF BR, 90/111/31** – A good season for this *brassica* pest, with Brownsman responsible for 73 records this year, showing that this species has firmly established itself on both islands.

Bright-line Brown-eye *Lacanobia oleracea*, **IF BR, 373/731/76** – As Orache thrives on the islands so does this species, trapped from 31 May-22 July with a peak of 73 on 24 June coming close to the peak of 87 last year: the most numerous moth on the Farnes in 2014.

Marbled Coronet *Hadena confuse*, **IF, 5/10** – This Sea Campion *Silene uniflora* feeder has declined by > 99% since 1992, a trend continued this year. It was seen on only three nights, 21, 23 and 26 June.

Lychnis *H. bicruris*, **IF, 2/2/5** – Another declining Sea Campion feeder, with only two individuals trapped, on 13 June.

Hebrew Character *Orthosia gothica*, **IF, 2/47** – With the trap on Inner Farne run only a few times during the flight season of this species, it is not surprising that few were caught, on 5 May and 15 June. Where trapping was increased in early spring last year, a far more representative figure for this species was obtained.

Smoky Wainscot *Mythimna impure*, **IF, 9/54/39** – A decrease in population of this species was seen for only the second time in nine years. It was recorded in the trap on three occasions from 11 July-1 August.

Lunar Underwing *Omphaloscelis lunosa*, **IF, 7/181/80** – A species that is certainly underrepresented this year due to a lack of trapping during its autumnal flight season; individuals were only recorded on two nights, with four trapped on 28 September and three on 1 October.

Mouse Moth *Amphipyra tragopoginis*, **IF BR, 10/39** – Named for its mousy-brown colour and tendency to run for cover rather than fly, this moth was seen around the trap on Brownsman on 23 July and then on six separate occasions on Inner Farne until 30 August.

Angle Shades *Phlogophora meticulosa*, **IF, 9/10** – One of the most attractive moths in the British Isles, this species was a feature throughout the year, with the first found on 5 May and then appearing every month until 28 September.

Dark Arches *Apamea monoglypha meticulosa*, **IF BR, 319/1924** – A strong season for this species; Brownsman contributed 185 of the records. The first was trapped on 15 June on Brownsman, and the last was seen on Inner Farne on 24 August. The peak count of 57 was from Brownsman on 13 July.

Clouded-bordered Brindle *A. crenata*, **IF, 12/21** – After the sudden colonisation of Inner Farne last year (this being only the third year it has ever been recorded), this species has kept a foothold with 11 trapped on 15 June and a single on 13 June.

Dusky Brocade *A. remissa*, **IF, 14/23** – With a similar pattern to Clouded-bordered Brindle, this species also appears to have retained its status as a new Farnes breeding species. It was trapped between 15-30 June, with a peak of five on 23 June.

Middle-barred Minor *Oligia fasciuncula*, **IF BR, 15/2536/225** – The most abundant species in 2013, the extremely low number trapped this year is worrying, even allowing for the reduced trapping during its peak month of July. The last record from Inner Farne was on 30 June, and 24 June on Brownsman, whereas the three peak counts last year came in July. This species seems to have suffered from the mild wet winter and unsettled conditions this summer.

Rosy Minor *Mesoligia literosa*, **IF, 1/49/23** – This species narrowly avoided its first blank year for 11 years, with just a single record coming on 25 July.

Common/Lesser Common Rustic *Mesapamea secalis/didyma*, **IF BR, 102/658** – Unless the genitalia are examined these species are inseparable, and as larvae of both species have been found on the islands they are here treated together. They represent another group that appears to have suffered from the mild winter, especially on Inner Farne where only seven were trapped. This species was seen in traps from 12 July-24 August with a peak of 33 from Brownsman on 24 July.

Flounced Rustic *Luperina testacea*, **IF BR, 19/39** – Once highly abundant, this species does not seem to be making a recovery as yet. It was first trapped on 22 July, with one to four seen until 28 August.

Rosy Rustic *Hydraecia micacea*, **IF BR, 45/682/375** – With only two individuals on Brownsman, and overall having a poor year, this species was trapped between 26 July-28 September with a peak of nine on 14 September.

Frosted Orange *Gortyna flavago*, **IF, 2/74** – This beautiful autumnal moth was only seen in the trap once this year, with two individuals on 9 September. Trapping conditions were poor during the flight season of this species, and this is reflected in the low number caught this year.

Mottled Rustic *Caradrina Morpheus*, **IF BR, 21/125/43** – Records dropped back to more usual numbers this year, with two records from Brownsman and 19 from Inner Farne, all trapped between 26 June-23 July.

Burnished Brass *Diachrysia chrysitis*, **IF, 5/101** – This dazzling beauty of a moth was another species to suffer a crash this year with only three individuals attracted to light and two casual records between 11-29 July. Interestingly on 11 July both forms, *juncta* and *aurea,* were seen.

Spectacle *Abrostola tripartite*, **IF BR, 47/97/6** – After the 2012 crash, this charismatic moth was trapped in good numbers from 9 June-16 July, with 16 records from Brownsman and a peak of 16 from the Inner Farne trap on 21 June.

Snout *Hypena proboscidalis*, **IF, 6/26** – A decrease in trapping days saw this species caught a mere six times after its strong showing last year. It was seen only in singles from 21 June-1 October, reflecting its natural scarcity on the islands.

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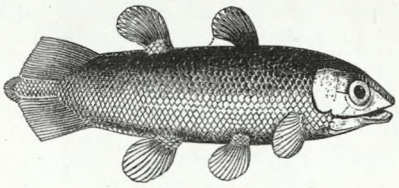
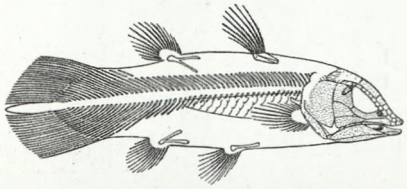

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CONTENTS

RING-NECKED PARAKEETS IN NORTHEAST ENGLAND

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SUMMARY

The Ring-necked Parakeet (Rose-ringed Parakeet) *Psittacula krameri* is a prominent and well-established exotic species in parts of southeast England. Elsewhere in Britain, its occurrence is largely as an occasional escapee. In recent years it has established a toehold in northeast England where its numbers have gradually increased to an estimated 60-70 birds prior to the 2015 breeding season, and it is now regularly resident in three discrete local areas. This article describes its establishment and gradual increase in population and range across the region.

INTRODUCTION

The Ring-necked or Rose-ringed Parakeet *Psittacula krameri* (Figure 1) has the widest distribution of any old world parrot species and comprises several subspecies. It occurs naturally across the width of Africa north of the moist forest zone, and across most of the Indian subcontinent as far north as southern Nepal and up to 2,000 metres above sea level. Its range has been extended by a number of introductions and it can now be found in a wild state in places as far apart as the USA, Hong Kong and several European countries, including Britain (Juniper and Parr 2003).

In the wild it is typically found in open woodland or around human habitation. It is a highly gregarious species, particularly outside the breeding season, and flocks can be numbered in thousands. It is also noted as a sedentary species (Forshaw 1977). All these features of its behaviour seem to be well reflected in the main feral British populations.

Figure 1. Ring-necked Parakeet on a feeder in Whitley Bay, December 2014 (© Jack Bucknall).

ESTABLISHMENT OF RING-NECKED PARAKEET IN BRITAIN

The Ring-necked Parakeet is one of the longest established and most popular parrot species in aviculture, being bred in a wide range of colour morphs. As with any captive species there is always the possibility of escapees; for example, the author has seen five parrot-family species, other than Ring-necked Parakeet, on the loose in the Tees Valley area. Also prior to the advent of the Wildlife and Countryside Act in 1981 exotic birds could be kept as free-flying, semi-liberty colonies.

Ring-necked Parakeet was first noted as breeding in the wild in Norfolk in the mid nineteenth century, though apparently without establishing a population. The current British population appears to have developed since 1969 when a family party was seen near Rochester in Kent and small groups were seen in the Surrey area. Nesting in the wild was first proven in Croydon in 1971 (Lever 1977). Recent studies have shown that the British population is comprised mainly of the most northerly subspecies *Psittacula krameri borealis*; this reflects the fact that the majority of imports for aviculture came from northern India, but perhaps also that this subspecies would be better suited to tolerate the UK climate (Jackson *et al.* 2015).

DISTRIBUTION IN THE WIDER UK CONTEXT

The UK breeding population as of 2012 was estimated at 8,600 pairs (Musgrove *et al.* 2013). Nationally the population is still concentrated in the Greater London area and east Kent, with a few outlying colonies in large urban conurbations such as Liverpool and Manchester. Most of Britain remains parakeet-free; the recent national bird atlas (Balmer *et al.* 2013) shows confirmed breeding in only 2% of hectads (Figure 2). In the areas surrounding the North East the atlas did not record any possible breeding in North Yorkshire, Cumbria or the whole of Scotland.

The closest place to the North East where Ring-necked Parakeets are seen regularly is around Rotherham and Sheffield, where groups of up to five and three respectively have been reported, although there were no breeding records up to 2012 (Thomas 2013).

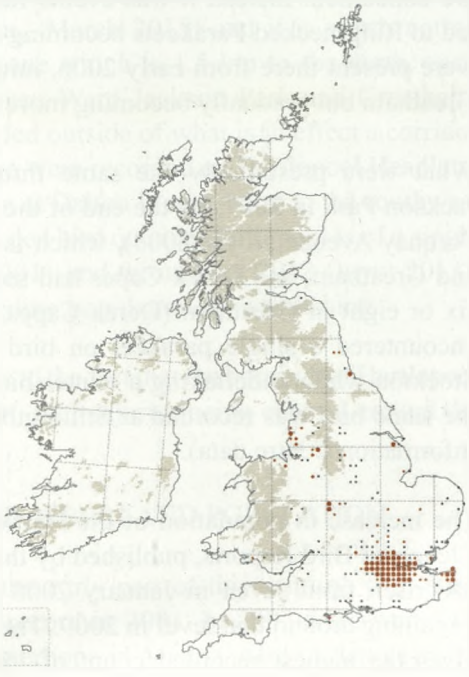

Figure 2. Breeding map of Ring-necked Parakeet. Reproduced from *Bird Atlas 2007-11* (Balmer *et al.* 2013) with permission from the British Trust for Ornithology.

ESTABLISHMENT OF THE CLEVELAND POPULATION

Until recently there was no reason to assume that the situation with Ring-necked Parakeets in the North East was anything other than that of sporadic escapes or releases. In the historical Durham area there were only two records from the 1970s and three from the 1980s (Bell, C in Bowey and Newsome 2012). The 1998 edition of *Birds in Northumbria*, the annual report of The Northumberland and Tyneside Bird Club, which listed historical records in Northumberland, only had a single report of an individual bird flying south over Hauxley in 1985 (Bowman and Hodgson 1999). Records became "almost annual" in the Durham Bird Club area from the 1990s and the first multiple record was of two birds in Peterlee in June 1996 (Bell, C in Bowey and Newsome 2012), though there was still nothing to suggest that parakeets were established in the area.

It was not until 2006 that the species became a North East breeding bird. A single female that had been frequenting Acklam Hall in Middlesbrough in 2005 was joined by a pair of birds in January 2006 and subsequently by a further male in May. Both pairs bred successfully at Acklam Hall that year, rearing three young between them (Joynt *et al.* 2008). Two adult females continued to be present at Acklam Hall until mid-March 2007, after which a single bird remained throughout the summer. Then in September 2007 four birds were present (an adult male, two adult females and a juvenile), suggesting that breeding had occurred locally, although not in Acklam Hall itself. Over the next few days the flock grew to seven birds but by the end of the month they had disappeared (Joynt *et al.* 2008). This proved to be the end of the story as far as the Acklam birds are concerned. Instead it was events further north in Hartlepool, also in 2006, which led to Ring-necked Parakeets becoming an established North East resident. Three birds were present there from early 2006, initially being seen quite regularly in the wood at Greatham but gradually becoming more settled in the town's Ward Jackson Park.

What were presumably the same three birds were still being seen around Ward Jackson Park in 2007; by the end of the year six were seen together on 22 October on Torquay Avenue (Joynt 2008), which is roughly midway between Ward Jackson Park and Greatham, and Derek Capes had seen a party of a minimum of four and possibly six or eight in Greatham (Derek Capes, pers. comm., April 2008). Derek Capes also encountered a single parakeet on bird feeders at Thorpe Thewles village north of Stockton while undertaking a winter bird atlas survey in 2007. What was most likely the same bird was recorded at Stillington on 26 March 2007 (Environmental Records Information Centre data).

The increase in population of the Hartlepool birds is well documented in the annual Cleveland Bird Reports, published by the Teesmouth Bird Club. In summary, numbers had risen from seven in January 2008 to 14 by August of that year, with numbers remaining around that level in 2009. The Cleveland Bird Report for 2009 (Joynt 2010) gives the highest recorded count of 15 birds seen on 18 August over Burn Valley

Gardens, and there was a report of 17 in the trees on Kingsley Avenue (David Harrison, pers. comm., February 2015), both locations being within 1 km of Ward Jackson Park. However in 2010 numbers increased dramatically with 29 birds counted in the Kingsley Avenue roost and two flocks, totalling 32 birds, seen over Burn Valley Gardens on 16 July (Joynt 2011).

The numbers recorded in Hartlepool were lower in 2011, with a maximum count of 21 birds alongside the A689 near Blackfords Garden Centre in November. It was speculated that this might have been as a result of a lack of observer coverage rather than a decrease in the population (Joynt 2012). This suggestion was supported by a count of 32 on Throston Grange Lane in February 2013 (Joynt 2014), as the increase would not have been the result of breeding in the intervening winter months.

By the end of 2013 numbers were up to the high 30s (David Harrison, pers. comm., February 2015) with subsequent maximum counts remaining around that level. The author observed two flocks, each of around 15 birds, fly south from Ward Jackson Park at dusk in October 2014, while at least another five birds remained in the park. The Cleveland Bird Report for 2014 (Joynt 2015, in prep.) details a regular winter roost by Rossmere School, Catcote Road at both ends of the year, peaking at 39 in November. The 2015 breeding season might be expected to produce an increase in numbers, although unless seen in flight it is virtually impossible to count the birds accurately while trees are in leaf.

Ward Jackson Park continues to be the epicentre of Ring-necked Parakeet activity and it would be unusual to visit the park and not encounter parakeets. They continue to foray down to Greatham (Jamie Boddy, pers. comm., March 2015) and it is worth noting that with the exception of Throston Grange Lane which is 1.5 km to the north, each of the locations listed above is roughly between Ward Jackson Park and Greatham. Occasionally small numbers of birds are recorded outside of what is in effect a corridor along the town's Catcote Road; for example two were recorded on Hartlepool Headland on 22 May 2012, and they are increasingly seen at Dalton Piercy, 3 km to the southwest of Ward Jackson Park. The only regularly recorded bird outside Hartlepool is of a single female in Marton, Middlesbrough, from mid 2011 and throughout 2012 (Joynt 2013), but there are no signs of a Middlesbrough breeding population re-establishing.

This apparently sedentary behaviour may be due to the fact that the borough of Hartlepool has relatively poor tree cover for the most part, the majority being centred around the town's west end and Ward Jackson Park.

ESTABLISHMENT OF THE NORTHUMBERLAND POPULATION

North of the Tyne, reports were sporadic in the early part of this century, with none in 1999, 2000 or 2003 and just one possible record in 2001. In 2002 there were two reports, both of singles at Big Waters and Westerhope in August. Also in that year, the

Northumberland County Records Committee removed the species from the main list, as it was felt that the probability of escapes outweighed the possibility of birds from feral populations in the south occurring (Bowman and Holliday 2003). In 2004 there was just the one record, again of a single bird, which oddly was on the island of Brownsman in the Farnes for a couple of days in October (Francis *et al.* 2005).

As with the situation in Cleveland, it was in 2005 that reports started to indicate residency with "a good series of sightings through the year" comprising Prestwick Carr (6 March), Big Waters (30 April), Darras Hall (22 August) and Ponteland in November and December (Fisher and Holliday 2006). In each case this was of a single bird.

Single birds continued to be reported in The Northumberland and Tyneside Bird Club reports through to 2011, with Ponteland and Prestwick Village being the main haunts, although one individual was seen at Corbridge on 19 October 2007 and another seen to fly in from the sea at St Mary's Island on 10 October 2007. So there will have been more than one bird present in the county at times during that period, even if only briefly.

In 2011, the species was moved from the "Escapes" section of The Northumberland and Tyneside Bird Club reports to the "Birds of unknown origin" section. A single bird continued to be seen at Prestwick Village and Ponteland until 14 June of that year after which no further sightings were recorded for that location, although a single was subsequently recorded in Exhibition Park, Newcastle, in August and September. It was also in 2011 that more than one bird was reported for the first time when a pair was seen at Benton Metro Station on 16 September and another pair in Churchill Park, Whitley Bay, where they were seen prospecting a nest hole (Richardson 2012).

A single, roving bird was again reported around Prestwick and Ponteland for much of 2012 with reports in January, March, May, October and November. A single bird, an adult female, was also photographed in a Gosforth garden in January and February of that year (Moira Gray, pers. comm., September 2015), and 2012 proved to be notable for the spread of records in the county. The Northumberland and Tyneside Bird Club had reports of singles at Earsdon Cemetery on 2 September; flying over a garden in Cramlington on 25 October, and in a Wallsend garden on 3 November (Richardson 2013). Further afield still, the *Northumberland Gazette* (7 July 2012) reported a sighting in a garden in Kirkwhelpington and that a pair had been frequenting a bird feeder in a garden in Alnwick for three months. A single bird that was seen at Clara Vale just south of the Tyne on 8 April may well have been the Ponteland bird.

By 2013 numbers had increased slightly and in September two were seen at Richardson Dees Park in Wallsend and five at Heaton Park, the latter relocating to Gosforth Garden Village a few days later. Five were again seen at Denton Park in Newcastle on 31 October 2013 (Richardson 2014). An outlying record was a single photographed at Hauxley and posted on Facebook by John Davison, which drew the comment that one had been seen around the allotments there.

This continuing spread of records led to Ring-necked Parakeet being accepted on to the Northumberland county list from 1 January 2014, so it is surprising that records in the Northumberland and Tyneside Bird Club's monthly newsletters were relatively few in that year with no reports until the September edition, which reported four birds feeding on berries at the Ponteland Leisure Centre on 27 July. However there had been sightings on two dates in March at Exhibition Park, of one and three birds respectively (Chris Redfern, pers. comm., September 2015). Nevertheless the birds themselves were continuing to increase as eight had been reported at Ponteland Leisure Centre on "Bird Guides" (http:// www.birdguides.com/) on 25 June. Later in the year, six were at Heaton Park in September and several seen or heard in Walker on various dates in November, including six or seven on 6 and 7 November. A pair was also seen apparently prospecting a nest hole in Fenham in January 2014 (Figure 3).

Figure 3. Ring-necked Parakeets apparently prospecting a nest hole in Fenham (© Moira Gray).

The slow but steady increase appears to be continuing into 2015 with the Northumberland and Tyneside Bird Club June newsletter reporting a flock of nine seen flying northwest at Byker on two separate dates in late April. However the largest number to date appears to be flocks in the Fenham area where 12 were seen in February 2015 (Philip Jordan, pers. comm., February 2015) and 17 reported in spring the same year (Moira Gray, pers. comm., September 2015). The parakeets are regularly in gardens and on bird feeders (Figures 4 and 5) where they often go unreported.

Figure 4. Ring-necked Parakeets feeding on fat balls in a Fenham garden (© Reginald Hall).

Figure 5. Ring-necked Parakeets in a Fenham garden January 2014 (© Moira Gray).

The situation on Tyneside differs from that on Teesside in that the Tyneside birds appear to be much more mobile; what are assumed to be the same birds were reported from Ponteland across to the east of Newcastle (Tim Dean, pers. comm., May 2015), although without more systematic recording it perhaps cannot yet be ruled out that there might be two separate, small flocks. Outside of Tyneside there is a scattering of reports of single or pairs of birds that may well be unconnected to the Tyneside birds. As yet these are confined to south Northumberland and it is noteworthy that up to the beginning of 2015 North Northumberland Bird Club had no reports of Ring-necked Parakeets from their area (John Lumby, pers. comm., February 2015).

ESTABLISHMENT OF SUNDERLAND/SOUTH TYNESIDE POPULATION

More recently, there are signs that South Tyneside and East Durham may be starting to be colonised. It is difficult to date precisely when this started but there were several reports of a single bird, noted in some reports as female, between mid-2008 and early 2009, mainly from the Hetton area but also with single records from Doxford Park and Marsden. Later two birds were in Mowbray Park on 3 March 2011 (Environmental Records Information Centre data).

Two were seen at Temple Park, South Shields on 24 July 2012 and subsequently there were several sightings of pairs or singles in late 2012 and May 2013 in the Jarrow and West Boldon area. Then in late May/early June 2013 up to seven birds were at Temple Park. These birds subsequently disappeared although singles were recorded elsewhere that year in Durham City on 7 April, Horden on 14 September, Brasside 12-15 November and Rainton Bridge on 30 November, with regular sightings of 1-2 birds at Hetton Bogs during the summer months (Durham Bird Club 2013).

In 2014 sightings continued with one or two birds at Silksworth Lakes, West Boldon, Washington Wildfowl Park and Hetton Bogs in the period up to April, and at Hetton Bogs, Silksworth and Marsden Quarry in the last three months of the year. Two were seen at South Marine Park, South Shields during the summer, and of particular note were five seen flying south over Whitburn on several dates in September. A flock of five birds seen over Sedgeletch, Houghton le Spring on 15 October was possibly the same as the Whitburn flock (Charlton 2015).

Five birds were reported in Backhouse Park, Sunderland in March 2015 and one or two birds were present in Westoe Cemetery, South Shields for an extended period in the early part of 2015, with breeding suspected in both locations. They have also been noted as spreading into Barnes Park, Sunderland (Durham Bird Club committee minutes, 29 April 2015).

While it is not an unreasonable assumption that the increase in sightings in East Durham and indeed on Tyneside is due to dispersal of birds from Hartlepool, unfortunately no Ring-necked Parakeets have yet been ringed in the North East, so their origins remain unproven. It would be interesting if ringing of some birds could be achieved so that the movements of individual birds and the sources of any future expansions in their range can be established.

OUTLYING RECORDS

Outside of what might now be regarded as the core locations of West Hartlepool, Newcastle and Sunderland/South Tyneside there continue to be occasional records. For example three were seen near Darlington town centre on 8 March 2011 (Environmental Records Information Centre data) and a pair over the town's West Park on 12 March 2015 (Vince Robertson, pers. comm., March 2015). A single was at Locke Park, Redcar

on 12 November 2011. A pair was seen at Yarm on 14 March 2015, while an anecdotal report of a single bird at Barnard Castle appears to be the furthest west in the North East that the species has been recorded so far. In Northumberland, a single adult female, photographed in a garden in Whitley Bay on Boxing Day 2014, was almost as unexpected as a pair of Turtle Doves. The photo (Figure 1), originally published on the photographer's blog (http://www.whitleybirder.blogspot.co.uk/2014/12/patch-and-local-mega.html#comment-form), prompted the comment that a similar bird had been present at Earsdon Village for some weeks.

Whether these are individuals dispersing from the core areas or further escapes is unclear. A blue morph bird that was photographed in a garden in Seaton Carew on 24 March 2015 (Figure 6) would have been a recent escapee as no blue birds have been noted in the Hartlepool feral flock. It is very likely that this would be the same bird as that seen in a garden in Skelton on 5 April 2015 in spite of the sightings being some 16 km apart. So a single bird could give rise to sightings in widely spread areas. Nevertheless it is worth noting that some of these more widely dispersed reports may presage early colonisation of other areas, although as yet there is nothing to confirm this.

Figure 6. Blue morph Ring-necked Parakeet in Seaton Carew, March 2015 (© Eric Paylor).

FUTURE PROSPECTS

Summing up the maximum counts in each of the three areas where Ring-necked Parakeets are establishing in the North East, the population as of early 2015 may be in the region of 60-70 birds, with around 40 of these on the western urban fringe of Hartlepool. This is an increase from a maximum of 10 birds in Cleveland in 2007. Nationally the population has increased by tenfold over the 15 year period from 1995-2010 (RSPB 2012) so the North East population is roughly in line with that.

A study of the establishment success of Ring-necked Parakeets across Europe found that parakeet occurrence was negatively correlated with the number of frost days (Strubbe and Matthyesen 2009). The species is also an early breeder, commencing with a single brood in February and March (Low 1988). These factors might be predicted to limit its

spread north and it is worth noting that the Hartlepool birds are currently likely to be the most northerly proven breeding population in the world. The same study also found that parakeet density both in the native and in the introduced regions was positively associated with human population density. This association with human habitation has been noted in the national population (Balmer *et al.* 2013), and from the records to date appears also to be the case in the North East.

In spite of this increase in population, breeding has so far rarely been proven, still less documented, with the notable exception of three pairs that nested in old woodpecker holes in a wooden sculpture in Ward Jackson Park in the same year (David Harrison, pers. comm., February 2015). A lack of trees with suitable cavities may well be a limiting factor in urban environments, as such trees are often felled on safety grounds, and this may be even more the case in the North East where urban tree cover is generally much lower than in their UK core range. It will be interesting to see if an increasing population starts to make use of buildings, as has been noted in some parts of their natural range (Forshaw 1977). A Ring-necked Parakeet was seen being ejected from a chimney pot by two crows in Hartlepool in early 2015, though there was no evidence that it was breeding there (Simon Lamplough, pers. comm., March 2015). Similarly there has been very little evidence regionally of Ring-necked Parakeets being predated, although a female Sparrowhawk was seen to take one as it flew in to roost at Blackford Nurseries garden centre in Hartlepool (David Harrison, pers. comm., February 2015).

Whatever the ecological brakes on the population might be, the continued if apparently intermittent population growth in the North East would suggest that such factors are not a significant limitation. A further tenfold increase over the next 15 years, which is not an unreasonable assumption, would result in around 600 birds. It is unlikely that there is sufficient suitable habitat in their current locations to support such a population, which might be predicted to lead to them dispersing to parks and suburbs in other areas of the North East. What seems an even safer prediction is that Ring-necked Parakeets are here to stay.

REPORTING SIGHTINGS

Sightings of Ring-necked Parakeets in the North East should be reported to the relevant county bird recorder or the Environmental Records Information Centre North East www.ericnortheast.org.uk.

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NOTES ON THE WOLF, BEAR AND LYNX IN DURHAM AND NORTHUMBERLAND

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SUMMARY

The archaeological and historical evidence for the three recently extinct large mammalian carnivores of Durham and Northumberland is appraised and discussed with reference to former distribution, possible reasons for and dates of their extirpation, as well as their cultural links to contemporary human society.

The mammals amphibians and reptiles of the North East (Bond 2012) contains a summary of the archaeological and historical evidence for Lynx *Lynx lynx*, Brown Bear *Ursus arctos* and Wolf *Canis lupus* in Northumberland and Durham (Vice Counties 66, 67 and 68; the space bounded by the rivers Tweed and Tees, and the Pennine hills). What follows is a reconsideration of the data, some new data, some cultural references, and some thoughts on why and when all three were finally extirpated in the two counties. There is a growing debate about reintroducing predators that were extirpated by humans so it is perhaps timely to review why and when these three became extinct in the North East.

INTRODUCTION

Moking Hurth Cave (Figure 1), also known as the Teesdale Cave and the Backhouse Cave, in upper Teesdale (NY9325) has the distinction of being the only location in Northumberland and Durham to provide the osseous remains of all three of the recently extinct indigenous large carnivores of the two counties, Brown Bear, Lynx and Wolf, which were part of a typical assemblage of mid-to-late Holocene species. Archaeological evidence for Brown Bear exists at further sites in Durham, but these are most likely to be animals imported, either alive or dead, after indigenous extinction; furthermore, interpreting the small number of other possible Wolf remains found across the two counties is confused by the difficulty of determining the difference between the bones of Wolf and large dog. There are no other Northumberland/Durham Lynx remains. Moking Hurth therefore remains the only location for all three species as indigenous animals within the two counties (Jessop 2012). The Moking Hurth bones are undated with the exception of a single Wolf skull which was determined, by pollen analysis, to be Iron Age (Simms 1974).

The dearth of archaeological information and the fascination of the large carnivores beg the question, is it possible to understand more about the history of Wolf, Brown Bear and Lynx, their historical place in local culture and subsequently how and when they became locally extinct? By trespassing short distances outside the two counties it is possible to get a better understanding of their history. Indeed, if the prehistoric home

ranges for each species were similar to those of extant populations elsewhere (Table 1) then there is little value in trying to understand their local history within the confines of current administrative boundaries alone.

Figure 1. Moking Hurth Cave in 2015.

Table 1. Modern home range size of Lynx, Brown Bear and Wolf (Large Carnivore Initiative for Europe, 2015).

Lynx	male 120-1800km2	female 80-500km2
Brown Bear	male 120-1600km2	female 60-300km2
Wolf	100-1000 km2	

The three species are discussed individually in this paper but there are some factors such as climate and habitat change and interrelations with humans which probably affected all three. All three species required large ranges with productive habitat in which to hunt and feed along with denning locations free from human disturbance in which to breed and, in the case of the Brown Bear, to hibernate. The loss of such habitat, and increasing conflict with humans over predation of domestic livestock and impacts on agriculture, are commonly cited as the reasons for the decline to eventual extinction. Deliberate extermination of the Wolf in the medieval period to protect deer for hunting by the privileged classes is also given as a reason for extinction (Pluskowski 2010).

The heyday of the three species occurred when the climate substantially warmed after the last ice age. For around 6,000 years, between 7,000 BC and 1,000 BC, upper Teesdale around Moking Hurth was wooded, with trees extending on to the slopes of the higher fells; only the high plateau was free from trees (Turner 1978). Tree species and the extent of woodland cover varied with climate fluctuation and the limited clearance by Mesolithic people, but the wildwood was at a maximum during this period.

An average temperature some 2 °C higher than today (Turner 1978) during the middle Bronze Age encouraged agriculture in the uplands in areas which are now too cool to support it, and by the late Bronze Age agriculture was well established in upper Teesdale (Roberts 1978). The beginning of a cooler and wetter climate around 1,000 BC which inhibited tree growth in upper Teesdale, combined with increasing grazing by domestic stock, saw the woodland replaced by blanket bog and grassland; by the end of 1,000 BC the present vegetation of the upper dale was established, and according to Turner (1978) it has not changed significantly since. The pollen sample used to give an Iron Age date to the Wolf skull excavated in 1969 from a swallow hole at Moking Hurth contained the pollen of oats (Simms 1974).

In Northumberland (Lunn 2004) and on the North York Moors, significant tree clearance for agriculture and grazing also began during the Bronze Age, continuing through the Iron Age and the Romano-British period, when tree pollen presence on the North York Moors fell to levels comparable to the present day (Sherlock 2012).

The timing, extent and intensity of the transition from woodland to agriculture and pastoral use varied across the region. Despite the subsequent resurgences of woodland, as far as the large carnivores were concerned the wildwood was substantially gone by the end of the Bronze Age and the beginning of the Iron Age (Huntley and Stallybrass 1995), and humans were utilising the northern uplands for seasonal agriculture and transhumance stock grazing. No doubt the antipathy between humans and large carnivores had already begun, with the loss of woodland disproportionately affecting Lynx and Bear.

PLACE NAMES

Bear (Yalden 1999) and Lynx (Hetherington 2010) place names in Britain do not exist. The Wolf, as the longest surviving member of the trio, has left its name across the northern landscape, although care must be taken to avoid confusion between the animal and Wulf as a common personal name which can occur in place names (Yalden 1999). In Weardale there are Wolf Cleughs in Rookhope and Westernhope (Morley Egglestone 1886); in Northumberland rocks near Wallington are known as Wolf Crag, and on the Scottish border the names Wolf Keilder, Wolf-lee, Wauchope Burn, Wolf Cleugh and Wolf-hope occur (Mennel and Perkins 1864). There is also a Wolf Hole near Rothbury which may indicate a former den site. In England the existence of Wolf place names is more prevalent in the high ground in the north, perhaps suggesting an earlier extermination from the lower counties (Yalden 1999). Dent (1974), explaining how the Wolf name can be lost from the landscape, gives as an example the stream Wolf Keilder, which was renamed in modern times as Ridge Burn. Yalden (1999) also describes the derivation of the name Wool Pits from Wolf Pits, the places where wolves were pitfall trapped; there is a Wool Pit Hill immediately to the east of the cave at Moking Hurth. Other examples include the name Wooley, near Lanchester, which derives from the twelfth-century name Ulflawe, meaning the "woodland clearing frequented by wolves"

(Poulton Smith 2014). The prefix ulf is also present in Ulpha, written in Old Scandinavian in 1279 as ulfr huagr and describing the hill frequented by wolves. Ushaw derives from the Old English wulf scaga meaning the small wood frequented by wolves (Poulton Smith 2014). No doubt there are many more.

LYNX

Being an ambush predator with a predilection for Roe Deer *Capreolus capreolus*, woodland loss is likely to have contributed greatly to the demise of the Lynx (Hetherington 2010).

The Moking Hurth Lynx bones are the only Durham/Northumberland Lynx remains but North Yorkshire provides other archaeological evidence of Lynx. A Lynx tibia from Moughton Fell Cave was radiocarbon dated to 1842 plus or minus 35 years Before Present (BP) (calibrated to AD 80-320) and a femur from Kinsey Cave to 1550 plus or minus 24 years BP (AD 25-600); the latter is the youngest date yet for Lynx bones in Britain. Together these dates place the Lynx in North Yorkshire both during and shortly after the Roman period (Hetherington 2010), but at a distance from the two counties.

Hetherington (2006 and 2010) also references a seventh-century lullaby *Pais Dinogad*, a new interpretation of the text of which refers to the hunting of Wild Boar, Lynx and Fox. A clue to the location of these hunters' prey is contained within the text as "fish from Derwent waterfall" but there are several river Derwents in the north of England, so which one is it? Based on the work of Gruffyd (1990), who concluded that the only significant waterfall worth mentioning in a poem on any of the northern Derwents is the Lodore Falls on the Watendlath Beck falling into Derwentwater Lake in Cumbria, Hetherington placed this textual reference to Lynx in Cumbria.

However Gruffyd's evidence for this location is limited, consisting of only the reference to an unnamed waterfall and the fact that the text is written in Cumbric, an ancient British language which was spoken across the whole of north Britain. Gruffyd compared modern maps and descriptions of the rivers Derwent in his hunt for waterfalls, which seems a questionable methodology for understanding waterfalls on rivers after a lapse of 14 centuries, and the *Pais Dinogad* text makes no reference to the nature of the waterfall.

A contrary hypothesis is made by Morgan (1993) who points out that the *Pais Dinogad* text is a later insertion into the heroic poem "Y Gododdin" which takes its name from Gododdin, a kingdom which lay between the other Celtic kingdoms of Strathclyde and Rheged in the west and the early Saxon kingdom of Bernicia (Northumberland) to the south east. He therefore concludes that the Derwent mentioned in *Pais Dinogad* is the river Derwent dividing Northumberland and Durham, which lay within the Gododdin territory and not in Rheged in the west. Morgan's argument is supported by Jarman (1976) who states: "There are several Derwents in northern Britain, but it is impossible

to be certain which is referred to in the fourteenth line (of *Pais Dinogad*). Jackson suggests the Derwent in County Durham as being within the Gododdin territory". It seems that it can plausibly be claimed that this seventh-century written record for Lynx is as soundly placed on the Northumberland/Durham border as it is in Cumbria, putting the Lynx in the two counties in the early medieval period.

BEAR

In Britain, what little evidence there is points to the indigenous Brown Bear beginning its long decline to extinction in the Neolithic and becoming very rare before final extinction in the early medieval period (Hammon 2010). The reasons for extinction are enigmatic but probably include a combination of woodland habitat loss, the bear being most at home in mixed deciduous woodland, over-hunting of a slow-to-reproduce large mammal, and deliberate extirpation of a predator of livestock (Hammon 2010).

In summarising the Durham records, Jessop (2012) states that the Moking Hurth bones are the only sure indigenous remains in Durham and Northumberland of a wild Brown Bear, the nature and context of the other remains suggesting imported European animals either as high-status captives or as skins and teeth for amuletic purposes. The two bones from Binchester (67 and 353) recorded by Jessop (2012) as "possibly bear" have since been reappraised as the bones of domestic pig.

Evidence for the native bear in the North East is sparse. Apart from the Moking Hurth bones the nearest remains of possible native bears include:

- A bear tibia from a third/fourth century layer of a Roman dig at Catterick Bridge in North Yorkshire which is thought to be from a whole animal rather than a skin, prompting the suggestion that this may be from a native bear hunted in the less developed area of the Pennines (Stallibrass 2002).
- An undated find of bear teeth excavated from a washing on Oxnopside in upper Swaledale in 1969 (Simms 1972).
- A bear scapula from a midden on the banks of the river Swale near Richmond which may be of Iron Age/Romano-British date (Stallibrass 2002).
- A bear vertebra excavated from Kinsey Cave, North Yorkshire, which has been radiocarbon dated to between the early fifth and the early sixth centuries AD (the early Middle Ages), is the last securely dated specimen of what must have been an indigenous Brown Bear (Hammon 2010).

The Catterick Bridge remains, if indeed from a wild bear, are the nearest dated remains to the two counties.

The Brown Bear once held a considerable mythical and quasi-religious significance in early human societies, a veneration which early Christianity sought to destroy (Pastoureau 2011). A local example of the cult of the Brown Bear is provided by the miniature bear figures carved in jet in North Yorkshire of Romano-British manufacture, possibly indicating that the bear as an icon still retained some social significance, even

though by this time it was becoming scarce as a wild animal (Hammon 2010). In parts of Europe, and particularly Scandinavia, the bear/human relationship extended beyond the metaphysical to include the belief in sexual relations between humans and bears, with the resultant bearlike attributes of strength and valour passed to the offspring and into the lineage. Earl Siward of Northumberland who died in 1055 believed himself to be the descendant of a bear and his father (Beorn Bereson) was reported to have had bearlike ears (Brunner 2007 and Pastoureau 2011).

Jessop (2012) records the occurrence of bears and apes in the Durham Account Rolls, when in 1532-1533 five shillings were paid for the care of bears and apes for the Bishop. Such captive animals were icons of social standing for the owner, in this case a "Prince" Bishop, although the seamier side of the relationship meant that the bears were often kept for baiting with dogs. Baiting of animals was a popular pastime among the medieval higher classes, extending to the baiting of swimming Polar Bears *Ursus maritimus* in the Thames and the baiting of Lions *Panthera leo* (MacGreggor 2012). There is no evidence that the Bishop's bears were ever baited, but provincial bears were occasionally called upon to support the royal taste for bear-baiting.

The relationship between bears and apes is a long one and both were used to entertain (MacGreggor 2012). The Bishop's apes were most likely Barbary Apes *Macaca sylvanus*, the ape species with the longest history as a household pet in the ancient world, with a pedigree persisting through all ages and a trade stretching as far west as Ireland (Raftery 1997). Performing bears were also frequently accompanied by Barbary Apes in nineteenth-century Europe (Raftery 1997) and there is an account of two gypsies with a "couple of bears and four monkeys travelling for several months through England, giving performances with dancing bears, and how a fatal accident befell them in Liverpool when a bear attacked an English girl" (Vukanovic 1959).

The exploitation of bears as performing animals persisted locally until the early twentieth century with photographs of dancing bears in the Bondgate at Darlington around 1900 and in St John's Chapel Weardale in 1914 (Durham County Council website).

WOLF

First excavated in the late nineteenth century by the Backhouse family of Quakers and then again between 1967 and 1971 by staff from the Yorkshire Museum, the Moking Hurth cave and an associated swallow hole have yielded the remains of three separate wolves.

In a note to William Davies of the British Museum, who was working on the Lynx bones from the cave, James Backhouse describes the Wolf finds as follows:

> From one of the ramifications, we extracted almost the entire skeleton of a Wolf. Its bones were intermingled with those of a Roebuck, on which it had

> probably been feeding. The Wolf's skull was a little over three fourths the size of a full grown male Arctic specimen. A single canine tooth, belonging to a much larger Wolf, was found at no great distance, and near the place where the Lynx bones were imbedded (Davies 1880).

During the Yorkshire Museum dig a Wolf skull was found associated with Red Deer *Cervus elaphus* bones in a swallow hole adjacent to the caves. Silt from the Wolf cranium included pollen and freshwater mollusc remains, with the pollen analysis yielding a typical Zone VIII assemblage, a zone beginning in the dale at about 1200 BC, in the late Bronze Age. However the presence of avena pollen (oats) most likely places the skull in the Iron Age or slightly later. The pollen assemblage indicates a landscape with some deciduous woodland, a considerable amount of grassland with cereal cultivation, and some damp ground with standing water (Simms 1974), not a wild wood.

There is a further reference from Simms of undated Wolf remains found when excavating a rock shelter in Tripsdale in the Cleveland Hills during 1959-60, the context suggesting a native Wolf (Simms 1972).

In March 2015 two canid skulls (Figure 2) and other bones were excavated from an underground fissure in a swallow hole on Stainmoor Common (NY8217), known as Swindale Pots. The two skulls were provisionally identified as wolf by Alec Ayers of Durham University, probably a male and a female. In both skulls the brain cases were destroyed, prompting the suggestion that the shake hole had been used as a wolf trap (Coult 2015). It would be interesting to have the skulls DNA analysed for confirmation.

Figure 2. Canid skulls from Swindale Pots (© Ben Coult 2015).

Other archaeological remains in Durham and Northumberland are summarised by Jessop (2012), but identification remains ambiguous because the bone contexts allow the possible confusion with bones of large dog.

Literary references to wolves can also be ambiguous, but medieval sources from northeast England and the Scottish Borders help to build a history of Wolf in the region.

In 1076 Robert de Umfraville was granted lands in Riddlesdale (now Redesdale), Northumberland, with the obligation to keep the countryside free from enemies and wolves (Harting 1880). Mennell and Perkins (1864) mention a reference to wolves in the hagiography of St Godric the hermit of Finchale, near Durham City written by Reginald of Durham in the twelfth century. Dr Margaret Coombe, who is currently translating Reginald's text, has kindly provided a location and date for the encounter between Godric and the Wolf. She considers the date to have been between 1110 and 1128 AD and the location a field encircled by woodland about 400 yards to the west of Finchale Abbey and above the river Wear, the Wolf leaving the woodland to confront Godric and returning to the wood at Godric's command (Dr Margaret Coombe, pers. comm., 2015). The text is richly embellished with complex religious symbolism designed to support Godric's exaltation to sainthood, but does seem to describe a genuine encounter with a Wolf.

A poem by Prior Lawrence of Durham who died in 1154, his *Dialogi*, consists of four books representing conversations between himself and two friends. Books 1 and 2 deal partly with the physical environment and describe the natural beauties and treasures of the county of Durham. Lines 221 to 230 of Book 2 give a "well attested" description of how the cold one winter drove the wolves to kill and eat 500 mares and foals "to Durham's lord's dismay". Lawrence recounts that this event happened when Flambard was Bishop of Durham, which dates the event to between 1099 and 1128. Lines 31 to 34 of Book 2 describing a tongue-tied lapse in conversation between the two friends makes reference to the old belief, contained in medieval bestiaries, that a Wolf could strike a man dumb with its gaze (Rigg 1997).

Around the year 1180 Bishop Puiset of Durham granted grazing and an iron mine at Rookhope in Weardale Forest to the Hospital of St Giles in Durham. On account of the wolves, the brothers were granted an exemption from the forest law of cutting three claws from the front feet of their dogs to prevent them hunting deer. This solitary example of exemption from Forest Law in Weardale suggests that Wolf hunting was then necessary; the land granted is close to the farm still known as Wolf Cleugh at Rookhope (Drury 1978).

In 1342 Conan Duke of Brittany gave pasture in his new forest at Richmond to the monks of the Abbey of Fors, forbidding them to use mastiffs to drive wolves from the pastures. In the same year Alan Earl of Brittany gave them common of pasture in Wensleydale and the right to take any flesh of animals killed by wolves (Harting 1880).

In 1394 the account rolls of Whitby Abbey record payment for the tanning of 14 Wolf skins (Harting 1880), and the Abbey of Rievaulx had the rights to trap wolves on Westerdale Moor in the Cleveland Hills (Waites 1997).

Wolves were present near Marske in Cleveland until 1369 and John of Gaunt (1340-1399) is said to have hunted wolves between Wensleydale and Stanemoor, the upland

straddling the border between Durham and Cumbria where wolves and Red Deer then abounded (Almond 2011).

In 1439 Robert Umfraville held the manor of Otterburn by the service of keeping Riddlesdale free of robbers and wolves (Harting 1880). If the fifteenth-century Robert is a descendant of the Robert of 1076 it is possible that by this date the title was nothing more than a sinecure, or perhaps this latter-day Robert witnessed the passing of the last wolves in Northumberland, finishing the job his Norman ancestor began.

Harting (1880) also mentions Ambrose "Roast Wolf", described as a "Barnes of Hatford near Barnard Castle", who got his nickname from the many wolves he killed and occasionally ate, during the reign of Henry VII. The account of Ambrose appears in Longstaffe's "Memoirs of the Life of Ambrose Barnes", in which an editor's footnote suggests that the story should be taken with a grain of salt. Henry reigned from 1485 to 1509 which is a very late date for wolves in England, and it is likely that this story is in error or an exaggeration.

Just across the Tweed in the Scottish Borders in 1166 and 1169 Robert Avenel granted land in Eskdale to Melrose Abbey with the right to trap wolves, and in 1458 and 1459 the bailie of the Earldom of March paid Gilbert Home five shillings for killing 10 wolves in Cockburnspath, just 24 km north of the Tweed (Gilbert 1979).

Wolves are very adaptable carnivores and able to utilise a variety of habitats; Blaise (1858) describing historical wolves in Yorkshire predating sheep states: "They used to breed in the 'cars' below, among the rushes, furze and bogs, and in the night time to come up from their dens".

Dent (1974) describes historical Breton wolves in a farmed landscape where they would lie up in small numbers in spinneys during the day and come together at night to hunt. In southern Europe modern wolves exist in the rural landscape wherever sufficient large ungulates are present (wild or domestic); they can subsist by scavenging from human refuse (Merrigi and Lovari 1996) and can successfully navigate major landscape barriers such as motorways (Blanco, Cortes and Virgos 2005). This adaptability to non-woodland habitats most probably contributed to the Wolf surviving in Britain for a thousand years longer than the Lynx or Bear.

Pluskowski (2010) links the extirpation of the Wolf in England to the establishment and expansion of the medieval hunting forests from the late eleventh century to their peak in the thirteenth century; the reason for deliberate extirpation being the protection of deer, principally Red Deer which were preserved to be hunted by the nobility. The wild lands of Durham and Northumberland and the continuing presence of wild Red Deer in the fifteenth and sixteenth centuries (Coult 2012) provided habitat and food, which given the Wolf's proven ability to exist in an open landscape could have supported wolves, had they been tolerated.

What little evidence there is in the two counties - the duty of Wolf killing in Redesdale and the granting of exemption from Forest Law for hunting dogs in Weardale, along with the North Yorkshire evidence - supports the theory of deliberate extirpation by the Norman aristocracy. Stock loss and the cash incentive associated with the establishment of large-scale medieval monastic sheep farming in North Yorkshire no doubt also contributed to the deliberate extinction of the Wolf.

The demise of the Wolf in the two counties is impossible to date, but given that they were present in the North York Moors, Cleveland, and on Stanemoor in the fourteenth century, and in the Borders in the mid-fifteenth century, and given home range size and the presence of suitable habitat in the two counties, a late fourteenth/early fifteenth century presence for Wolf in Durham and Northumberland does not seem unreasonable. After this time Wolf records disappear from the literature, perhaps confirming a final extinction and supporting the theory of deliberate extirpation over a relatively short period of time.

A PERSONAL NOTE

The idea of reintroducing large carnivores is an endearing one to many people. For those who have experienced such places there is no doubt that a landscape with large carnivores has a sense of completeness not sensed in the wildlife-deprived habitats of the UK. Such introductions are often conceived as an integral part of an idealised vision of "re-wilding"; the re-creation of "desirable" large scale ancient habitats usually of native woodland and usually in the uplands. In the UK this is most commonly Scotland, where space is available without humans.

Setting aside the likely opposition from certain groups to any attempt to reintroduce a large carnivore to the uplands of Durham and Northumberland, it still seems impossible that the two counties could provide sufficient unoccupied space or enough woodland to support Wolf, Brown Bear or Lynx, with possibly one exception. Modelling for the possible reintroduction of Lynx into Scotland included Kielder in Northumberland, with an estimated 800 km^2 of suitable habitat. This is contiguous with the Scottish Southern Uplands block of suitable habitat, which when combined could support up to 50 Lynx. A larger population of around 400 Lynx could be supported in the Highlands of Scotland but to maintain and link the two populations further tree planting would be needed, along with measures to mitigate the barrier effect of built infrastructure in the Scottish central belt (Hetherington *et al.* 2008). Given that the Lynx poses no threat to humans and predation of sheep can be managed it is not impossible that north Northumberland may one day see the return of at least one of its lost carnivores.

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A FOSSIL COELACANTH REDISCOVERED

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"I have in vain endeavoured to obtain a sight of the specimen; but it is now not known where it can be seen" King (1850).

SUMMARY

A fossilised *Coelacanthus granulatus* from the Permian of County Durham, recently donated to the Natural History Society of Northumbria's collections, has been recognised as a specimen that was illustrated by Adam Sedgwick in 1829. The specimen is also a syntype of two nominal taxa: *Pygopterus scoticus* Agassiz and *Nemopteryx mandibularis* Agassiz (Agassiz 1833).

INTRODUCTION

In November 2013 the Darlington and Teesdale Naturalists' Field Club (DTNFC) donated a large[1] and well-preserved fossil fish (Figure 1) to the Natural History Society of Northumbria (NHSN).[2] Initial examination suggested that the specimen was a Permian Coelacanth, *Coelacanthus granulatus* Agassiz, and several aspects of this fossil were immediately noted: 1) the rarity of *Coelacanthus*, 2) the great rarity of examples of this degree of completeness, and 3) the fact that the fossil had been mounted in a wooden frame, with coloured plaster filling the areas of the frame not occupied by the block; the frame had also been glazed. These features suggested that somebody had previously thought that this fossil was notable enough to deserve mounting. Finally, the fossil had a handwritten label associating it with a well-known Darlington Geologist (R Taylor Manson) and a classic collecting locality (Thickley, County Durham).

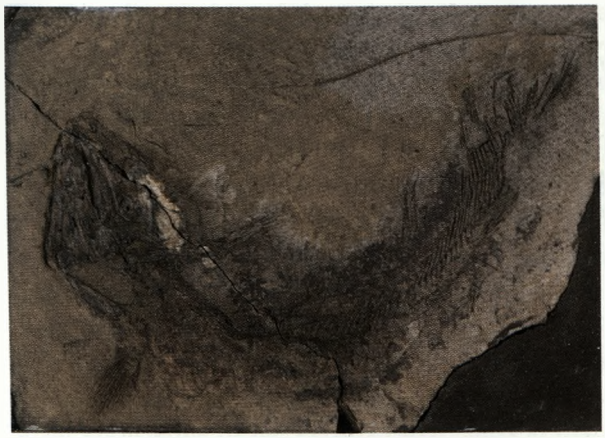


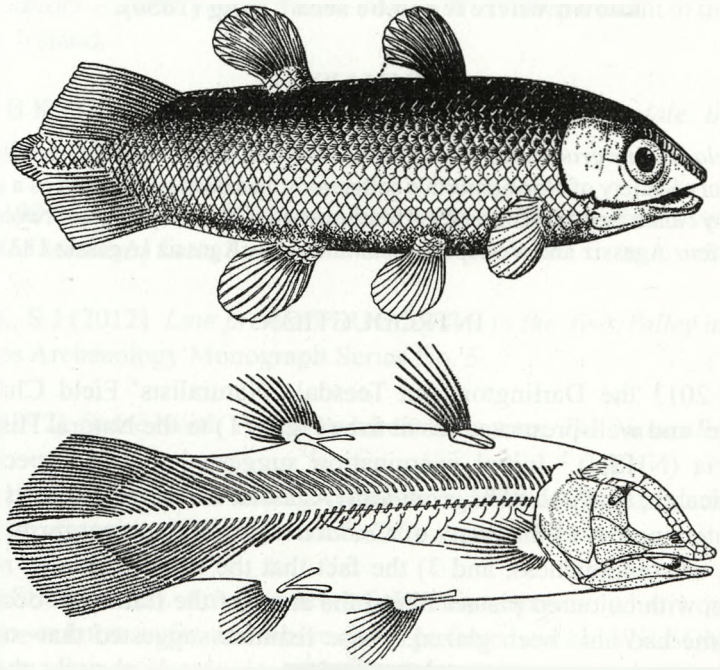
Figure 1. Fossil fish numbered NEWHM 2013.H1500 in the collections of the Natural History Society of Northumbria.

[1] The fish is 31 cm long, and with a maximum width of 23 cm. It is housed in a framed box 49.5 cm by 38 cm, and with a depth of 4 cm.

[2] The specimen has been catalogued with the number NEWHM 2013.H1500.

It was decided to investigate further, to see if any more of the fossil's history could be discovered. On searching through the historical literature on *Coelacanthus* the surprising fact emerged that this fossil had been the subject of an engraving published in 1829. Not only that, but because the engraving had been used as the basis of the description of certain species of fish, the fossil was actually a type specimen of some historic importance. Figure 2 shows a reconstruction of an early Coelacanth from its fossil remains.

Figure 2. Illustration of Coelacanth from Smith 1956. (After Smith Woodward.)



PROVENANCE

A label, glued to the frame, is pre-printed with the name of the Society (as Darlington and Teesdale Naturalists' Field Club: thus post-dating 1896, when that name was adopted), and with the headings "Name", "Formation", "Locality" and "Donor". The details are added in manuscript, as:

Name	Fossil Fish
Formation	Permian
Locality	Thickley
Donor	Dr Manson

The donor

Dr Manson, whose name is given on the label as the donor of the fossil to DTNFC, was a well-known geologist who was active in Darlington in the later part of the nineteenth

century. Dr Richard Taylor Manson (1832-1900) was born in Liverpool and trained as a doctor in Newcastle before practising in south Durham, finally settling in Darlington in 1882 (Wooler 1907; Hetherington 1987). Interested in geology from an early age, his *Popular Geology of Darlington* was published in 1864. He was a vice-president of the Darlington Naturalists' Society when it was founded in 1860. That society closed in 1891 and its collections and library were passed to the newly formed Darlington Naturalists' Field Club (which also numbered Manson among its founders). This latter society continues today as the Darlington and Teesdale Naturalists' Field Club.

As a prominent geologist of the area, it is not surprising that an important fossil would come into Dr Manson's ownership, and it is natural that he would pass it on to a society that he had helped to found. It is not known whether he gave it to the earlier society (founded 1860) or the later society (founded 1891), but a "large quantity of fossils" was part of the property passed from the former to the latter in 1891 (Hetherington 1987).

The locality

According to the label the fossil was found in Thickley. This is a perfectly credible provenance: East Thickley quarry is one of the classic sites for Permian fossil fish in south Durham, and a site well known to Dr Manson, as evidenced in his 1898 book *Zigzag Ramblings of a Naturalist*. But Dr Manson could not have collected the fossil himself, since he was born three years after an illustration of it was published. If (as discussed below) it was previously owned by Henry Witham in 1829, then the fossil must have passed through at least one intermediary owner since Dr Manson could not have known Witham (who died in 1844, when Manson was a boy in Liverpool).

THE FISH IS BROUGHT TO THE ATTENTION OF GEOLOGISTS

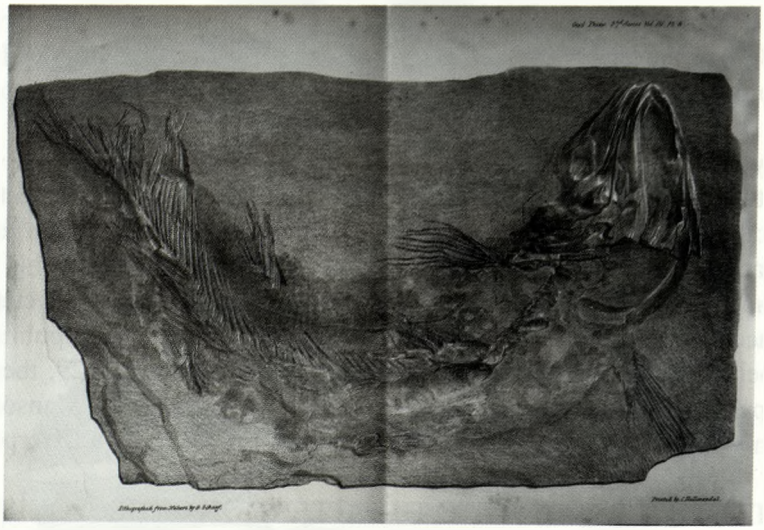
An unidentified fish

The first description of the specimen was in a paper by Adam Sedgwick (1829) on the geology of the magnesian limestone. Sedgwick's paper included several plates illustrating Permian fish, and a close examination of his plate 11 (Figure 3) reveals that there are enough points of similarity to conclude that it shows this *Coelacanthus* specimen (making allowance for the plate being a mirror image of the fossil). Not only does the overall form agree, but also the exact placement of the fins, the position of the lepidotrichia (fin rays), and even the presence of some angled elements composed of lepidotrichia at the tip of the tail and of a Y-shaped element between the head and the right pectoral fin.

Some of the illustrated fish were given scientific names in Latin by Sedgwick. Others, like this example, were named simply as "Fossil fish". This is understandable, given the scant knowledge of the Permian fish fauna at that time. Sedgwick commented that the fish on his Plate 11 was "far too imperfect to be referred to any known species or genus. It may hereafter serve the purpose of comparison."

It is not known who was responsible for giving Sedgwick access to the specimen. He listed several people who had provided fossil fish for him to study, and singled out H Blanshard of London and Henry Witham for supplying specimens for illustration. Later, Louis Agassiz wrote in the introduction to *Recherches sur les Poissons Fossiles* (1: 19) that Henry Witham of Lartington (which is near Barnard Castle) had in his museum the most beautiful collection then existing of fossil fish from the magnesian limestone, which included the majority of specimens illustrated by Sedgwick. If our fossil was supplied by Witham, though there is no proof that it was, it could explain why it remained in the Darlington area.

Figure 3. "Fossil Fish", Plate 11 in Sedgwick's 1829 monograph on the magnesian limestone.



The fish is described as a Pygopterus - Louis Agassiz and the *Poissons Fossiles*

The next description of the fish in print was through the work of Louis Agassiz, who tried to identify the various species illustrated by Sedgwick and concluded (wrongly, to our modern understanding) that it was a species of *Pygopterus*.

Louis Agassiz's highly important work on fossil fish, *Recherches sur les Poissons Fossiles*, was published in parts over a period of 11 years, and it is possible for a species to be mentioned in a list in one part, illustrated in a second and described in detail in a third: the three parts possibly separated by a decade or more during which time information could be used and copied by other workers. Fortunately there is a detailed breakdown of the dates of issue of the work, composed by W H Brown and included in Woodward and Sherborn's *Catalogue of British Fossil Vertebrata* (1890). The first indication that Agassiz had looked carefully at the fish on Sedgwick's plate 11 was in 1833 as part of a synoptic list of the families, genera and species of "Ganoides" occupying pages 1-18 of part 1 of Volume 2. On page 10 Agassiz listed a species as *Pygopterus scoticus* Agassiz, and with reference to Sedgwick's plates 10 and 11 he also listed synonyms of the name, as "Nemopteryx mandibularis Ag. ou Sauropsis scoticus

Ag. dans un précédent catalogue". This "preceding catalogue" seems never to have been published and could have been an unpublished manuscript: Marcou (1896) alluded to a major manuscript that Agassiz compiled at the time he was working on fossil fishes.

This listing, scant as it is, contains enough information to establish it as a valid description of the taxon *Pygopterus scoticus*, because it includes a bibliographic reference to an illustration. The type specimens of the species are the fossils illustrated by Sedgwick on plates 10 and 11, one of which is the specimen now in the care of the NHSN.

As for the name *Nemopteryx mandibularis*, because it was first published as a junior synonym of a name it would not normally be "available" under International Code of Zoological Nomenclature rules. However "if such a name published as a junior synonym had been treated before 1961 as an available name and ... adopted as the name of a taxon ... it is made available thereby but dates from its first publication as a synonym".[3] It seems that Agassiz made a later decision to use *mandibularis*, in preference to *scoticus*, and 1833 was the last time he used the latter name. In the list of corrections (issued 1844, 2 part 2: 291) there is an instruction to change the name *Pygopterus scoticus* to *Pygopterus mandibularis*, but he had already published two plates illustrating fossils labelled as *Pygopterus mandibularis* in 1839 (Atlas Tome II: 53 and 53a). Because it was adopted by Agassiz as the name of the taxon, it is available for use.

As for the genus *Nemopteryx*, the name is already used for a genus of insects described by Leach in 1815, so it should not be used for a fossil fish; there are no problems in using the name *Pygopterus*.

In 1844 Agassiz's detailed written description of *Pygopterus mandibularis* appeared (in Text II part 2: 73-336), and the discussion included the two specimens illustrated in 1839 as well as the fishes on Sedgwick's plates 10 and 11.

Since the fossils illustrated on Agassiz's plates 53 and 53a, and the fish on Sedgwick's plate 10 are recognisably *Pygopterus mandibularis* in the long-understood sense, and the fossil illustrated on Sedgwick's plate 11 is a Coelacanth, then the taxon named by Agassiz in 1833 and discussed in 1844 was actually a composite of two species that are quite unrelated. It was left to later authors to clarify the situation.

Agassiz's synoptic list of "Ganoides" was reprinted in academic journals. The earliest appeared in 1833 in the *Neues Jahrbüch* (Agassiz 1833), and at first sight might be thought to compete with the entry in *Poissons fossiles* for priority in date. The article gave the same information as in the table in the *Poissons fossiles*, but is in German rather than French; however the title of the article makes it clear that the information is derived from Volume 2 of *Poissons fossiles*.

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[3] The International Code of Zoological Nomenclature, available online at http://www.nhm.ac.uk (accessed December, 2013).

The next description of the specimen as a *Pygopterus*, still named as *P. scoticus*, is in the book *Lethaea Geognostica* by H G Bronn, 1835-1837. Bronn was coincidentally an editor of the *Neues Jahrbuch*. The first author other than Agassiz to abandon the name *scoticus* in favour of *mandibularis* was J Morris in his *Catalogue of British Fossils* (1843: 204), where he listed *Pygopterus mandibularis* with reference to Agassiz's figures 53 and 53a, and Sedgwick's plates 10 and 11.

In a publication that could represent Agassiz's last position on the issue (Agassiz 1844), a synoptic table of British fossil fishes listed plate 10 of Sedgwick's work under *Pygopterus mandibularis*, but did mention Sedgwick's plate 11 under the listing of *Coelacanthus granulatus*.

The fossil is described as a Coelacanthus – King and Egerton

While most subsequent authors (including Howse in his 1848 monograph of Permian fossils of Northumberland and Durham) were content to repeat earlier listings, it was inevitable that eventually somebody would look again at the identity of the fishes in Sedgwick's illustrations. It seems that the first to do so were William King and Sir Philip Egerton in the *Monograph of the Permian Fossils of England* (1850);[4] this is the first revision of the taxa described by Agassiz. King realised that three of the specimens placed by Agassiz in *Pygopterus mandibularis* (Agassiz's figures 53 and 53a and Sedgwick's plates 10) were one taxon, for which he retained the name *Pygopterus mandibularis*; and that the fourth, shown on Sedgwick's plate 11, illustrated a second taxon: a specimen of *Coelacanthus granulatus*.

When Louis Agassiz identified our specimen as a *Pygopterus*, the genus *Coelacanthus* had not been described in print. The first appearance of the name *Coelacanthus* was in 1839 in Agassiz's *Recherches sur les Poissons fossiles*, when a fish from Henry Witham's collection was illustrated on plate 62 of Volume 2 of the Atlas and captioned as *Coelacanthus granulatus*. The accompanying text, describing the genus and species in detail, was issued in 1844 (in Text II part 2: 170-173) although in the text the name is given as *Coelacanthus granulosus* (this may be a typographical error).

So either King and Egerton, or perhaps both working independently, realised that the fish on Sedgwick's plate 11 was not a *Pygopterus* but in fact belonged to Agassiz's genus *Coelacanthus*. A paragraph signed by Egerton (in King 1850) comments that "It is very much to be regretted that all efforts to discover the original ... have proved ineffectual", but goes on to discuss those anatomical features shown on Sedgwick's illustration that enable the fish to be identified. A second paragraph is evidently by William King, and in a bibliography probably by him a footnote comments "I have in vain endeavoured to obtain a sight of the specimen; but it is now not known where it can be seen" (King 1850).

[4] The book was written by William King but includes substantial amounts of text by Sir Philip de Malpas Grey Egerton, whose contributions to the fish section are annotated with his initials. He wrote one of the paragraphs relating to *Coelacanthus granulatus*.

An incidental note: although Sedgwick's figure was the first to illustrate a specimen of a *Coelacanthus*, it was not the first illustration of a member of the family Coelacanthidae. That honour belongs to a fossil fish illustrated in Gideon Mantell's *Fossils of the South Downs* (1822), and later named as *Macropoma mantelli* by Louis Agassiz.

THE LATER HISTORYOF THE SPECIMEN

After the listing by William King, the specimen seems to have vanished from the literature.[5] Subsequent detailed studies on the anatomy of Permian *Coelacanthus*, for instance the papers by Moy-Thomas and Westoll (1935) and the detailed re-description of the anatomy of *Coelacanthus granulatus* by Schaumburg (1978), did not refer to the specimen.

The fossil is interesting not only because of its history but also because its unusual completeness suggests that it would reward closer study. Although some elements of the skull have been displaced and there is a large crack across the head, it appears that a substantial amount of the skull is still present. Most of both the pectoral fins and associated girdle are visible, and the gill arch supports (though covered by rock) appear to be still present. The absence of preserved material is only really significant towards the tail end of the fish. Modern technology could contribute to the study, with X-Ray Computerised Tomography now allowing researchers to study the elements of the skeleton that are hidden, and 3-D printers enabling copies to be manufactured and studied without much further recourse to the specimen.

As a final query, it might be noted that I have not traced the current location of the other specimens illustrated by Sedgwick: further historic material of similar importance could yet come to light.

CONCLUSION – A SYSTEMATIC SUMMARY AND STATUS OF THE SPECIMEN

Status as a type specimen

The specimen is a syntype of two species-group names, first published as *Pygopterus scoticus* Agassiz, 1833 and *Nemopteryx mandibularis* Agassiz, 1833.

The names *Nemopteryx mandibularis* Agassiz and *Sauropsis scoticus* Agassiz appear for the first time as objective synonyms of *Pygopterus scoticus*, and therefore both names have the same type specimens (the specimens represented on Sedgwick's plates 10 and

[5] The study of fossil Coelacanthidae can be followed through Forey (1998) and Forey and Cloutier (1991). It might be worth mentioning that two scientists with an interest in *Coelacanthus* lived in northeast England: these were William King (1808-1886), who was curator of the Sunderland Subscription Library and later (1840-48) of the Newcastle Museum, and Stanley Westoll (1912-1995), a world-renowned authority on fossil fish whose long connection with Newcastle included a career (1948-1977) as Professor of Geology at the University (see Paterson and Fortey 1999), where he assembled a strong *cadre* of Vertebrate Palaeontologists.

11). *Sauropsis scoticus* can be dismissed as a generic recombination of *Pygopterys scoticus*, but in the light of Agassiz's later attitude – preferring to use *Pygopterus mandibularis* rather than *P. scoticus* – the presence of *Nemopteryx mandibularis* Agassiz in the synonymic list is significant.

The presence of a Coelacanth among type material of *Pygopterus mandibularis* has no significant implication for the continuing identification of the species, since the other syntype is a *Pygopterus mandibularis* in the currently accepted sense. Revision subsequent to the work of Agassiz has made the identity of the species clear.

Status as a figured specimen
The specimen was figured by Sedgwick in 1829 (on plate 11).

Status as a cited specimen
The specimen was cited by Sedgwick (1829).

Sedgwick's illustration – and consequently this specimen – was cited by Agassiz in 1833 and again in 1844. Agassiz's synoptic list of "Ganoides" was translated and reprinted in journals, but those references are derivative of Agassiz (1833).

Other authors to cite the illustration include: Bronn (1835-1837) (as *Pygopterus scoticus*); Morris (1843) and Howse (1848) (as *Pygopterus mandibularis*); King and Egerton in King (1850), Woodward (1891), and Moy-Thomas and Westoll (1935) (as *Coelacanthus granulatus*).

ACKNOWLEDGEMENTS

On behalf of the Natural History Society of Northumbria the author would like to thank The Darlington and Teesdale Naturalists' Field Club for the donation of this specimen. Thanks also go to the geologists Tim Pettigrew and Ken Sedman for their comments on the Durham Permian fish fauna, to Sylvia Humphrey, geological curator for the Society's collections, and to the librarians of the Literary and Philosophical Society of Newcastle and Durham University Library for providing access to material in their care. Newcastle University Robinson Library is also to be thanked for facilitating the photograph of Sedgwick's fossil fish plate.

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BRYOPHYTES: CHANGES IN DIVERSITY AND HABITAT IN CASTLE EDEN DENE (1975-2011)

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SUMMARY

The most species-rich areas of bryophytes[1] in Castle Eden Dene (SSSI, Peterlee, Co. Durham) were identified by reference to a survey carried out by A J Richards in 1975. These areas were sampled in 1990 and again in 2007-2011 and the results compared with Richards' survey of 1975. The conclusions of the 1990 survey were that there had been changes of bryophyte flora which were similar to those which had occurred in other parts of Britain. Pollution, changes in weather patterns, and in some places the removal of canopy are thought to have led to removal of substrates and disruption of microclimates necessary for bryophyte growth.The results of the survey during 2007-2011 were that once again there had been changes in bryophyte flora because of major disturbances in Castle Eden Dene, mainly due to landslips leading to a removal of substrates and canopy, and possibly also as a result of changes in levels of pollution and canopy renewal.

INTRODUCTION

Castle Eden Dene, a nature reserve of great natural beauty (Figure 1), is the largest of several steep-sided valleys in vice county 66 (VC66, which equates to County Durham). Castle Eden Dene lies between Horden and Blackhall Colliery (grid ref. NZ 457408), stretching four miles inland to near Wingate (grid ref. NZ 405389) and covers 200 ha. The area has been managed as a nature reserve since its purchase from the Burdon family in 1951. It is now owned and managed by Natural England as a National Nature Reserve. The site has Site of Special Scientific Interest (SSSI) status partly because of its extensive yew woodland, the most important woodland on the magnesian limestone in Britain (Ratcliffe 1978).

Management of Castle Eden Dene is aimed at retaining semi-natural deciduous woodland. Where human interference has resulted in the destruction of the natural vegetation, remedial action has taken place by way of felling and replanting with trees native to the area and encouragement of regeneration of these species.

The Dene is an immature valley lined by steep-sided cliffs which form a gorge in the west of the Dene. Deposits of boulder clay above the cliffs are made unstable by water

[1] Bryophyte refers to all embryophytes, plants that do not have true vascular tissue and are therefore called "non-vascular plants". This includes mosses and liverworts.

Figure 1. Scenery of Castle Eden Dene (Chris Evans).

flowing through sands and gravel beneath and resulting in many landslips. Under cliffs, alkaline soils have been formed by weathering of the limestone. The microclimate is constantly humid with a relatively even temperature, similar to that of many Atlantic regions which are rich in bryophyte species. This, combined with the local geology and diversity of woodland, has led to many varied habitats suitable for bryophytes. It contained a third of the number of species of bryophyte which occurred in VC66 (Corley and Hill 1981). According to Richards' survey of 1975 (Richards 1977), 113 species of mosses and 29 liverwort species were to be found in Castle Eden Dene.

Bryophyte Surveys of Castle Eden Dene

The extent of the bryophyte population in Castle Eden Dene was recorded in a survey by A J Richards during 1975 (Richards 1977). This extensive survey recorded the location of bryophytes in named compartments of the Dene (Figure 1), the type of substrate(s) for each bryophyte and whether the named bryophyte was rare, frequent, or abundant.

The National Vegetation Classification Woodlands Community Survey of Castle Eden Dene (Williams 1989) had only included a few terricolous (soil) bryophytes, excluding epiphytes (tree bryophytes), epiliths (rock bryophytes) and bryophytes found on rotting and dead wood.

In 1990 a survey was carried out to record the extent of the bryophyte population in the Central West area of Castle Eden Dene (compartments 3 and 4) and the associated microclimates (Mitchell and Robertson 1997). The survey was designed to measure the

distribution of bryophytes on various substrates, similar to Richards' survey in 1975; but in addition biotic and abiotic factors, including tree canopy, were measured, as these were thought to be important in defining microclimate. This was particularly relevant at this time because of the loss of canopy due to Dutch elm disease.

A further study to investigate population interactions in primary succession using rock-colonising bryophytes took place in Castle Eden Dene in the 1990s (Mitchell and Arthur 1998). Species recorded in this survey were also included in the 1990 survey.

In 2007, after a 17 year gap, another bryophyte survey was initiated. Although the sampling effort, the number and distribution of samples over various substrates and area sampled, was similar to the 1990 survey, this sampling took place on 14 occasions between June 2007 and February 2011 including every season, in what could be described as a long exposure snapshot of the Central West area of Castle Eden Dene. The aim was to compare species diversity over the same area as the 1990 survey, recording location, substrate, slope, aspect, tree canopy, shade and moisture for each sample as in the 1990 survey.

METHODS

The same methodology was followed as in 1990 namely:

i) Identification of the area to be studied;
ii) A detailed survey of the selected area;
iii) Profiles through the Dene.

A total of 166 sites, distributed over various substrates, were sampled in the Central West area of Castle Eden Dene (Figure 2). These consisted of 39 epiphytic samples, 25 samples on rock, 81 on soil, and 21 on dead wood. Samples taken from three cross-section profiles of the Dene were also included. Species accretion curves were constructed for each substrate to ensure that the majority of common species had been included in the survey.

As the survey methods were similar, the bryophyte species recorded in Central West area in the 1975, 1990 and 2007-2011 surveys are compared in Appendix Table 1. Similarities between the 3 surveys were as follows:

i) The same Central West area was used in comparing bryophyte populations. Richards' survey in 1975 included all compartments in Castle Eden Dene but only bryophytes recorded in Central West were used in the comparison in Appendix Table 1, although incidence of bryophytes in other compartments is acknowledged where appropriate.
ii) The same named substrates were recorded for bryophytes in the three surveys.
iii) A comment regarding abundance, frequency and rarity of species was

made in each survey based on subjective measures in the 1975 survey and numbers of samples in the latter two surveys.

iv) Although the 1975 survey and the two later surveys were carried out by different recorders, differences in expertise and experience of the recorders were acknowledged and dealt with by the use of microscopic features for identification of difficult bryophytes in the 1975 survey and in the latter two surveys, and also by confirmation of identification by County Recorders.

v) The same sampling effort was used in the two later surveys although timescales were different. The use of taxon accretion curves for each substrate in the two later surveys ensured that most bryophytes would be recorded for a particular substrate. In the 1975 survey the expertise of the recorder, an experienced botanist, ensured that this was the case. Seasonal changes were taken into account in the three surveys.

These similarities were felt to be sufficient to make a qualitative record of the data but not for a quantitative statistical analysis. The results of the summary table (Appendix Table 1) should be treated with caution. However there was sufficient parity between surveys to make general comments on changes in occurence for particular species, particularly when these are echoed in different parts of the country.

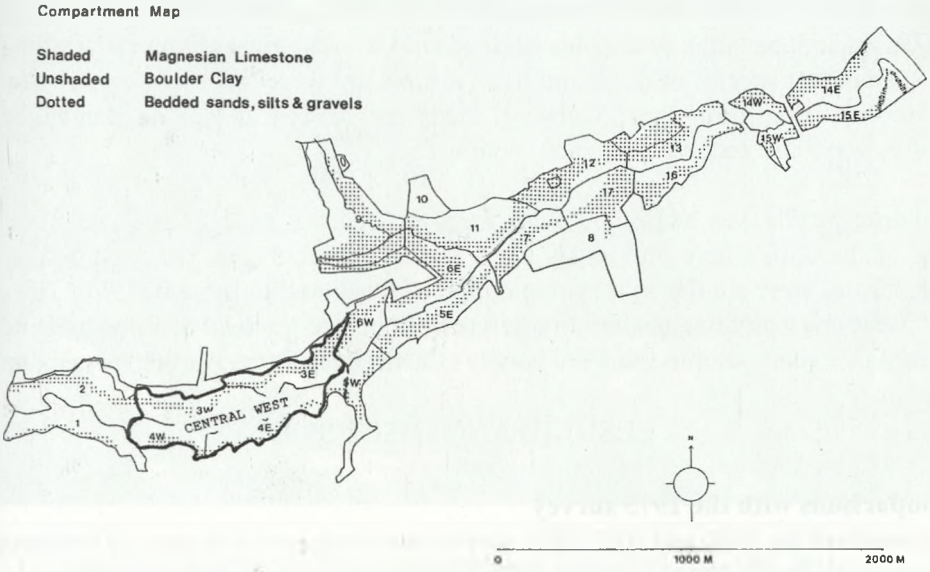
The results of three transects through the Central West area are given in Appendix Tables 2, 3, and 4. The numbers of epiphytes sampled for individual tree species during 2007-2011 are recorded in Appendix Table 5, and Appendix Table 6 gives the species of recorded bryophytes and their common names.

Sampling and Identification of Bryophytes

Richards' 1975 survey of bryophytes was used to identify those compartments of the Dene which were most species-rich, an area known as Central West. This area was surveyed in 1990 and resampled in 2007-2011 ("Central West", Figure 1) and consisted of compartments 3 and 4 (combined area 38.5 ha), containing 55 and 59 species of bryophyte respectively at the time of Richards' survey. Compartment vegetation maps (Williams 1989) were used to note the bryophyte-rich areas and substrates to be found. This was done by a preliminary walk through each discrete vegetation area. Specimens for identification were taken from each bryophyte area and the identification confirmed by samples previously identified by G G Graham (County Recorder 1990). Identification of further samples in the 2007-2011 survey were confirmed by a County Bryophyte Recorder, John O'Reilly. In the survey, the location (by grid reference), and biotic and abiotic factors were recorded for each random sample. The samples were variable in terms of area up to 1 metre^2, but each sample was homogeneous in terms of slope and aspect. This allowed comparisons to be made of bryophyte populations from various substrata and was more likely to ensure uniformity of microclimate within each sample. Abiotic factors were also recorded for each sample. Small samples of species were taken and identified by microscope. Nomenclature of bryophytes was in accordance with the moss and liverwort census catalogues 2013 downloaded from the British Bryological Society (BBS) website. *The Moss Flora of Britain and Ireland* by

Smith (2004) and also *Mosses and Liverworts of Great Britain and Ireland* published by the British Bryological Society (2010) were used for identification (the latter in the later stages of the survey). These reference sources were also used to identify current names of bryophytes where these have changed.

Figure 2. Map of Castle Eden Dene.



Measurement of Abiotic and Biotic factors for the 2007-2011 survey

Abiotic measurements:

Location of sample (grid reference)

Light and shade were measured by 5 scaled categories:

nil shade	1
little shade	2
mid shade	3
heavy shade	4
deep shade	5

Substrate moisture was estimated using 5 scaled categories as follows:

dry ground	1
normal ground	2
damp ground	3
waterlogged	4
in water	5

Biotic Factors:

Type of substrate (bare rock, soil, wood (tree species), dead wood)

Canopy of the bryophyte sample

Records of samples recorded in 2007-2011 together with biotic and abiotic factors were recorded in a spreadsheet linked to species and the tables included in this paper were extracted from these data.

The profiles

Many parts of the Dene were difficult to access but a suitable cross section of the Dene was found in compartment 3 East and 4 East in Central West Area. Ground distance was measured and the slope of the measured ground was taken by clinometer readings. The most abundant species of moss and liverwort on soil were recorded for each section of the profile of uniform slope. Moisture, shade and canopy as well as plants other than mosses were also recorded for each section.

A shorter profile was made in 3 West from the bed of Castle Eden Dene Burn to the base of the cliff, where previously Elms *Ulmus* spp. had been removed before 1990. The profiles were similar in aspect and type of woodland to those of 1990. The profile in 3 West originally had healthy bryophyte flora before removal of Elms by Dutch elm disease five years prior to the 1990 survey (Castle Eden Dene Warden, pers. comm.).

RESULTS AND DISCUSSION

Comparisons with the 1975 survey

The results of the 1990 and 2007-2011 surveys are compared with those of the bryophyte survey of Richards during summer 1975 (Appendix Table 2). The same area was used for comparison, that of compartments 3 and 4 (as defined by Richards) which is "Central West" in the present survey (2007-2011). The similarities between the methods used in the three surveys were thought to be sufficient to make a qualitative but not a statistically quantitative comparison. However in comparing the results of the three surveys, the following differences in methodology should be borne in mind.

Richards' extensive survey recorded the incidence of species in all compartments of the Dene with a general comment on abundance, substrate, and location of species. However the 1990 survey was more concerned with the ecology of recorded species and was not an exhaustive search for rare species.The survey during 2007-2011 was similar in method to the 1990 survey in order to show changes in bryophyte occurrence and distribution. Because of the lack of equivalence of aims and recording methods between the three surveys, any differences in distributions of bryophytes between 1975 and 2011 should be treated with caution (Lawley 2010; O'Reilly 2010). However changes in the bryophyte flora have occurred which are similar to those recorded elsewhere in Britain (Bates 1995; O'Reilly 2010). Table 1 shows the changes in numbers of species of acrocarpous, pleurocarpous mosses and liverworts recorded from the three surveys (acrocarpous mosses grow upright and bear capsules at the tops of their stems; pleurocarps form wefts or mats that spread horizontally with capsules arising from their main stems (Figure 3)).

Figure 3. Pleurocarpous *Eurhynchium striatum* with capsules (Gaynor Mitchell).

Table 1. Comparison of numbers of species recorded in 1975, 1990 and 2007-2011.

Type of species	1975	1990	2007-2011
Acrocarpous	29	30	20
differences		+1	-10
Pleurocarpous	35	21	18
differences		-14	-4
Liverworts	18	13	13
differences		-5	0

Differences between results of the 1975 and 1990 surveys

In 1975 a total of 81 species of bryophytes were recorded in Central West, of which 29 were acrocarpous and 35 pleurocarpous mosses. There were 17 species of liverworts recorded.

In total, 65 species of bryophyte were recorded in "Central West" in 1990, including 11 species not recorded in the 1975 survey. The species that were occasional in Durham County were Fragile fork-moss *Dicranum tauricum* and Starry Thyme-moss *Mnium stellare* and those that were rare were Matted Feather-moss *Brachythecium populeum* and Flagellate Feather-moss *Hyocomium amoricum* (Graham 1988). Fragile fork-moss *D. tauricum* was abundant in Central West of Castle Eden Dene although this species had not been recorded in 1975, but had been previously recorded in the Dene in 1971 (Graham 1988). Rough Stalked Feather-moss *Brachythecium rutabulum* was recorded

in 1975 as scarce and also had previously been found on logs (Richards 1975), but was abundant in 1990.

The most notable change between 1975 and 1990 is in the numbers of pleurocarpous species, which decreased by 14 species compared to 1975. Pleurocarpous species are more susceptible to occult deposition of sulphur dioxide and nitrogen oxide gases that could be blown in on mists or "haars" from the sea. The mists linger in the bottom of the Dene where more pleurocarpous species are to be found.

An exception is the increase in Rough Stalked Feather-moss *B. rutabulum,* not recorded in the 1975 but abundant in 1990. Rough Stalked Feather-moss *B. rutabulum* has shown enhanced survival and nutrient growth in polluted environments (Gilbert 1970). Another explanation for increases in Rough Stalked Feather-moss *B. rutablulum* could be greater light intensities in the Dene (Grime *et al.* 1990) due to gaps in the canopy from the death of Elms, land slips and the creation of more permanent paths through the Dene (ordered by Peterlee Development Corporation in 1971 to penetrate areas that had been choked with vegetation). The increase of Fragile Fork-moss *Dicranum tauricum* could also be explained by tolerance to pollution. Certain species that were frequent or abundant in the 1975 survey have become rare during the 1990 survey. These are Bifid Crestwort *Lophocolia bidentata,* Hair Pointed Feather-moss *Cirryphyllum piliferum*, Lesser Pocket-moss *Fissidens bryoides*, Endive Pellia *Pellia endiviifolia* and Overleaf Pellia *Pellia epiphylla.*

Changes in weather patterns 1975-1990

A source of moisture is provided by the bed of Castle Eden Dene Burn, which never became completely dry, although the stream disappears underground for long stretches during dry periods. Thus initially, during the 1975 survey, increased surface moisture and humidity levels were sustained during summer when rainfall was lowest, temperatures highest, and hours of sunshine were at their maximum, by moisture from the bed of Castle Eden Dene Burn. This enabled bryophytes to survive adverse conditions and extend their growing period to the following year. Between 1975 and 1989, decreased rainfall and increased temperatures above the mean (calculated from annual weather records between 1940 and 1989) have occurred in the locality during 10 out of 15 years since 1975 (Wheeler 1990). This may have led to longer periods when Castle Eden Dene Burn was below ground, resulting in more stress on liverworts, in particular during periods of low rainfall, that could in part explain the reduction in *Pellia* spp. of thalloid liverworts. During this period, loss of Elm canopy near the bottom of the Dene in compartment 3 led to further stress on bryophytes due to increased competition from herbaceous species because of increased light intensities. This could partly explain the reduction of recorded species of bryophyte between the 1975 and 1990 surveys in the Central West area of the Dene.

Differences in results between the 1990 and 2007-2011 surveys

The 2007-2011 survey recorded a total of 51 species of bryophyte, 20 acrocarpous (Figure 4) and 18 pleurocarpous species of moss, and 13 species of liverworts (Appendix Table 1).

Figure 4. Acrocarpous *M. hornum* close up (Gaynor Mitchell).

There were 14 bryophyte species present in the 2007-2011 survey but not in the 1990 survey. However Beard-moss *Barbula convoluta*, Common Striated feather-moss *Eurynchium striatum* and Greater featherwort *Plagiochila asplenoides* had been recorded in 1975; thus the absence of a species in a survey, particularly when rare, does not mean that it will not be recorded in future. Species recorded in VC66 as scarce (O'Reilly 2010), and recorded in the 2007-2011 survey, were Great Scented

Snakewort *Conocephalum salebrosum* and Bordered Thyme-moss *Mnium marginatum* respectively. Another notable change was reduced recording of *Dicranum tauricum,* which was not recorded in 1975, abundant and recorded on seven tree species in 1990, but was frequent and only recorded on Beech *Fagus sylvatica* in the 2007-2011 survey. *Dicranum tauricum* is able to withstand air pollution and there is evidence that this has decreased locally over the last 15 years; nitrogen oxides for 2010-2012 did not exceed the critical load (Air Pollution Information System (APIS) 2012).

Reduced numbers of recorded species between 1990 and 2007-2011 may be as a result of habitat loss caused by increased numbers of landslides and rock erosion. Between 2000 and 2011 there have been 15 times when monthly rainfall has exceeded 100 mm compared with eight times between 1980 and 1990 (archived weather data, Durham Weather Station 2014). Increased pulses of heavy rainfall have led to more landslides in the Dene, resulting in scouring of substrates and loss of canopy due to fallen trees. As findings from profiles indicate, canopy is essential in providing a suitable microclimate for bryophytes, except close to the moist bed of Castle Eden Dene Burn (Mitchell and Robertson 1997). The closure of paths due to landslips may encourage recolonisation by bryophytes because of lack of disturbance, particularly nearer to Castle Eden Dene Burn where canopy is not so important in providing suitable microclimates. However if shade is not present due to canopy loss then herbaceous species would be more likely to grow and shade out bryophytes. The shorter profiles in 3 East, 1990 and the latest survey, is evidence that bryophyte cover increased as canopy regrew.

Changes in rainfall patterns have led to a more erratic pattern of flow in Castle Eden Dene Burn. The Burn may flow at any time during a year depending on rainfall and is not confined to winter only. This may not allow a sufficient length of time for bryophytes to regrow on boulders in Castle Eden Dene Burn during summer months.

Figure 5. Fox-tail Feather-moss *Thamnobryum alopecrum* (Gaynor Mitchell).

Profiles in Castle Eden Dene and zonation of bryophytes

The results of the profiles in the Dene are shown in Appendix Tables 2, 3, and 4. The profiles of the north-facing (Appendix Table 2) and south-facing slopes (Appendix Table 3) of the Dene were taken at accessible points in the Central West area. The canopy was intact and the profiles show zonation of endohydric and ectohydric species of moss with accompanying changes in abiotic factors, shade, moisture, and relative humidity.

Endohydric species have well developed water conducting tissue and conduct water from the base of the moss cushion to the photosynthesising leaves at the apex. Ectohydric species absorb water by the stem and leaf surfaces but there is no internal conduction of water. This was illustrated by the uptake of the dye basic fuschin: Figure 9 shows the initial route of water entry into Fox-tail Feather-moss *Thamnobryum alopecrum*. All cells were stained deep pink except for a broad band of nerve tissue which was clear of dye; the nerve of the dorsal surface of Fox-tail Feather-moss *T. alopecurum,* an ectohydric moss, is discontinuous (Figure 7) and unable to transmit water. In Figure 8, water has not been taken up by the majority of cells of Swan's neck Thyme-moss *Mnium hornum*, an endohydric moss, because of a waxy layer, and the nerve is continuous and adapted to internal conduction of water (Figure 6).

Figure 6. Fox-tail Feather-moss *T. alopecurum,* uptake of basic fuschin dye x40 magnification (Gaynor Mitchell).

Figure 7. Fox-tail Feather-moss *T. alopecurum,* electron micrograph of dorsal surface of leaf (Gaynor Mitchell).

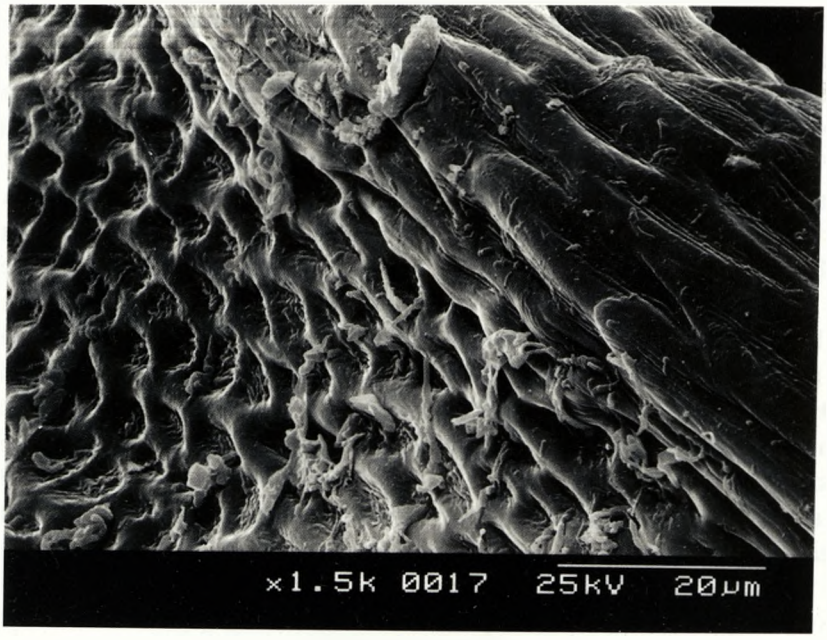
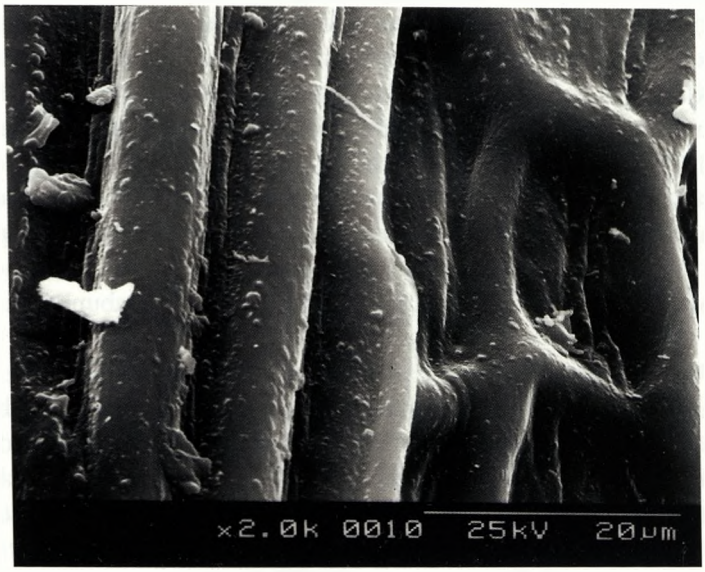


Figure 8. Swan's neck Thyme-moss *M. hornum,* uptake of basic fuschin dye x100 magnification (Gaynor Mitchell).

Figure 9. Swan's neck Thyme-moss *M. hornum,* electronmicrograph of dorsal surface of leaf (Gaynor Mitchell).



Fox-tail Feather-moss *T. alopecrum* was the dominant moss only on the lower slopes (section 2 in Appendix Table 2, north-facing slope, and sections 1, 2 and 3 in Appendix Table 3, south-facing slope) where shade, moisture and relative humidity are greater. Conversely, Swan's neck Thyme-moss *Mnium hornum* prefers drier more acidic conditions and was the dominant moss in those sections of the slope 6 and 7 in Appendix Table 3 and section of the slope 7 in Appendix Table 2, where moisture and shade were reduced to 2 or 3, and also relative humidity (when measured) was in the 60s% compared with the 80s% lower down the slope closer to the Burn.

Great Scented Liverwort *Conocephalum conicum* and Common Feather-moss *Kindbergia praelongum* were found on the lower slopes of the north-facing profile and Common Tamarisk-moss *Thuidium tamariscinum* and Cypress Leaved Plait-moss *Hypnum cupressiforme* on the lower south-facing slopes. These are species which do not rely on the internal conduction of water and so require constantly high levels of humidity. Increased humidity, shade, and moisture of the lower slopes allows a greater range of substrates to be colonised: rock, dead wood and tree branches, for example. However as humidity and moisture decrease, the range of substrates colonised falls. In sections 6 and 7 (Appendix Tables 2 and 3) only tree roots were colonised by mosses.

In addition to the main profile through the Dene, a shorter profile as far as a cliff in 3 West (Appendix Table 4) on a south-facing slope was recorded. The Elm canopy had been removed in 3 West before the 1990 survey and bryophyte growth was poor but varied, bryophytes being outcompeted by herbaceous plants. In 2011 the canopy was intact comprising Ash *Fraxinus* spp., Birch *Betula* spp. and Sycamore *Acer pseudoplatanus*, and there was vigorous growth of Fox-tail Feather-moss *Thamnobryum alopecurum* on all sections of the slope.

Epiphytes

Sycamore supports nine species of epiphyte (Appendix Table 5), Ash *Fraxinus excelsior* (Figure10) and Beech *Fagus sylvatica* have seven species, Elm *Ulmus glabra* has eight, Oak *Quercus* spp. and Yew *Taxus baccata* six, and Larch *Larix decidua* has three species of epiphytes. Although the numbers of species of epiphytes were similar to those recorded in 1990, the survey of 2007-2011 recorded six species that had not been recorded as epiphytes in 1990, namely Creeping Feather-moss *Amblythecium serpens*, Common Striated Feather-moss *Eurynchium striatum*, Mouse–tail Moss *Isothecium myosoides,* Kneiff's Feather-moss *Leptodictyum riparium,* Wood Bristle-moss *Orthotrichum affine* and Clustered Feather-moss *Rhynchostegium confertum*. Fragile Fork-moss *Dicranum tauricum* is now only found on Beech and is frequent and not abundant in Castle Eden Dene.

In 1990 Elm supported the greatest number of species of bryophyte; Elm had 10 species which were epiphytic, Ash had eight (Figure 10). Mountain Fork-moss *Dicranum montanum*, rare in VC66, was found on Wild Rose *Rosa canina* and had last been recorded in the Dene in 1957 (Graham 1988). Fragile Fork-moss *Dicranum tauricum* is an epiphyte which was not recorded in the 1975 survey and was abundant. Bates (1995) also reported an increase in *D. tauricum* in VC22 (which equates to Berkshire), now frequent on tree boles, stumps and logs in woodland in east and central Berkshire, the areas formerly most affected by sulphur dioxide.

Figure 10. Moss epiphytic on Ash (Gaynor Mitchell).

Rambling Tail-moss *Anomodon viticulosus*, Lateral Cryhaea *Cryphaea heteromalla* and Flat Neckera *Neckera complanata* are species which were rare in the Dene in 1975 but were not sampled in Central West in 1990. These species have also decreased in VC22 and, in the opinion of Bates, reflect the loss of mature Elms by Dutch elm disease (Bates 1995), since it is known to have restricted the occurrence of basiphilous epiphytes elsewhere (Bates *et al.* 1994, cited in Bates 1995).

Since 1990 young Elm trees have continued to grow near the Burn at the bottom of the Dene and support a number of bryophytes recorded in Appendix Table 5.

CONCLUSIONS

Compartments known as Central West in Castle Eden Dene still support a healthy and diverse population of bryophytes despite adverse natural changes in the Dene. Between 1975 and 2011 there has been loss of substrates due to rock erosion and landslips and temporary loss of canopy due to Dutch elm disease. The frequency of landslips has increased and been made more likely because of episodes of heavy rainfall. There is evidence from profiles across the Dene that where canopy is restored bryophyte growth will also be restored, but not necessarily the same species diversity. Although there has been an overall loss of recorded rare species some of them have reappeared in the latest survey. Complete removal of canopy and substrates due to natural landslips would seem to be the biggest threat to bryophytes now that pollution levels are decreasing and new canopy has replaced that lost to Dutch elm disease.

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APPENDIX – TABLE 1

Results comparing bryophytes present in CED in Central West area in 1975 with those present in 1990 and 2007-2010

Key to substrates where bryophytes occured
S = soil E = epiphyte R = epilith DW = dead wood

Present in 10 or more samples = abundant A
Present in 3 to 10 samples = frequent F
Present in less than three samples = rare R
Bryophytes not present in the Dene in Central West (1975 survey but present elsewhere in the Dene = elsewhere E)
Species not sampled in the 1975 survey of the Dene = NS
Species not sampled in the 1990 survey but recorded in other surveys = OS

(Pleurocarpous moss bears the fruit on a short side branch and not on the main stem or branch as in acrocarpous species).

The species recorded in 1975 in compartments other than Central West (3 and 4) have not been considered in the table except when recorded in 1990.

Central West is in tetrad NZ43J (2 km x 2km square) Bryophytes marked * are also found in tetrad NZ43E.

Table to show changes in bryophyte diversity and abundance from surveys 2007-11, 1990, and 1975

SPECIES	2007-2011	1990	1975
Mosses			
Acrocarpous species			
Amphidium mougeotii	NS	NS	R (R)
Atrichum undulatum	F (S)	R (DW)	R (DW)
Barbula convoluta	R	NS	R (S)
B. unguiculata	NS	NS	R (S)
Didymodon fallax	R (R)	R (R)	E (R)
Bryoerythrophyllum recurvirostrum	R (R)	NS	N S
Bryum caespiticium	NS	NS	F (S)
B. capillare	NS	R (E DW)	R (S R)
B. dichotomum	NS	R (R)	R (R)
B. laevifilum	NS	R (DW)	NS
Campylopus flexuosus	NS	NS	F (E)
Ceratodon purpureus	NS	R (DW)	F (S R)
*Dichodontium pellucidum**	R (S)	R (S)	F (R)
Dicranella heteromalla	R(S)	R (S)	F (S E)
D. varia	R (R)	R (S)	A (S)
Dicranoweisia cirrata	NS	R (DW)	R (
Dicranum montanum	NS	R (E)	NS
D. tauricum	F (DW E)	A (E R DW)	NS
Didymodon insulanus	R (R)	NS	NS
Diphyscium foliosum	NS	NS	R (S)
Ditrichum flexicaule	NS	R (R)	R (R)
Eucladium verticillatum	R (R)	R (R)	R (R)
Fissidens adianthoides	NS	R (R)	NS
F. bryoides	NS	R (S)	A (S)
*Fissidens taxifolius**	A (S R DW)	F (S E)	F (S)
Funaria hygrometrica	NS	R (S)	F (S)
Mnium hornum	A (S E DW)	*A* (S E)	A (S E DW)
M. marginatum	R (S)	NS	NS
M. stellare	R (R)	R (R)	E
Orthodontium lineare	NS	R (S)	E (E)
Orthotrichum affine	R (E)	NS	NS
O. pulchellum	NS	OS (J B	NS
Plagiomnium rostratum	R (SR)	R (S)	NS
P. undulatum	A (S E R DW)	A (DW S)	A (S DW)
Pohlia melanodon	NS	R (S)	NS
P. wahlenbergii	NS	NS	R (S)

Polytrichastrum formosum	R(S)	NS	NS
Polytrichum commune	NS	R (DW)	NS
Rhizomnium punctatum	R (R)	R (DW R)	F (R)
Syntrichia laevipila	NS	NS	R
Tetraphis pellucida	NS	NS	R (DW)
Tortella tortuosa	NS	R (R)	NS
Tortula muralis	NS	NS	R (R)
Ulota crispa	NS	NS	R (E)
Weissia controversa	R (S)	R (E)	E (S)
W. longifolia	NS	NS	R (R)
W. rostellata	NS	NS	R (R)
Zygodon viridissimus	NS	R (E)	NS
Total species	20	30	29

Pleurocarpous species

*Amblystegium serpens**	A (EDWS)	R (S DW)	F (E)
A. varium	NS	NS	OS
Anomodom viticulosus	NS	NS	R (E)
Brachytheciastrum velutinum	A (S E DW R)	F (E)	F (R S)
Brachythecium plumosum	R (R)	R (E)	F (DW)
B. populeum	NS	R (DW)	E (DW)
B. rivulare	NS	NS	F (E R)
*B. rutabulum**	A (E S DW R)	A (S E R)	R (DW)
Calliergonella cuspidata	R(S)	NS	NS
Campylium stellatum	NS	R (S)	E (S)
Cirriphyllum crassinervium	NS	NS	R (DW)
C. piliferum	NS	R (S)	A (S E R DW)
Climacium dendroides	R (S)	NS	NS
Conardia compacta	NS	NS	R (R)
Cratoneuron filicinum	NS	NS	R(R)
Cryphaea heteromalla	NS	NS	R (E)
Ctenidium molluscum	NS	R (R)	F (R)
Dicranum majus	R (S)	NS	NS
Eurhynchium striatum	F (E S)	NS	A (S)
Homalothecium sericeum	NS	NS	F(S E R)
Hygrohypnum luridum	NS	NS	F (R)
H. ochraceum	NS	NS	R (R)
Hygroamblystegium fluviatile	NS	NS	F (E)
Hylocomium splendens	NS	NS	R (R)
Hyocomium amoricum	NS	R (R)	E (E)
Hypnum cupressiforme	F (E S)	A (R E DW)	A (ES)
H. cupressiforme v. resupinatum	R (E)	R (E)	F (E)
Isothecium alopecuroides	NS	NS	R (E)

I. myosuroides	R (S)	R (R)	F (E S R DW)
*Kindbergia praelongum**	A (S E R DW)	A(S E R DW)	A(S)
Leptodictyum riparium	R (E)	R (R)	NS
Leskea polycarpa	NS	NS	F (S E DW)
Neckera complanata	NS	NS	R (E R)
Oxyrrhynchium hians	F (S)	F (S E)	A (S)
Palustriella commutata	NS	R (R)	R (R)
Plagiothecium nemorale	NS	NS	E (E)
P. succulentum	NS	R (S)	F (DW)
Amblystegium varium	NS	NS	F (R)
Platyhypnidium alopecuroides	R (R)	NS	NS
Pseudotaxiphyllum elegans	NS	R (S)	NS
Rhychostegiella tenella	NS	NS	F (R)
Rhynchostegium confertum	F (R E)	R (S)	R (R)
*Thamnobryum alopecurum**	A (S E R DW)	A (S E R DW)	A (S DW)
Thuidium tamariscinum	F (DW S)	R (E)	R (DW)
Total species	18	21	35

Liverworts

Aneura pinguis	R (S)	R (R)	R (S)
Cephalozia connivens(GGG)	NS	NS	R
Chiloscyphus polyanthos	R (R)	OS	R (S DW)
*Conocephalum conicum**	A (S R DW)	A (S R)	A (S R)
C. salebrosum	R (R)	NS	NS
Diplophylum albicans	NS	NS	R (DW)
Jungermannia atrovirens	R RS)	R (R)	F (R)
J. pumila	NS	NS	R (S)
Leiocolea turbinata	R (S)	OS	F (R)
Lepidozia reptans	NS	R (DW)	E (E)
Lophocolea bidentata	F (E S R)	R (DW)	F (S E R DW)
L. heterophylla	R (E)	F (E R)	NS
*Lunularia cruciata**	F (S R)	F (R S)	F (S)
Marchantia polymorpha	NS	R (DW)	R (E)
Metzgeria furcata	F (E S DW)	F (E)	F (E)
*Pellia endiviifolia**	R (S)	R (S R)	A (S)
P. epiphylla	R (RS)	R (DW)	A (S)
P. neesiana	NS	NS	R (S)
Plagiochila asplenioides	R (DW S)	NS	R (S DW)
Radula complanata	NS	NS	R (E)
Riccia glauca	NS	R (S)	NS
Total species	13	13	17

Total number of bryophyte species in Central West	51	64	81

APPENDIX - TABLE 2

Profile of bryophyte distribution and associated biotic and abiotic factors on a north-facing slope of CED (canopy intact)

Compartment 4

Section of slope reference	1	2	3	4	5	6	7
Length of section (metres)	3	20	10	20	20	20	20
Slope (degrees)	55	40	50	40	20	30	30
Moisture (scale 1-5)	4	3	3	3	2	2	2
Shade (scale 1-5)	5	3	3	3	3	3	3
Canopy species							
Acer pseudoplatanus		p	p		-	p	p
Fagus sylvatica	-	-	-	-	-	-	p
Fraxinus excelsior	p	p	p		-		-
Quercus spp.	-	-	-	p		p	
Rhododendron ponticum	-	-	-	-	p	-	p
Taxus baccata	p	p	p	p	p	-	-
Corylus avellana	-	-	-	-	p	p	p
Herbaceous species							
Geranium robertianum	p	-	-	-	-	-	-
Mercuralis perennis	-	p	-	-	-	-	p
Asplenium scolopendrium	p	p	-	-	-	-	
Dryopteris filix-mas			p	p	p	p	p
Chrysosplenium phyllitis	p						
Dominant bryophyte species (ground)							
Conocephalum conicum	**d**	p	p				
Kindbergia praelongum		p	**d**	**d**		p	p
Thamnobryum alopecurum	-	**d**	-	-	-	-	-
Fissidens taxifolius	-	-	p	p	-	p	
Plagiomnium undulatum		p				**d**	-
Mnium hornum	-	-	-	-		-	**d**
Jungermannia atrovirens	-		-	p	p	-	-
Polyrichum formosum	-		-	-	p		

Other bryophyte substrates							
Rock	p	p	p	p	p	-	-
Tree trunks	p	p	p	p	p	-	-
Tree roots	p	p	p	p	p	p	p
Rotten wood	-	-	-	p	-	-	-

p = present
d= dominant bryophyte species

APPENDIX - TABLE 3

Profile of bryophyte distribution and associated biotic and abiotic factors on a south-facing slope of CED (canopy intact)

Compartment 3

Section of slope reference	1	2	3	4	5	6	7
Length of section (metres)	10	15	20	20	10	20	20
Slope (degrees)	15	20	20	47	30	25	40
Moisture (scale 1-5)	4	4	3	3	3	2	2
Shade (scale 1-5)	4	4	4	4	3	2	2

Canopy species							
Acer pseudoplatanus	p	p	p	p	p	-	-
Fraxinus excelsior		p	-	-	p	-	-
Quercus spp.	p	-	p	-	-	-	p
Rhododendron ponticum	-	-	-	-	-		p
Taxus baccata	p	-	-	-	p	-	-

Herbaceous species							
Asplenium scolopendrium (phyllitis)	p						
Dryopteris filix-mas	p	p	p	p	p	-	p
Mercuralis perennis	p	p	-	-		-	-
Rubus fruticosus	-	-	-	p	p	p	p
Primula vulgaris			-	-	p	-	-

Dominant bryophyte species (ground)

Brachythecium rutabulum	-	-	-	-	**d**		-
Plagiomnium undulatum	-	p	-		-		-
Eurynchium striatum	-	-		p	-		
Thuidium tamariscinum	-	p	-	-	-	-	-
Hypnum cupressiforme	p	-		p	p	p	p
Mnium hornum (endohydric)	-	-	-	-		**d**	**d**
Atrichum undulatum				p			p
Dicranella heteromalla					p	-	-
Thamnobryum alopecurum (ectohydric)	**d**	**d**	**d**	-	-	-	-

Other bryophyte substrates

Rock	p	p	p	p	p	-	-
Tree trunks	p	p	p	p	p	-	-
Tree roots	p	p	p	p	p	p	p
Rotten wood	p	p	p	-	-	-	

p = present
d = dominant bryophyte species

APPENDIX - TABLE 4

Profile of bryophyte distribution and associated biotic and abiotic factors on a south-facing slope of CED where canopy was removed before 1990

Compartment 3

Section of slope reference	1	2	3	4
Length of section (metres)	5	8	6	12
Slope (degrees)	16	0	20	27
Moisture (scale 1-5)	4	4	4	4
Shade (scale 1-5)	4	3	4	4

Canopy species	*Fraxinus excelsior*	p	-	-	-
	Betula spp.		p	p	p
	Acer pseudoplatanus				p
Fern	*Phyllitis scolopendrium*	p	p	-	-
Herb	*Rubus fruticosus agg.*				p
		-	-	p	p
		p	p	p	p
Dominant bryophyte species (ground)	*Thamnobryum alopecurum*	**d**	**d**	**d**	**d**
	Plagiomnium undulatum	p		-	-
	Rhyncostegium confertum	p	-	-	-
	Kindbergia praelongum		p	p	

present on dead wood, trees, and rock

p = present

d = dominant bryophyte species

APPENDIX - TABLE 5

Epiphytes of Central West Castle Eden Dene 2007-2011

	Ash	Sycamore	Elm	Beech	Oak	Yew	Larch
Amblythecium serpens		X			X		X
Bracythecium rutabulum	X	X					
Brachytheciastrum velutinum		X	X	X	X	X	
Dicranoweisia cirrata			X	X	X		
Dicranum tauricum				X			

	Ash	Sycamore	Elm	Beech	Oak	Yew	Larch
Eurynchium striatum			X	X			
Oxyrrhynchium hians		X				X	
Hypnum cupressiforme		X		X		X	
Isothecium myosoides			X				
Kinbergia praelongum	X	X	X		X	X	X
Leptodictyum riparium						X	
Lophocolea heterophylla				X	X		
Metzgeria furcata	X	X				X	
Mnium hornum	X			X	X		
Orthotrichum affine			X				
Plagiomnium undulatum	X		X				
Rhynchostegium confertum	X	X	X				X
Thamnobryum alopecurum	X	X					
Total	7	9	8	7	6	6	3

APPENDIX – TABLE 6

Common names of bryophytes in Central West Area of Castle Eden Dene recorded between 1975 and 2011

Central West is in tetrad NZ43J (2 km x 2 km square) Bryophytes marked * are also found in tetrad NZ43E.

(Pleurocarpous moss bears the fruit on a short side branch and not on the main stem or branch as in acrocarpous species).

SPECIES

Mosses

Acrocarpous species

Amphidium mougeotii	Mougeot's Yoke-Moss
Atrichum undulatum	Common Smoothcap
Barbula convoluta	Beard-moss
B. unguiculata	Bird's-claw
Didymodon fallax	False Beard-moss
Bryoerythrophyllum recurvirostrum	Red Beard-moss
Bryum caespiticium	Tufted Thread-Moss
B. capillare	Capillary Thread-moss
B. dichotomum	Bicoloured Bryum
B. laevifilum	Syed's Thread -moss
Campylopus flexuosus	Rusty Swan-neck moss
Ceratodon purpureus	Redshank
*Dichodontium pellucidum**	Transparent Fork-moss
Dicranella heteromalla	Silky Forklet-moss
D. varia	Variable Forklet-moss
Dicranoweisia cirrata	Common Pincushion
Dicranum montanum	Mountain Fork-moss
D. tauricum	Fragile fork-moss
Didymodon insulanus	Cylindric Beard-moss
Diphyscium foliosum	Nut -moss
Ditrichum flexicaule	Bendy Ditrichum
Eucladium verticillatum	Whorled Tufa-moss
Fissidens adianthoides	Rock pocket-moss
F. bryoides	Lesser Pocket-moss
*F. taxifolius**	Common Pocket-moss
Funaria hygrometrica	Bonfire-moss
Mnium hornum	Swan's neck Thyme-moss
M. marginatum	Bordered Thyme-moss
M. stellare	Starry Thyme-moss
Orthodontium lineare	Cape Thread-moss
Orthotrichum affine	Wood Bristle-moss
O. pulchellum	Elegant bristle-moss
Plagiomnium rostratum	Long Beaked Thyme-moss
P. undulatum	Hart's tongue Thyme-moss
Pohlia melanodon	Pink Fruited Thread-moss
P. wahlenbergii	Pale Glaucous Thread-moss
Polytrichastrum formosum	Bank Haircap
Polytrichum commune	Common Haircap

Rhizomnium punctatum	Dotted Thyme-moss
Syntrichia laevipila	Small Hairy Screw-moss
Tetraphis pellucida	Pellucid Four-tooth Moss
Tortella tortuosa	Frizzled Crisp-moss
Tortula muralis	Wall Screw-moss
Ulota crispa	Bruch's Pincushion
Weissia controversa	Green Tufted Stubble-moss
W. longifolia	Crisp Beardless-moss
W. rostellata	Beaked Beardless-moss
Zygodon viridissimus	Lesser Yoke-moss

Pleurocarpous species

Amblystegium serpens	Creeping Feather-moss
Anomodom viticulosus	Rambling Tail-moss
Brachytheciastrum velutinum	Velevet Feather-moss
Brachythecium plumosum	Rusty feather-moss
B. populeum	Matted Feather-moss
B. rivulare	River Feather-moss
*B. rutabulum**	Rough Stalked Feather-moss
Calliergonella cuspidata	Pointed spear-moss
Campylium stellatum	Yellow Starry Feather-moss
Cirriphyllum crassinervium	Beech Feather-moss
C. piliferum	Hair Pointed Feather-moss
Climacium dendroides	Tree-moss
Conardia compacta	Compact Feather-moss
Cratoneuron filicinum	Fern Leaved Hook-moss
Cryphaea heteromalla	Lateral Cryhaea
Ctenidium molluscum	Comb-moss
Dicranum majus	Greater Fork-moss
Eurhynchium striatum	Common Striated feather-moss
Homalothecium sericeum	Silky Wall Feather-moss
Hygrohypnum luridum	Drab Brook-moss
H. ochraceum	Claw brook-moss
Hygroamblystegium fluviatile	Fountain feather-moss
Hylocomium splendens	Glittering wood-moss
Hyocomium amoricum	Flagellate Feather-moss
Hypnum cupressiforme	Cypress Leaved Plait-moss
H. cupressiforme v. resupinatum	Supine Plait-moss
Isothecium alopecuroides	Larger Mouse-tail Moss
I. myosuroides	Mouse –tail Moss
*Kindbergia praelongum**	Common Feather-moss
Leptodictyum riparium	Kneiff's Feather-moss

Leskea polycarpa	Many-fruited Leskea
Neckera complanata	Flat Neckera
Oxyrrhynchium hians	Showy Feather-moss
Palustriella commutata	Curled Hook-moss
Plagiothecium nemorale	Woodsy Silk-moss
P. succulentum	Juicy Silk-moss
Platydictya jungermannioides	Spruce's Leskea
Platyhypnidium alopecuroides	Portuguese feather-moss
Pseudotaxiphyllum elegans	Elegant Silk-moss
Rhychostegiella tenella	Tender Feather-moss
Rhynchostegium confertum	Clustered Feather-moss
*Thamnobryum alopecurum**	Fox-tail Feather-moss
Thuidium tamariscinum	Common Tamarisk -moss

Liverworts

Aneura pinguis	Greasewort
Cephalozia connivens (GGG)	Forcipated Pincerwort
Chiloscyphus polyanthos	St. Winnifrid's Liverwort
*Conocephalum conicum**	Great Scented Liverwort
C. salebrosum	Great Scented Snakewort
Diplophylum albicans	White Earwort
Jungermannia atrovirens	Dark Green Flapwort
J. pumila	Dwarf Flapwort
Leiocolea turbinata	Top Notchwort
Lepidozia reptans	Creeping Fingerwort
Lophocolea bidentata	Bifid Crestwort
L. heterophylla	Varaiable-leaved Crestwort
*Lunularia cruciata**	Crescent-cup Liverwort
Marchantia polymorpha	Star-headed Liverwort
Metzgeria furcata	Forked Veilwort
*Pellia endiviifolia**	Endive Pellia
P. epiphylla	Overleaf Pellia
P. neesiana	Endive Pellia
Plagiochila asplenioides	Greater featherwort
Radula complanata	Even Scalewort
Riccia glauca	Glaucous Crystalwort

JOHN HANCOCK AND THE "LÆMMERGEYER OF THE ALPS"

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SUMMARY

John Hancock's artistic reaction to the Lammergeier[1] includes a taxidermy mount and subsequent lithographic illustration. These are discussed in the context of John Hancock as a scientific taxidermist, an illustrator, and as part of the museum that he greatly helped to develop.

INTRODUCTION

This idea for this article came about when David Lowther noticed that somebody had sketched, in pencil, an extra leg on the plate of the Lammergeier in the Natural History Society of Northumbria's copy of Gould's *Birds of Europe* (1837) (Figure 1). Fine illustrations in zoological books are so rarely altered that this act in itself is interesting. However when we realise that this copy of the book had belonged to William C Hewitson and was bequeathed by him to John Hancock (Goddard 1929),[2] this act of apparent vandalism can be fitted into other aspects of John Hancock's artistic reaction to Europe's largest raptor and arguably one of its most visually dramatic birds.

This article looks at the background of John Hancock's taxidermy and other art, and proceeds to focus on his treatment of the Lammergeier by means of a mounted specimen and lithographic illustrations. By looking at the layout of the bird gallery designed by John Hancock, it is shown that his "Læmmergeyer of the Alps" was one of his most important works.

JOHN HANCOCK AS ARTIST AND SCIENTIST

John Hancock (1808-1890) is well remembered in the North East as perhaps the leading ornithologist of the region during the Victorian period (see for example Embleton 1892; Goddard 1929), and as an exceptionally talented taxidermist. During his lifetime he was famed for the skilled artistry of his taxidermy. However taxidermy was not the only

[1] *Gypaetus barbatus* (Linnaeus 1758), the Lammergeier (or Lammergeyer), also known as the Bearded Vulture.

[2] John Hancock gave it to the current owners, the Natural History Society of Northumbria.

expression of his artistic inclination and, *inter alia,* he produced a set of lithographs in the 1850s.

Figure 1. Copper engraving by J and E Gould, published in Gould (1837). Pencil alteration in an unknown hand: probably either by William C Hewitson or John Hancock.

John Hancock's involvement with the natural history community in Newcastle spanned a period of more than 60 years from the 1820s onwards. Through the mid-nineteenth century he was part of a golden generation of North East naturalists that included his brother Albany and his friend William C Hewitson. Travel to Europe for several ornithological expeditions and study of the local avifauna resulted in 20 published papers including his major written work, a catalogue of the birds of Northumberland and Durham (Hancock 1874). Like most of his contemporaries, his activities as a naturalist included assembling a collection of specimens – in his case, carefully documented – most of which he prepared. His interest in falconry and especially in the Gyrfalcon *Falco rusticolus* is well known.

John Hancock was by no means the only taxidermist working in the North East in the Victorian period. Leslie Jessop has compiled a list of more than 90 known workers, ranging from amateur naturalists who prepared their own specimens, through part time bird preservers[3] who made some income from their hobby, to major and long lasting businesses who could turn a flat skin taken in the field, salted and roughly padded with straw, into a fully prepared and boxed taxidermy mount. For several decades the leading professional taxidermists of the region were Robert Duncan and family of Newcastle, whose company advertised in trade directories between 1847 and 1913. In the later period they were rivalled by John Jackson (active 1888-1906). An indication that John Hancock did not regard himself in the same category as Duncan and Jackson – that he was an amateur rather than a professional – is the fact that he only rarely listed himself as a bird preserver in the trade directories: he is recorded as such at his home address of 4 St Mary's Terrace twice, in 1855 and 1860.

All of his ornithological experience meant that, like the best artist-naturalists, John Hancock knew how a living bird should look. Alfred Newton, reviewing Hancock's achievements as a naturalist (Newton 1908), said of his taxidermy that even "the worst of them never looks like a stuffed bird – the attitude of some may be ungraceful or possibly forced, but life is always there".

John Hancock's bird collection included mounts as well as flat skins (what are now often called study skins); the latter included, for instance, birds from India that were sent to him by correspondents such as Edward Blyth, curator of the Royal Asiatic Society's Museum: these are now in the collections of the Natural History Society of Northumbria. That he did on occasion create mounts from flat skins of species he could not have seen alive is shown by the list of exotic specimens at the end of the catalogue of his collection (Howse 1899). However Hancock's collection of mounted birds was dominated by the British species that he collected and that he could have seen living.

John Hancock's taxidermy is often envisaged as an art form in its own right, "with great artistic skill … creating a semblance of life in his specimens" (Goddard 1929). It is unfortunate that this artistic skill is now often overlooked by people who generally see Victorian taxidermy only as a surreal and grotesque endeavour. John Hancock's artistic taxidermy is, in its original intent, far removed from the bizarre tableaux (of a kitten's tea party, or card-playing squirrels for example) of Walter Potter that have become associated in the minds of many with "artistic" taxidermy. Hancock, while a naturalist first and foremost, produced work that was as much about educating people about the natural world and instruction in the methods of natural history, as about visual spectacle. The sheer verve of his tableaux works, which drew admiration at the Great Exhibition in 1851, might serve to obscure their importance as scientific artefacts, but

[3] The terms "bird preserver" and "bird and animal preserver", and occasionally "bird stuffer", were used throughout the nineteenth century; the more polite "taxidermist" became more common after the late 1800s.

the meticulous attention to detail which typifies his approach should leave us in no doubt as to the breadth of Hancock's vision.

From dead bird to illustration

The transformation from a dead bird or a flat skin into a painting or other illustration involved possibly the intervention of several people, and the reliance of collectors and artists on the skills of the professional taxidermist is often obvious in the finished work. For example, whatever the artistic merits of the two paintings titled *The Chorus of Birds* by Jan van Kessel (1626-1679) (in the Shipley Art Gallery, Gateshead), to a naturalist's eye they present ridiculous scenes of badly stuffed birds. Nearer to John Hancock's period, John Gould's *Century of Birds from the Himalaya Mountains* (1831) resulted from the receipt of a collection of bird skins by the Zoological Society of London, and may best be understood as a visual representation of a "cabinet" collection. Gould's contribution – and that of his wife Elizabeth, who transformed his rough sketches into the lithographs in the finished work – was to visualise the flattened skins as they might have appeared when part of the living creatures.

This dependence of the illustrator on the art of the taxidermist can also be seen in the Lammergeier portrayed in Gould's *Birds of Europe* (Figure 1). The large and colourful image has an immediately stunning impact, but looking more critically it is obvious that the image has been copied from an overstuffed specimen whose legs have been placed so far forward that the bird should tend to tip backwards; the forward-looking head also results in a stiff and posed appearance. The artist has tried to place the model in some sort of habitat with a hint of a mountain in the background, but the foreground conveys no feeling of an alpine scene.

LITHOGRAPHY

The lithographic process was invented in late eighteenth-century Germany by Alois Senefelder and first showcased in Britain in 1801. It was less costly than engraving and, particularly after the print "revolution" of the 1820s, became increasingly popular with artists for the control it allowed them over the reprographic process. Previously the artist's initial conception, often set out in a preliminary detailed watercolour, had to be interpreted by trained engravers. Artists with the skill to engrave their own work were exceptional and even artist-engravers such as Thomas Bewick were occasionally let down by poor work from the printers.

Senefelder's process, by contrast, could be learned quickly by anyone. Drawing directly on to a smooth slab of fine-grained limestone with a greasy, "soapy" pencil or crayon, the lithographer did not need the special skills and paraphernalia required for engraving. The fatty acids contained in the wax react with the limestone, creating an insoluble "lime soap" that soaks up ink but repels water. Once the image is drawn, the entire stone surface is covered in a solution of nitric acid and gum arabic, "fixing" the drawing on the stone. The surface is then washed and, while still damp, rolled with printing ink and sent through a press, producing a monochromatic reversed image (Senefelder 1819).

Although trained engravers were already capable of some remarkable effects, lithography allowed for free, sweeping lines that are difficult in intaglio printing processes. This was quickly discovered to be of particular use in the depiction of birds and its full potential was first demonstrated in Edward Lear's extraordinary book on Parrots (Lear 1832). John Gould employed the process for his many folios from the outset, a choice that contributed greatly to their aesthetic and popular success, and his own as a businessman (Tree 2004). It was therefore the natural choice of process for a talented but untrained artist like John Hancock, and his early efforts in the medium from the mid-1840s attracted considerable praise from his contemporaries: "marvellous productions", as Hewitson described them.[4]

Monochrome lithographs are a rarity in a "finished" work. More often the black and white plates were the first stage in the production of a final folio illustration, being hand-tinted – usually with watercolour paints – by the artist or, in Gould's production-line process, by a team of colourists.

John Hancock's Fasciculus

John Hancock contributed successfully to the Great Exhibition of 1851 (see reviews cited by Embleton 1892). He displayed several masterpieces of taxidermy that attracted many plaudits and even an enquiry from Queen Victoria regarding the possibility of owning one: he intended presenting her with "The Gorged Falcon",[5] but since the mount is still in Newcastle this intention was never carried through. Shortly after the Exhibition, Charles St John lauded Hancock's talents in comparison with those of his metropolitan peers: "Most or all of your London bird stuffers are both such rogues and so ignorant of their art that it seems waste of money paying them for teaching."[6] Another correspondent, the Rev Frederick Robertson, had been so impressed by the Crystal Palace exhibits that he had made enquiries to buy the lot of them, but found that they were "far beyond my purse". Nonetheless he wrote a fulsome letter to Hancock, whom he had never met, telling him that "[the] falcons & heron etc struck me as so immediately superior to anything of the sort I had ever seen though I have seen much in Taxidermy, so living & inspired".[7]

John Hancock's *Fasciculus* of eight lithographs (Hancock 1853), published in large format (paper size 55 cm x 37 cm), came about because of the Great Exhibition. Hancock stated on the title page that the illustrations were representations of "specimens stuffed and contributed by the author to the Great Industrial Exhibition of 1851", and it is clear from his introduction that the lithographs depicted mounted animals rather than there being any intention to create new interpretations of their lives or behaviour (see also below).

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[4] Hancock Correspondence, letter 0322, William C Hewitson to John Hancock, 24 December 1845.

[5] Hancock Correspondence, letter 0419, John Hancock to the Duke of Leeds, 10 November 1852.

[6] Hancock Correspondence, letter 0952, Charles St John to John Hancock, 23 May 1852.

[7] Hancock Correspondence, letter 0670, F W Robertson to John Hancock, 16 January 1852.

Although John Hancock stated that this was his first attempt at drawing on stone, the technical discussion suggests that he was familiar with the techniques and had first-hand experience of other methods of illustration.

Most of the plates showed mounted birds that – as discussed below – later became centrepieces in the Natural History Society's Museum in Newcastle: these were 1) "The Hooded Falcon", 2)"The Struggle with the Quarry", 3) "The Gorged Falcon", 4) "Black Game and Ptarmigan", which showed a group of dead, hanging birds, 5) "The Dead Gull", which deliberately steps away from naturalism in that it includes the glass dome in which the birds were placed, and 6-7) "The Læmmergeyer of the Alps", which was illustrated on two plates. The other subject, the young sleeping leopard, is a rare example of John Hancock's work with mammal specimens.

The plate of The Dead Gull drew criticism from one correspondent, Henry Liddell: Liddell's letter has not been seen by us, but some idea of its contents can be gained by Hancock's reply.[8] This is worth quoting in full because it elaborates Hancock's intention.

> Allow me in the first instance to thank you for your kind attention and for the warm interest you take in the success of my artistic endeavours. And at the same time permit me to state my surprise at the total dissatisfaction you express with the drawings in the Fasciculus. Your opinion indeed has come upon me like a thunder clap on a bright sunny day; for all who have spoken to me on the subject seemed pleased with the work; and I have received direct expressions of appreciation from numerous persons, and among them ... from Artists, naturalists and Lithographers, in all of whose judgement I have entire confidence - neither were the plates published without mature consideration and the advice of competent judges both in London and Newcastle when the process was exhibited previous to publication. And it was from the general satisfaction expressed that I was induced to lay the drawings before the public. Such being the case your letter could not fail to startle me a little. I am however inclined to think that you have entirely misunderstood the scope of the work. I never proposed to figure birds merely as such my object being to represent stuffed birds, to shew what had been done in taxidermy and exhibited in the great exhibition of 1851. ... Pictorial treatment would therefore have been entirely out of place; and that what you censure inparticular - the glass shade - is consequently a valuable adjunct. The Little Gulls represent stuffed birds - every one must see that in the drawing they are reduced in size, so all must conclude that the glass shade is likewise reduced, therefore no one ought to mistake them for humming birds. And besides there is a Day Crab represented in the drawing which alone is sufficient to lead to a just estimate of size.
>
> In conclusion I beg to state that though I deem your criticism fallacious yet I am far from concluding that the drawings are without defects. I know full well that they

[8] Hancock Correspondence, letter 0440, John Hancock to H T Liddell, 6 July 1853.

have numerous blemishes and am always thankful to those friends who will take the trouble to point them out to one. Should you continue to feel dissatisfied with the drawings I shall be very glad to (are quite at liberty) to have them returned to me as I have many applications for the copies since they came out and have only a few left.

There is no suggestion that Hancock intended his lithographs for the *Fasciculus* to be coloured. Indeed, the high level of "finish" and tonal shading on the monochrome images strongly suggests that he regarded them as finished plates.

JOHN HANCOCK AND THE LAMMERGEIER

When the Natural History Society erected a new, purpose-built home (started 1880, opened 1884) for their museum, the largest of the three big galleries was devoted to birds. John Hancock had a major role in developing both the museum in general and the bird gallery in particular: not only did he design the layout and supervise the installation of the specimens but he also donated his entire collection to constitute the display. The dominant position of his collection can be seen by looking at the list of specimens in Howse's 1899 catalogue of the bird gallery.

A further indication of the importance of the bird gallery is that it seems to have been the only major gallery to have been fully installed when the museum opened. More than twenty years later, the other two large galleries (Zoology and Geology) were still unfinished, with specimens only placed roughly in position and with the labelling not completed (Gill 1908).

The walls on the ground floor of the bird gallery were lined with a large number of glass-fronted cases of mounted birds. Labels in the cases gave the provenance (place, date, collector) of most of the specimens, and these provenances were repeated in Howse's 1899 catalogue. These wall displays aimed at displaying the British avifauna in a synoptic series, for a specialist audience of ornithologists. There was no separation of common species from the rarities, whether of local, national or international importance: the interest of these birds seems to have been of secondary importance to their systematic position. As an example, John Hancock's specimen of Red-necked Nightjar *Caprimulgus ruficollis* was placed in the same case as three Nightjars *Caprimulgus europaeus*, although the case label did point out that "This is the first British killed specimen on record".

Several large display cases in the centre of the bird gallery stood in marked contrast to this systematic display. Not only were they placed on specially built wooden pedestals made by cabinet-makers, rather than the joinery-built boxes around the walls, but they featured large and imposing taxidermy dioramas. They were literally the centrepieces of the bird gallery, and served also to highlight John Hancock's importance as an artistic taxidermist. In contrast to the synoptic series the detailed provenance of these specimens was not given.

The three largest centrepiece displays were: 1) "The Læmmergeyer of the Alps Gypaëtus barbatus (Linn.)", 2) "Greenland Falcon attacking Raven" and 3) "Eagle attacking Swans", which was placed at the centre of the gallery. The diorama of Gyrfalcon/Raven was dated 1854, the White-tailed Eagle and Swans 1862, and the Lammergeier was one of the mounts displayed at the Crystal Palace Exhibition in 1851. Further artistic taxidermy included a series of three groups illustrating Falconry – "The Hooded Falcon", "Struggle with the Quarry" and "Gorged Falcon".

Unfortunately "The Læmmergeyer of the Alps" is the only one of the three major centrepiece groups to have survived. The other two were possibly discarded between 1933 and 1937 when the bird gallery was refurbished. The curator T Russell Goddard reported in 1933 that improvements had been long needed; although birds were then being cleaned and renovated "a certain number of birds will be replaced during the course of the work" (Curator's Report dated 12 April 1933, NHSN archive). He later reported (Russell Goddard 1937) that a new display of eagles was installed to replace the "Eagle attacking Swans", "which in the course of time had become badly faded and was in a dilapidated condition". There is no mention of the Gyrfalcon/Raven display, but it is quite possible it was also replaced at that time.

Provenance of the Lammergeier

We only know of the provenance of the Lammergeier through Dennis Embleton's obituary of John Hancock (Embleton 1892). In 1845 John Hancock went on a tour of Switzerland with his friend William Hewitson and kept a journal, to which Embleton had access (its present location is unknown). Embleton noted that Hancock was able to "purchase of Herr Anderegg, near Leukerbad, the skin of the Lämmergeier which now conspicuously adorns and almost lives again in our Museum".

At least three Swiss guides with the surname Anderegg were active in the mid 1800s. The best known is Melchior Anderegg (born 1828), but there was also Jakob Anderegg, and Melchior's cousin Johann. We know about Johann Anderegg from W W Fowler in his *A Year with the Birds* (1886), in which he states:

> I myself have been fortunate in having as a companion an old friend, a native of the Oberland, who has all his life been attentive to the plants and animals of his beloved mountains. Johann Anderegg … a peasant of the lower Hasli-thal, in the canton of Bern … I have never yet found his equal among the younger generation of guides, either in variety of knowledge, or in brightness of mental faculty. He taught himself to read and write, and picked up knowledge wherever he found a chance. When his term of military service was over, he took to the congenial life of a guide and "jäger" in close fellowship with his first cousin and namesake, the famous Melchior, the prince of guides. But a long illness, which sent him for many months to the waters of Leukerbad, incapacitated him for severe climbing, and at the same time gave him leisure for thinking and observing: Melchior outstripped him as a guide, and their companionship, always congenial to both as men possessed of lively minds as well as muscular bodies, has long been limited

to an occasional chat over a pipe in winter-time.

> But he remained an ardent hunter, and has always been an excellent shot … He did much collecting for [Professor Fatio] and in the course of their expeditions together, contrived to learn a great deal about plants, insects, and birds, most of which he retains in his old age. There is nothing scientific in his knowledge, unless it be a smattering of Latin names, which he brings out with great relish if with some inaccuracy; but it is of a very useful kind, and is aided by a power of eyesight which is even now astonishing in its keenness. I first made his acquaintance in 1868, and for several years he accompanied my brother and myself in glacier-expeditions in all parts of the Alps … He is now between sixty and seventy, but on a bracing alp, with a gun on his shoulder, his step is as firm and his enjoyment as intense, as on the day when he took us for our first walk on a glacier, eighteen years ago.

Taking Johann Anderegg's age as given here, he would have been about 20-30 years old when Hancock and Hewitson toured Switzerland. Unless he travelled widely, or traded in exotic specimens, we might assume any Lammergeiers he made available to English naturalist/travellers would be Swiss in origin.

The Lammergeier population in Switzerland dwindled through the 1800s and the species became extinct in the country in the early twentieth century.[9] There have been reintroductions from 1979 onwards (see for example Anderegg *et al.* 1984). The provenance of John Hancock's specimen would have been of interest even to ornithologists in the nineteenth century, and today the DNA preserved within it could yet contribute to our knowledge of the historic genetic diversity of the population in Switzerland.

THE ARTISTIC REACTION

The display mount and lithograph

John Hancock was still working on the Lammergeier six years after he obtained it. In 1851 he consulted the ornithologist John Wolley about details of eye coloration.[10] Wolley forwarded information from Lord Derby, who had kept a living Lammergeier in his menagerie at Knowlton (Woolfall 1990):

> I enclose a letter which I have received from Lord Derby on the eye of the lammergeyer, for your inspection. It does not allude to a point on which I should

[9] For the history of the species' decline see Girtanner (1870 [summarised in English by Dresser (1872)]) and Glutz von Blotzheim (1971). Girtanner (1870) listed 48 Lammergeier specimens in Swiss collections alone, collected in the 1820s (7 specimens) 1830s (3) 1840s (4) 1850s (13) 1860s (9): a heavy predation load for such a small population.

[10] Hancock Correspondence, letter 0860, J Wolley to John Hancock, 17 February 1851.

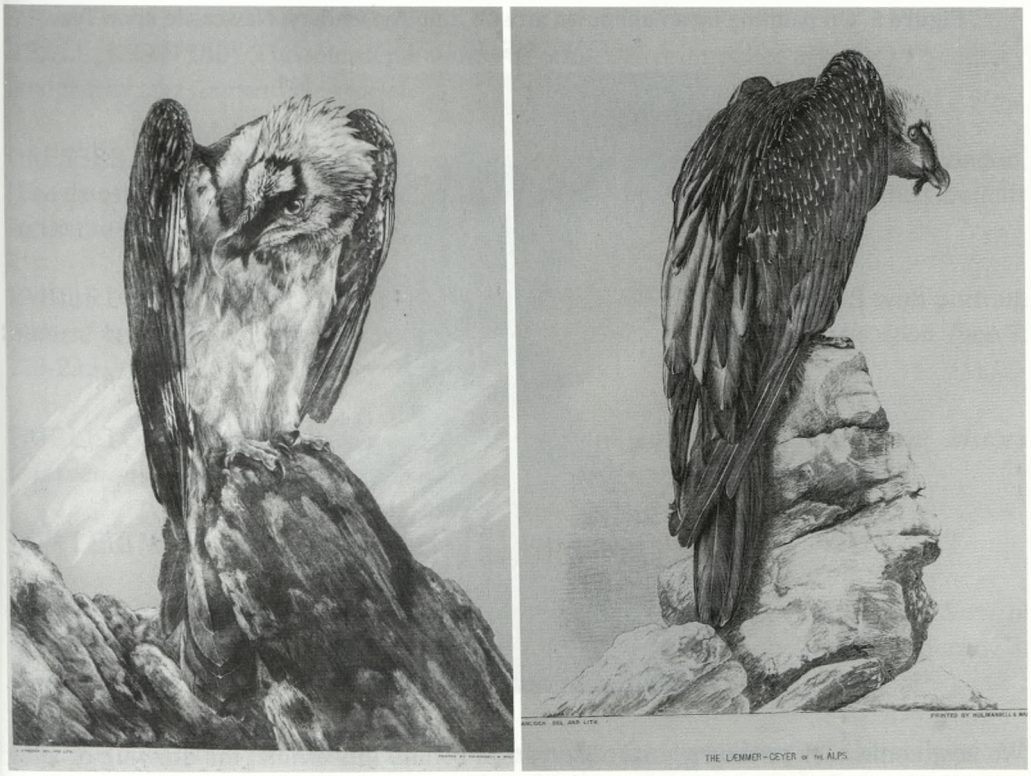
have been glad to have had my own observation confirmed viz. that it is the sclerotic covering of the eye which is coloured in this remarkable manner, and which extend so very unusually far over the eye, for the eye of a bird. I am however, very glad to have the additional assurance that this is a true vermilion, and as I have said before I think you will give its appearance best by laying red sealing wax upon the glass eye. You know that the varnish is made by leaving scrapings of red sealing wax in a little spirit of wine till they are thoroughly discoloured. I am the more confident in this opinion of the appearance of the eye from my recollection that I compared it at the time I saw it to red sealing wax varnish - of these sketches of eyes I send, done with this varnish … I suppose that were the eyeball removed it might be found vermilion all over instead of white. You must not be misled by the curator's expression "fleshy part round the eyelid." I have no doubt he means what I do, the part next to the eyelid on the eyeball itself which he calls fleshy because of its colour and its opacity, for of course it is perfectly opaque, and being always moist, it has the exact look of being varnished. ... The eyes, as I have painted them, are probably too small. The colour of the Iris in the glass eye appears deeper than from memory. I had thought it ought to be & it was, I thought, of a paler straw colour.

Like most large and dramatic taxidermy, the Lammergeier mount is best seen from one viewing position, and in this instance John Hancock has placed it in a raised position on a plaster support in the form of a large, craggy rock (Figure 2). The bird is hunched in a characteristic vulturine attitude and tangibly "alive", with its head rotated so that one eye looks down on its audience. Thus Hancock puts into the viewer's mind that here is a mighty bird of the Alps perched on a rock, scanning the valleys and outcrops below for food, or keeping watch on an alpinist approaching from below. If the mount was to be removed from the plinth and placed at a lower height, this effect would be lost.

Figure 2. John Hancock's taxidermy mount of a Lammergeier in 2015 by David Noble-Rollin.

For the lithograph the bird is shown at eye level but with head turned away, an attitude that allows Hancock to demonstrate his technical virtuosity in rendering the contrast of its soft breast and belly feathers against the coarseness of the granite outcrop (Figure 3). The rear image (Figure 4) has no background indicated, but for the frontal view there are several pale diagonal streaks that suggest a distant steep slope, part snow, part rock, viewed through an alpine atmosphere. The textural contrasts seem to have been deliberately achieved. John Hancock says in the introduction to the *Fasciculus* that he had experimented with technique. The rear view of the Lammergeier was "worked out on the 'wet principle', the lights being produced by scraping as in Mezzotint; the front view … was done much in the same manner, only the stone was prepared dry as for a tint".

Figures 3 and 4. Lithographs (front and rear) by John Hancock (Hancock 1853).



The overall effect is dramatic, but not wholly successful when we notice that the viewpoint adopted in the lithograph is to place the Lammergeier at the same level as the viewer: the centre of the bird lies at the centre of the image, creating the impression that rather than being perched on a high rock the animal is down at ground level, something you might see in an aviary rather than on an Alpine crag. The cause of this displacement was probably unintentional, coming about through the process used to generate the lithographs, for Hancock did not sketch the taxidermy mounts directly. In the introduction to the *Fasciculus* he described how photographs were taken by Francis

Stevenson and used to "attain authentic delineation of the stuffed birds in outline, general drawing and character". The details of plumage were taken from the birds themselves. It was ultimately the placing of the camera that caused this loss of dramatic impact.

If further proof was needed on the importance of viewpoint, we might refer to an anonymous oil painting in the Laing Art Gallery (TWCMS: F5163) (Figure 5). The artist has obviously used John Hancock's mounted bird as a model, yet the overall result is very different from the lithograph. The scene has the feel of a bird perched high on a rocky crag in the Alps, but if we ignore the sketchy additions of mountains and a streaked sky, the main difference to Hancock's lithograph is that the bird is placed above, and looking down upon, the viewer. If the painting itself was hung above eye level, the effect would be increased yet further.

Figure 5. Oil painting by an unknown artist. Laing Art Gallery, Newcastle upon Tyne (TWCMS: F5163).

We now come back to the original observation behind this article: the drawing of a leg on the Lammergeier in Gould's *Birds of Europe* (Figure 1). Gould's illustration certainly does show a bird that has only one leg visible, but both this leg and the one in the pencil sketch are right legs. Whoever added the leg did not want to correct an apparent shortage of limbs. We suggest that the leg was probably added by John Hancock, whose alertness to the way that living birds stand would make him aware of the unbalance in Gould's model, the stuffed mount drawn by Gould had its leg positioned so far forward as to tip the bird backwards. That John Hancock made this amendment only on the Lammergeier, and not on other illustrations of birds showing similar misbalance, probably results from the strength of his interest in this particular species.

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THREE PLANTS IDENTIFIED BY PETER TURNER, SON OF THE MORPETH NATURALIST WILLIAM TURNER

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SUMMARY

The Morpeth physician William Turner (*circa* 1508-1568) was the first writer in English to identify approximately 300 native plants. His son Peter (1542-1614) was devoted to his father's legacy in natural history studies and ensured the publication of his father's work. Although Peter produced few written records of his own, he formed part of an oral, co-operative pattern of research and exchange which carried his and his father's work through into the writings of the next generation. Descriptions of three plants, Bog-myrtle *Myrica gale,* Cross-leaved Heath *"Erica hirsuta Anglica"* and a cranesbill *"Geranium bohemicum",* are attributed to him. The aim of this paper is to provide the details of these identifications, and to establish his legacy within the broader context of the botanical work of his generation.

DISCUSSION

We associate the early naming, description and identification of plants with William Turner, whose reading, research and fieldwork in some parts of England and Europe resulted in him providing first records of about 300 English native plants, supported by a series of comments comparing English names for the same plant, and distinguishing between English and European species. Turner's work, amassed over a 30 year period between 1538 and 1568, appeared in his writings from the student handbook, *Libellus de re herbaria*, via *The names of herbes* (1549), to the tri-part *Herball*, begun in 1551 and published in its entirety in the year of his death.

Compared to this massive pioneering achievement, the few extant comments on plants by his son Peter Turner, preserved not in any work of his own but indirectly in those of his contemporaries, appear pitifully thin. His career as a London physician after training at Heidelberg seems to have been quite different from his father's, moving away from an early Galenism to embrace Paracelsianism and other radical medical ideas and methods. Yet it is obvious that Peter Turner was devoted to his father's legacy in natural history studies in two very important ways. First of all, as his prefatory letter to the 1568 edition of the *Herball* indicates, it was he who continued his father's work of amending the Cologne printer-publisher's errors and who decided that the work, in all its perceived imperfections, should go through the press for publication.

Secondly, from the indirect records, it is clear that Peter Turner associated with the next generation of natural historians, starting in his Heidelberg days and continuing into the

many years when he lived in close proximity to a group of knowledgeable enthusiasts based around Lime Street in London. In parliament in the 1580s at the same time as Sir Walter Ralegh (or Raleigh), he was also Ralegh's physician during the years of his imprisonment in the Tower (1603-1618), suggesting that he knew not only about the exciting imports from Virginia and the New World which Ralegh, Thomas Harriot (*circa* 1560-1621) and other colleagues had been collecting and experimenting with, but also of Ralegh's mineral, medical and botanical experiments during his incarceration. Indeed it is difficult to state with any certainty whom Peter Turner might not have known and collaborated with for more than 30 years from about 1580 to his death in 1614. But it is clear that, in particular, he worked with the naturalists Thomas Penny (1532-1589) and Thomas Muffet (1553-1604). These associations in turn brought his findings to the attention of important European writers on plants who were taking herbalism forward into botany: Mathias De l'Obel ("Lobelius", 1538-1616), Charles De l'Écluse ("Clusius", 1526-1609), and the brothers Jean and Gaspard Bauhin (1541-1613 and 1560-1624 respectively).

That is to say, the younger Turner formed part of an oral, co-operative pattern of research and exchange which carried his father's work through into the writings of the next generation. Given also that he inherited his father's writings, and yet seems to have been open to new theories and practices, he must surely have been a repository of knowledge, both inherited and personally acquired, which would make him invaluable to his associates. It is not yet known how much information Turner passed on to colleagues concerning either flora or fauna, but as a starting point the three plants attributed to his research by Charles Raven in his classic analysis of *English naturalists from Neckam to Ray* (1947) are poignant remains of his legacy which need to be celebrated within this broader context.

Bog-myrtle *Myrica gale* (Figure 1)
Raven notes of this:

> Jean Bauhin in his *Historia plantarum universalis* i.ii, 225, records that "thirty years ago an eminent doctor, Peter Turner, presented us with a dried herbarium (*nos donavit herbario sicco*) and among others this [*Myrica gale*] with the name 'Gale' attached to it. In this very year 1605 I tasted the leaf". (Raven 1947: 165)

Two things are of interest here. One is, as Raven points out, the clear indication that Turner was collecting plants while, and just after being, a student in the 1570s. Not only that, but he was drying them in a herbarium, a practice which his father found current in Northern Italy in the 1540s following the lead set by Luca Ghini of Bologna, and which he too may have adopted. This makes Turner the younger not just a serious plant collector but one who was fully *au fait* with modern methods of preserving individual specimens for comparative reference.

Figure 1. Bog-myrtle *Myrica gale* (illustration from Thomé 1885).

Secondly, the name he passed on to Bauhin was the name his father had given to the plant in Part 3 of the *Herball*. There he stated not only that he had seen it growing in Cambridgeshire, where it was called "Gall", as well as in "low Germany", but also that he and "diverse other in Summersetshyre" had "tried by experience" that it was "good to be put in beare" [beer] (Chapman, McConchie and Wesencraft 1995: 683-684). In Somerset the plant was called "Goul or Golle". He entitled his chapter on the plant as "Of the Fen shrub or bushe called Gall". Geoffrey Grigson, in *The Englishman's flora*, lists this name as derived from an Old English rootstock, and as prevalent in the West Country, but spreading up into Cumberland and Yorkshire.

The plant actually did and does exist in Turner's native Northumberland, under the local name of "fleawood" (Grigson 1955: 242; Swan 1993: 95) especially in the north of the county round Harbottle and Holystone. However Turner records only the Somerset name and usage, and it may well be that his son remembered the beer-making from his early years in Wells, where his father was Dean 1551-1553/4 and again from 1560. But there is also evidence to suggest that he himself returned to the West Country where he still had ties and contacts in later years, and therefore it is to the decade after his father's death that the creation of a herbarium, which included Bog-myrtle *Myrica gale,* should be attributed. What can be affirmed is that because Peter Turner passed on this local Somersetshire name, originally adopted by his father William Turner via Thomas Penny, to the Bauhin brothers, the term became part of mainstream European botany and was thereby adopted by Linnaeus.

"Erica hirsuta Anglica"

This name covers a plant which one might have expected William Turner to have seen many times in his home county, and with at least some variety of species, yet he included only the briefest and most general references in his writings to any representatives of *Erica* or *Calluna* – the heaths and lings of the *Ericaceae*. He included in his list in *The names of herbes* (1549) a passing mention of "*Erice*... named in English Heth hather, or ling", and then gave a few more details in one of the shortest chapters of *Herball Part 1* (1551) for *Calluna vulgaris*. Here he disputed Dioscorides' assertion that it should be called a tree, and Pliny's that it grew in woods, basing his assertion on the form of "ericam" that he had seen growing in England on wild plains and woodless hills, though admitting that he had seen "hethe" in Northumberland which was "so hyghe that a man may hyde himself in" it (Chapman and Tweddle 1989: 197).

Professor Alan Davison has pointed out that the vegetation around William Turner's home town of Morpeth may have altered in some parts due to changed patterns of cultivation, though he suggests that *Ericaceae* were plentiful in the locality, and that anyway he would have seen some species of heather growing plentifully on the trip he recorded having made up to Holy Island off the Northumbrian coast. Later in his life, this family of plants would also have been noticeable in the damp peaty regions prevailing in some parts of the West Country, since it favours not dissimilar conditions to those of Gale.

It seems likely that Peter Turner found this plant under those West Country conditions. As with Gale, a dried specimen was passed on to the Bauhin brothers, appearing in Jean's posthumous *Historia plantarum universalis* (1650), where it was clearly recorded as provided "*a Domino Petro Turnero Anglo*". The name it was given, "*Erica hirsuta Anglica*" was recognised a few decades later by John Ray as a misleading nonsense (Nelson 2014: 46, 49). In a personal communication Professor Davison has clarified this further in relation to modern botany:

> There is a species currently recognised as *Erica hirsuta* (a synonym of *Erica eriocephala* Lam.) but it is South African. I looked at the older floras and it seems that *Erica hirsuta* with or without the *anglica* is a very old name. Hooker & Sowerby explain that the name was incorrect because the plant was in fact *Calluna vulgaris* (heather). So...the name as it appears in the text [might be] probably *Calluna vulgaris* and possibly a hairy leaved variety.

However, in confirmation of Professor Davison's doubts, as *Calluna vulgaris* has no recognised subspecies, varieties, or forms, attention has turned to the different species and subspecies of *Erica.* In Ray's time, the term *Erica vulgaris hirsutior* (Nelson 2014: 46, 49) was applied to the Cross-leaved Heath *Erica tetralix* (Figure 2). Raven, one of the first to recognise the importance of Turner's donations to fellow botanists, did not even bother to refer to the old misnomer but simply provided a footnote saying the Bauhins had received from him *Erica tetralix* (Raven 1947: 169). This is the Cross-leaved Heath

which, as a "short, greyish, downy undershrub" (Fitter, Fitter and Blamey 1985: 274) meets all the requirements of a plant described in Bauhin as "*pulchella*" (translated by Nelson as "dainty"), short and "*in ambitu hirsute*". For those reasons, Nelson rejects the possibility that the Turner-Bauhin plant was the subspecies *Erica ciliatis*, the Dorset Heath, which Fitter *et al.* describe as not only "taller and more straggly" but "hairless" (Fitter *et al.* 1985: 174). Nelson's detailed research therefore supplements Raven's brief footnote, leaving Cross-leaved Heath *Erica tetralix* as the likely candidate.

Figure 2. Cross-leaved Heath *Erica tetralix* by Hajotthu.

"Geranium bohemicum"

The omission of detailed discussion of distinct *Erica* and *Calluna* species in the *Herball* is a reminder that, stupendous as were his efforts and his achievements, William Turner could not do everything and that his works demonstrate some striking omissions. A reminder of this fact is his scarcely adequate references to the geranium family *Geraniaceae* in Part 2. This was a family well represented in Northumberland and also in Somerset, and for which his publisher provided six illustrations. Of these, only two were named: "*Pinke needle*" *and* "*Geranium alterum*" (identified by Chapman as most likely the annuals Common Stork's-bill *Erodium cicutarium* and Dove's-foot Crane's-bill *Geranium molle* respectively), the others being simply numbered *Geranium* III, IIII, V and VI, with the accompanying two-paragraph commentary amounting to less than eleven lines (Chapman *et al.* 1995: 41).

When coming to this group Peter Turner therefore had little from his father to go on, nor does the evidence indicate for certain that he went as an adult researcher to Northumberland (though his and his father's colleague Thomas Penny did) where he

would have encountered up to 15 different species (Swan 1993), including the single species which he apparently misidentified. What follows is Raven's description in translation of the plant Thomas Penny gave to De l'Écluse in 1581, having received it from Peter Turner, and which De l'Écluse incorporated into his ever expanding volumes describing plants (Raven 1947: 167-169). Turner had found the plant in the fields round Copenhagen, during his visit to Denmark sometime in the 1570s:

> The bulbous Geranium has a bulbous root consisting of many small and oblong bulbs, fibrous towards the top; a stem a foot high, with nodes [*geniculatum*], slightly reddish at the root and nodes; at each node two leaves resting on rather long pedicels, cut into five principle parts, each of which is unequally jagged at the edge: from each junction at the foot of the leaves rise five sheathed leaflets: flowers at the top of the branches, joined in pairs and resting on small pedicels, rosy, of five leaves, in colour purplish pink [*ex purpureo rubescentes*] like the blue flowers of the Geranium but rather smaller.

What is initially striking about his language is that, even in translation, it represents a more modern form of botanical description, including more detailed description of the flower, than had been available to William Turner a few decades previously. However it lands Penny with a misidentification in which a description of one species is conflated with the nomenclature of another. According to the *Geranium* taxonomist Professor Peter Yeo, *G. bohemicum* is "a biennial, E and C Europe, north to S Scandinavia. One of only 2 annual/biennial blue-flowered geraniums." (Yeo 1985: 144).

This is obviously not the plant which Turner saw in Denmark, since he remarks specifically on its colour, "*ex purpureo rubescentes*". De l'Écluse himself noted that it seemed similar to Wood Cranesbill *Geranium sylvaticum* (Raven 1947: 169) and this is the plant which the *Geranium* expert Robin Moss has confirmed in conversation as corresponding to Penny's description of Turner's plant. *G. bohemicum* does not have a "rosy-purple"-flowering variant; nor does it have the developed bulbous root or nodes described above. Wood Cranesbill *G. sylvaticum*, on the other hand, can be fitted exactly to Penny/De l'Écluse's description. This is a very widespread plant across Europe: William Turner, if he had been in the Italian or Swiss Alps in the early summer, would have found meadows of it growing in profusion with colours ranging from pure white through shades of pink to bluish purple. There are some pure blue cultivars in circulation today in Britain, but in the wild, as modern experts note, this denizen of "northern England and Scotland" is typically "reddish-mauve" – though like the later flowering *Geranium pratense*, the hue of its petals can vary deceptively according to the light (Swan 1993: 161; Fitter *et al.* 1985: 138).[1]

[1] The cultivated form most resembling Peter Turner's wild plant is *Geranium sylvaticum* "Silva", kindly identified by Robin Moss and donated to the respective William Turner gardens in Carlisle Park, Morpeth, The Old Deanery, Wells, and St Olave's Churchyard, Hart Street, London.

How this particular misnomer came to be applied by Peter Turner is not at all clear. However its existence is not untypical of the difficulties natural historians face in matching modern plant names and descriptions to those from the pre-Linnaean records, any more than it was easy for either of the Turners to match the plants they saw to the names and descriptions of the classical writers on whom they still relied. What seems likely is that Peter Turner, not having travelled up to the north of England where he would have seen Wood Cranesbill *Geranium sylvaticum* (Figure 3), described what is in fact a typical colouring and appearance of that species, but grafted it by name on to a plant he had seen in his foreign travels: the blue-flowered *Geranium bohemicum*.

Figure 3. Wood Cranesbill *Geranium sylvaticum* (© John Richards).

We become aware of these gaps in knowledge and consequent problems in identification only because Peter Turner and his colleagues carried on his father's work, participating in the pan-European work of collecting together from individual sites piecemeal information about the common flora of England and various parts of the continent. As his herbarium has long been lost, there is no way of knowing how wide-ranging was his collection; how many of the species he researched differed from those his father knew; how many passed into orally transmitted information; and how many were recorded by others in print without acknowledging him as the source. If we add to this the difficulty of getting past pre-Linnaean names, it is remarkable that Peter Turner's descriptions were nevertheless clear enough for modern botanists to identify with reasonable security the few attributions we can credit to his research.

ACKNOWLEDGEMENTS

My thanks to Professor Alan Davison and Robin Moss for conversations and emails in April 2014 resulting in the advice recorded in the above piece, and to Phil Manning, Church Manager of St Olave's London, where both the Turners are buried, for instigating and co-operating with research on the work of the distinguished son of a famous father.

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Arctic Tern, Farne Islands © Samuel Hood

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EDITORIAL

The North East is a region of great natural beauty, with agricultural lowlands bordered to the west by the hills, moorlands and bogs of the North Pennines and to the east by the stunning coastline along the North Sea. This coast hosts some of the most important seabird colonies in Europe. Of these, the Farne Islands, remnants of the Whin Sill sitting some five km east of Seahouses, attracts tens of thousands of visitors each year and is a vital part of the local economy.

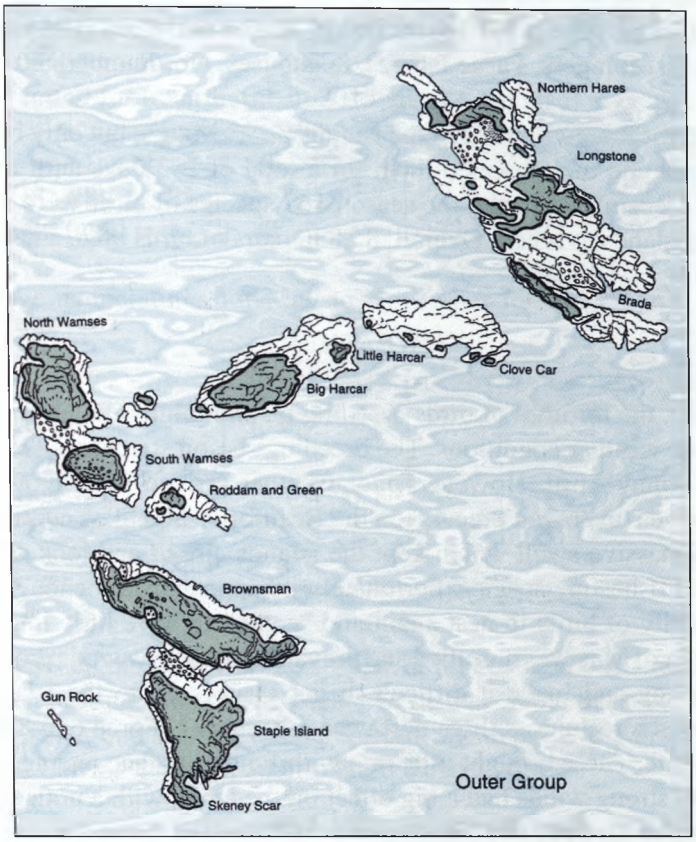
The breeding bird populations and other aspects of the Farne Islands' fauna and flora have been documented by annual reports published in the *Transactions of the Natural History Society of Northumbria* over many decades, latterly under the *Northumbrian Naturalist* title. We have recently evolved from 'Birds on the Farne Islands' to 'Farne Islands Wildlife', but in this volume we have widened the remit still further to include Coquet Island and the Long Nanny. All three sites are important seabird colonies with many species in common, but each has unique aspects with respect to the problems of managing biodiversity, safeguarding rare or declining species and in facilitating access for people to enjoy natural heritage. The sites are managed by different organisations with the advice and support of the local community, and there is an increasing degree of cooperation to share experiences, ideas and results.

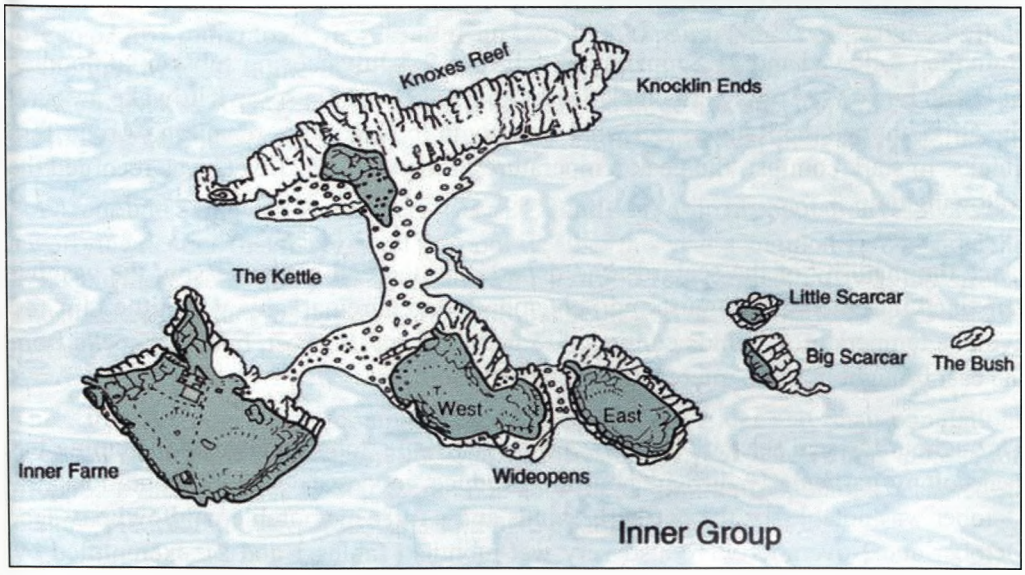
As the factors which affect seabird breeding success often impinge upon the whole of the North Sea coastline, it is in our interest to have a wider perspective on seabird and coastal ecology. The aim of this issue of *Northumbrian Naturalist* is therefore to support such a wider perspective by showcasing the conservation and monitoring work done at these key sites each year by the staff and the many volunteers who contribute their time and effort. We also hope that this will help facilitate the sharing of problems, monitoring and management techniques to benefit the North East coast as a whole.

Chris Redfern (Editor)

Inner Farne © Ed Tooth.

Map of the Farne Islands





BIRDS ON THE FARNE ISLANDS 2015

Lana Blakely, Ed Tooth, David Roche and Tom Hibbert
National Trust Rangers, Farne Islands, Seahouses, Northumberland NE68 7SR

The National Trust Rangers sailed to the islands on 23 March, but only became resident there on 14 April and then manned them for a total of 233 days until returning to the mainland on 3 December. During the season 167 species of birds were recorded, 26 of which used the islands to breed. Overall, 85,830 pairs of birds bred, a decrease of 1,126 pairs from 2014.

WEATHER

To a great extent, the fortunes of birds breeding on and migrating via the Farne Islands are dependent on weather conditions. The breeding season started well with light winds and a dry and sunny April. However, poor weather arrived in early May and strong northeasterly winds (average Force 4.8 on the Beaufort scale) blew continuously for six days causing a massive swell which kept the islands closed and took out some of the more exposed cliff-nesting species. Fortunately it happened early enough in the season to allow a majority of birds to nest again and seemed to have little impact on overall numbers. The rest of May was unsettled and prevailing westerly winds prevented migrant birds from arriving and made it difficult to get visitors on to the islands. Unsettled weather continued into June as three northwesterly storms (Force 6 to 8) blew through on 2, 6 and 22 June. These brought little rain with June drier than average (Table 1), but the third spell of strong winds had a big effect on the terns, with a noticeable reduction of birds in the more exposed Brownsman colony. A spell of warm weather at the end of June saw the temperature reach 22.8 °C.

Rain then followed and 31.5 mm of rain fell over 2-3 July causing substantial flooding of Puffin burrows, Arctic Tern chick deaths and even washing some Kittiwake nests off the cliffs, though the Rangers did what they could to protect the remaining Arctic Tern chicks. In stark contrast, the peak temperature of the year of 23.6 °C was recorded the following day.

Once the majority of the seabirds had departed at the end of the season, the weather remained unsettled and August and September were unremarkable with little rain and average temperatures. Winds continued to prevail from the west, but brief spells from the east brought in some interesting migrant birds.

Throughout the seal season (October and November) strong winds made counting the seal colony particularly difficult, but did produce good sea watching conditions: 22 October was notable for the northerly winds and a truly memorable wildfowl passage. October and November were also very wet months (Tables 1 and 2), exemplified by the collapse of part of the courtyard wall on Inner Farne after 29.1 mm of rain fell on

the night of 14 November. A break in the weather on 3 December allowed the Rangers to depart the islands and watch the impressive storm that arrived the day after from the safety and comfort of the mainland.

Table 1. Total rainfall for Inner Farne in 2015 and a Seahouses average.

	May	June	July	Aug	Sept	Oct	Nov	Total
Inner Farne 2015 (mm)	68	33.9	67.9	64.9	35.4	74.9	96.3	441.3
Seahouses Average (mm)	52	48	55	72	61	59	71	319

Table 2. Average temperatures for May to November for Inner Farne in 2015 and a Seahouses average.

	May	June	July	Aug	Sept	Oct	Nov
Inner Farne Average Temperature (°C)	10.0	13.35	14.45	14.65	13.3	10.65	7.9
Seahouses Average Temperature (°C)	10.1	12.8	14.3	14.4	12.2	9.8	6.3

OVERVIEW OF BREEDING BIRDS

A new record was set this year, with 26 species of bird using the islands to breed. These included the first nesting attempt of Roseate Tern since 2009, the second ever breeding attempt by Shoveler, and nesting attempts from Shelduck, two pairs of Red-breasted Mergansers and Carrion Crow, in addition to the usual species.

Shags and Cormorants were the first species incubating eggs in late March. Despite the poor weather earlier in the season, Guillemots had another record year as the population rose to 53,461 individuals, representing around 35,820 pairs, almost overtaking Puffins as the Farnes most numerous breeder. The Razorbill population remained stable but productivity was slightly lower than average. Of the three auk species, Puffins suffered the most, with widespread flooding of burrows resulting in a very poor season for them.

For Arctic and Sandwich Terns, there was a 24% and 22% drop in population respectively, a worrying decline that may reflect the poor weather this year. Common Tern bucked the trend and increased by 10 pairs. As with Puffins, Arctic Tern productivity was disastrous. The absence of young birds was noticeable and at the end of July the terns were notable by their absence.

The Kittiwake population remained relatively stable, but Eider and Shag populations declined by around 10% despite the bumper season last year. The Fulmar population dropped by nearly 30% to 209 pairs and sadly the Cormorant population resumed its decline this year and decreased by 12 pairs to 81, the lowest on record.

As with the general trend of slight declines in populations, Kittiwake and Eider productivity was slightly lower than average. After an exceptional year in 2014, Shags had another very productive season.

Of other species, good numbers of Mallard, Oystercatcher, Ringed Plover and Rock Pipit bred, the Swallow population increased to a record 10 pairs and Pied Wagtail to a record 9 pairs. A number of these were even seen raising second broods, in stark contrast to the struggles of some of the seabirds this season.

BIRD MIGRATION OVERVIEW

An often frustrating year finished with a total of 167 species recorded from around the islands during the course of the season. A persistent westerly airflow produced what was one of the poorest springs on record. Along much of the east coast, common migrants were notable by their absence, while May failed to deliver any of the expected scarce drift migrants normally associated with a Farne Islands spring. However as with any season, there were some notable highlights: the islands' second Surf Scoter, flying north on a day of good wildfowl passage on 22 October, and the third Thrush Nightingale, which spent two days on Brownsman from 15 August. Having been seen in the previous two years, the adult Bonaparte's Gull appeared for a third winter, exactly a year on from its 2014 appearance, but the Bridled Tern failed to return for an anticipated third season.

Previous day-record counts were broken for Great Northern Diver and Short-eared Owl, with a new second-highest count for Goosander and a third-highest for Swift, while notable absentees during the course of the season included Wood Sandpiper (only the second blank year since 2000) Grey Phalarope (first blank year since 1998), Mistle Thrush (first blank year since 1989), Bluethroat (second blank year since 2000), Greenfinch (first blank year since 1998), Common Rosefinch and Yellowhammer.

In order of status, species for which there are currently less than 20 island records included: Surf Scoter (second), Thrush Nightingale (third), Bonaparte's Gull (second island record when first found in 2013), Black-necked Grebe (fifth), Dusky Warbler (ninth), Marsh Warbler (eleventh and first autumn record), Great Shearwater (fifteenth) and Osprey (nineteenth).

Other highlights included (number of individuals in brackets): Gadwall (3), Balearic Shearwater (8), Leach's Petrel, Storm Petrel (13), Water Rail (4), Long-tailed Skua, Black Tern (2), Iceland Gull (2), Glaucous Gull (2), Long-eared Owl, Wryneck (2), Richard's Pipit (2), Stonechat (1), Barred Warbler (2), Icterine Warbler (2), Yellow-browed Warbler (17), Red-breasted Flycatcher (3), Red-backed Shrike (2), Little Bunting (2) and Ortolan Bunting.

SYSTEMATIC LIST

The status of each species is classified using the categories listed below. 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 2015 figure is given and a five-year mean is given in brackets next to it.

Mute Swan *Cygnus olor.* An uncommon visitor.
Records of our largest swan usually reflect local movement through Inner Sound and this year was no exception, with the only sighting involving a herd of eight heading north on 6 July.

Whooper Swan *C. cygnus.* An uncommon winter and passage visitor.
Spring was quieter than in recent years, with just two records involving 11 birds. Ten were on the sea in Inner Sound on 29 March, and one flew north through Staple Sound on 16 April. This latter bird was in the company of six gannets, flying in unison with the flock, mirroring their flight pattern and even gliding for short spells. Autumn produced six over Inner Farne on 25 October, two north on 5 November and 11 drifting south in Inner Sound on 13 November. The final record was of a herd of nine heading west on 2 December.

Pink-footed Goose *Anser brachyrhynchus.* A well represented winter and passage visitor.
Spring passage was light, with a single bird west and a skein of 17 north over the Inner Group on 23 April. Autumn movement was more evident, with the first recorded on 24 September when a skein was heard passing over Inner Farne. This preceded an impressive display of migration on 25 September, when a total of 1,149 geese flew southwest through the Inner Group in 21 skeins (ranging from 18-162 individuals). On 26 September a further 157 birds flew west, after which only small numbers were seen, with 1-18 on seven dates from 1 October to 24 November. The only exceptions were skeins of 48 south on 1 November and 108 south on 24 November.

Greylag Goose *A. anser.* An uncommon passage and winter visitor.
Movement around the Farnes involves both feral and wild birds, with this season producing three records. Two north through Staple Sound on 29 May were the first, followed a week later by another two north over Brownsman on 6 June amid a skein of Canada Geese. The final record came on 8 November, with a flock of five flying west over the islands.

Canada Goose *Branta canadensis.* An uncommon passage visitor.
As usual, early June produced several records as birds undertook their annual moult migration to northern Scotland. The majority came from the Inner Group, with two north over the Kettle on 1 June and skeins of nine west on 2 June, 19 north on 4 June and 15 north on 11 June. The only record for the Outer Group was the largest flock of the year, of 37 north over Brownsman on 6 June, accompanied by two Greylag Geese.

Barnacle Goose *B. leucopsis.* A well represented passage and winter visitor.
After the exceptional passage last year it was a quiet season for this Arctic-breeding goose. Spring produced sightings on four dates, with 80-90 north on 7 May, 20 north on 13 May, 13 east on 20 May and seven north on 21 May. Autumn movement was similarly low, with a skein of 100 south on 5 October, 11 north on 21 October and a final 48 north on 19 November.

Brent Goose *B. bernicla.* A well represented passage and winter visitor.
Nearby Lindisfarne supports a significant number of wintering 'pale-bellied' birds (*B. bernicla hrota*), and it is this taxon that makes up the majority of Farnes records. 1-20 were seen on 15 dates between 3 September and 23 November, with peak counts of 112 north on 5 September, 46 north on 23 September and 36 north on 21 November. Birds of the locally scarcer 'dark-bellied' subspecies (*B. bernicla bernicla*) were seen twice this season, with two on 12 November and four on 14 November.

Shelduck *Tadorna tadorna.* A well represented visitor and occasional breeder.
Pairs were evident around the islands between March and June, while 1-4 passage birds were noted on six spring dates and six autumn dates, mostly moving through Inner Sound. Peak counts involved eight north on 1 November and seven north on 23 November. In the past, Shelduck have nested on Staple Island (five-year mean: 0.8) and Inner Farne (0.6), and although a pair was seen on the Brownsman pond in mid-May and then again in early June, and four adults were seen on Longstone on 13 June, there was no evidence of successful breeding this year.

Mallard *Anas platyrhynchos.* A common winter and passage visitor and well represented breeder.
Birds are present all year, with breeding pairs supplemented by winter visitors. The first Mallard nest was discovered behind the Pele Tower under an old wheelbarrow on 24 March. A family of eight ducklings was first seen on 30 April, and after that a regular stream of new broods were noted, unfortunately never lasting more than a few days. A late brood was also discovered on 9 September with seven ducklings, all of which

survived to fledging and were regularly seen around Inner Farne throughout October and November. Due to the ability of this species to have second broods quickly, assessing the true population is difficult. A total of 12 (14.4) pairs were found this year, and they nested as follows: Inner Farne 5 (6.4), West Wideopens 1 (1.6), East Wideopens 0 (0.4), Knoxes Reef 0 (0.2), Staple 2 (1.8), Brownsman 3 (2.6), North Wamses 1 (0.6), South Wamses 0 (0.4) and Big Harcar 0 (0.4). Autumn produced movement of 1-11 birds on five dates from 5 September to 23 November, with a high count of 29 north on 21 November. Knoxes Reef attracted regular gatherings of up to 30 birds throughout autumn, peaking at 56 in October. As usual, a large number of these birds remained to overwinter.

Gadwall *A. strepera.* An uncommon visitor.
This handsome dabbling duck remains scarce, with records in only 18 of the 35 years since it was first seen in 1979. This season produced two records on 26 August: two flew north through Staple Sound, and a few minutes later a female dropped on to Knoxes Reef with a group of Mallards.

Pintail *A. acuta.* An uncommon passage and winter visitor.
A good year for this attractive duck, with records on eight dates. A pair flying north through Inner Sound on 20 April were the only spring birds, with no further records until six flew north on 18 August. Thereafter 4-7 were seen flying north on one August, three September and one October date, with a final pair flying north on 22 November.

Shoveler *A. clypeata.* A well represented passage and winter visitor and extremely rare breeder.
The first record was a pair over Knoxes Reef on 12 April. A pair, thought to be the suspected breeding pair from last year, arrived on the Inner Farne pond on 21 April and were still present on 25 April. By 3 May, the male only was seen on Top Meadow, with the female presumed to be on a nest somewhere. The female was seen back on the pond on 12 May but without any ducklings so we assume that her nest was predated or failed. This is the second ever breeding attempt after the first last year. Also on 12 May two males flew in off the sea, with one remaining into the next day. In autumn, the high tide roost on Knoxes Reef held 1-3 birds on three August dates, with 3-4 flying north on two dates in September. The final record came on 31 October, with a male flying north, while Knoxes Reef held another male and two females.

Wigeon *A. penelope.* A common passage and winter visitor.
A group of seven on Knoxes Reef on 19 February was evidence of the overwintering flock, while spring passage produced four north on 23 March, seven on 24 March and two on 16 April. After the first autumn arrival with 10 north on 19 August they became regular on passage and around the islands, with numbers typically ranging from 1-80. Counts of over 100 individuals were made on seven dates, with peaks of 268 on 29 September, 218 on 30 September and 219 on 21 November. As usual, a wintering flock built up around Knoxes Reef consisting of up to 80 birds.

Teal *A. crecca.* A common passage and winter visitor.
Spring passage was light, with a drake on 16 April, three birds on 19 April and a pair on 9 May. Two birds on Brownsman Pond on 4 July were the first of the autumn, after which 1-54 were recorded regularly on passage and around the islands, favouring Knoxes Reef and Brownsman. The highest count of the season was on 31 August, with 196 recorded flying north in several flocks. Some remained to spend the winter around the islands, with up to 52 around Knoxes Reef in November.

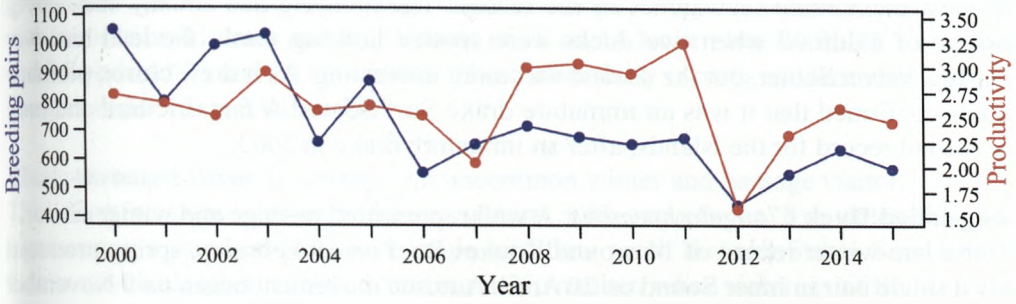
Pochard *Aythya farina.* An uncommon passage visitor.
Although regarded as roughly annual, the last record of this diving duck was in 2011, making the sightings this season long overdue. Five birds flew north through Staple Sound on 5 September, a group of three followed several minutes later by another two.

Tufted Duck *A. fuligula.* A well represented visitor.
The islands have not seen any significant numbers since 2012, and with only four records this season the run of quiet years continues. A single bird south on 24 April was the sole spring sighting, with autumn records of two north on 26 July and three north on 31 August, all through Inner Sound. The final record was of a female on the sea off Brownsman's east rocks on 29 October, before it flew north with a group of Eider.

Scaup *A. marila.* An uncommon passage and winter visitor.
There was just one record this season: a flock of seven birds flying north through Inner Sound on 21 November during a period of extensive wildfowl movement.

Eider *Somateria mollissima.* A breeding resident.
Large flocks gathered around the Kettle through spring as the breeding season began, peaking at 220 on 27 April. Courtship was observed when the Rangers arrived in mid-March with the first nest found on 14 April. There was a 10.79% decrease on last year's breeding pairs to 570 (593.4). Birds nested as follows: Inner Farne 333 (357.4), West Wideopens 13 (21.4), East Wideopens 4 (5.2), Knoxes Reef 3 (3.8), Staple 33 (32.4), Brownsman 162 (150.8), North Wamses 1 (4.2), South Wamses 7 (6.8), Big Harcar 1 (3.8), Northern Hares 1 (0.6), Longstone 9 (2) and Longstone End 3 (5). The first chicks were seen on 17 May with multiple crèches seen around the islands. This year 382 birds were monitored producing 935 chicks resulting in a productivity of 2.45 (2.53), slightly down from 2.59 last year (Figure 1). Numbers built again in late autumn, with up to 170 regularly recorded around the islands throughout November. Passage produced a northward movement of 103 birds across 21, 22 and 23 November during a period of strong northerly winds.

Figure 1. Eider breeding pairs and productivity 2000-2015.



Pair of Eiders on the Farnes © Ed Tooth.

Common Scoter *Melanitta nigra.* A common passage and winter visitor.
Well represented, with records on 84 dates throughout the year, involving birds both on passage and lingering around the islands. As usual, Inner Sound often held a large raft of birds in spring, with around 250 present on 2 May. The number of rafting birds then decreased and, although July saw a brief resurgence in sightings with a group of up to 141 present in the first week of the month, none remained by August. Passage produced 1-131 on 61 dates, with high counts of 205 north on 23 June, 235 north on 26 June and 599 (591 north, eight south) on 9 September.

Velvet Scoter *M. fusca.* A well represented passage and winter visitor.
An excellent year for this elegant scoter, with most records occurring in the autumn months. The first of the year flew north through Inner Sound on 22 June, with another north through Staple Sound on 29 June. 1-3 were then seen on seven dates from 25 July to 9 November, with a higher count of five on 30 August. Strong northerlies late in the season produced an impressive day count of 15 north on 21 November, before an even more spectacular total of 23 was recorded the following day.

Surf Scoter *M. perspicillata.* An extremely rare visitor.
Thanks to howling northerly winds overnight, Saturday 21 November produced one of the most memorable seawatches of the season. The morning had already seen heavy passage of wildfowl when two ducks were spotted heading north; the lead bird was clearly a Velvet Scoter, but the second was more interesting. As it drew closer, plumage details confirmed that it was an immature drake Surf Scoter! A fantastic bird and only the second record for the islands, after an immature drake in 2003.

Long-tailed Duck *Clangula hyemalis.* A well represented passage and winter visitor.
After a late-winter record of 14 around Knoxes Reef on 18 February, spring produced only a single pair in Inner Sound on 20 April. Autumn movement began on 9 November with two female types flying south, followed by 1-2 on 10, 12, 16 and 20 November. Passage increased dramatically as strong northerly winds produced movements of 80 on 21 November and 24 on 22 November, all flying north. Numbers quickly dropped as the wind changed, with three birds north on 23, a drake north on 24, a duck off Brownsman on 26 and a final drake south on 27 November.

Goldeneye *Bucephala clangula.* A common passage and winter visitor.
Small numbers typically winter around the islands but this year the only records involved birds on passage with 1-10 recorded on nine dates between 19 October and 24 November, with higher counts of 32 north (in two hours) on 20 November, 69 north on 21 November and 28 north on 22 November.

Goosander *Mergus merganser.* An uncommon passage visitor.
Another exceptional year for this typically inland sawbill, with records on 11 dates. Spring produced two birds north on 23 March, with autumn producing sightings of 1-4 on seven occasions between 22 July and 30 October. During this period there were high counts of six north on 6 September, seven north on 21 August and an impressive 17 north together on 15 August – the second highest day count for the islands, after the record last year of 19.

Red-breasted Merganser *M. serrator.* A well represented passage and winter visitor and rare breeder.
Birds were resident around the islands from 16 April to 17 July, with passage producing 1-4 on four spring dates (three May, one June), and seven autumn dates (three July, four November). As last year, two pairs were seen courting in the Kettle, the first on 7 May and then both pairs together on 16 May. Both females subsequently disappeared leaving the males alone on 24 May. Females were noted on land, roosting on the beach in St Cuthbert's Cove and making their way further on to Inner Farne, confirming that both were attempting to nest. The outcomes of the breeding attempts are unknown as no young were observed; however, as the females re-appeared only a few weeks after being noted absent, it is likely that both nests were predated. Nevertheless it was another year in which the islands continued to play host to this rare Northumberland breeder.

Red-throated Diver *Gavia stellate.* A common winter and passage visitor.
Recorded throughout the year, with sightings peaking in late autumn. Spring migration produced 1-2 on six dates, with a high count of five on 7 May. Autumn was much busier, with records on 41 dates and high counts of 19 on 14 November, 26 on 22 November, and 24 birds on 23 and 24 November. There were daily records in December until the Rangers departed on 3 December.

Black-throated Diver *G. arctica.* An uncommon winter and passage visitor.
This diver remains scarce in Farnes waters, with records on five dates this year representing a standard season. A single bird flew south through Staple Sound on 12 October, with all other records occurring in November, when sightings of Red-throated and Great Northern Divers also increased. Singles were recorded on 13, 20 and 22 November, with the only multiple count involving two north on 21 November.

Great Northern Diver *G. immer.* A well represented winter and passage visitor.
An excellent year for this bulky diver with records on 18 dates, involving up to 45 birds. Spring produced a summer-plumaged adult on 6 May, with further singles in autumn on one September and three October dates. November then brought an influx, with 1-4 on 12 occasions between 15 November and 3 December, with repeat sightings in the Kettle suggesting at least one wintering bird. During this period passage peaked on 22 November, with 20 birds seen in a single day (18 north, two on the sea). This eclipsed the previous record day count of 15, reached in both 1998 and 2003.

Slavonian Grebe *Podiceps auritus.* An uncommon winter and passage visitor.
Despite being a well-represented wintering bird on the adjacent mainland, Slavonian Grebe is surprisingly scarce around the islands. This season produced two records, both from Inner Sound. A single individual was seen drifting south on 14 November, with another on the sea before flying south on 27 November.

Black-necked Grebe *P. nigricollis.* An extremely rare visitor.
Last winter, Seahouses harbour hosted two of these locally rare grebes, with one venturing into the Kettle on 22 January. This is only the fifth record for the islands, and the first since 1995.

Great Crested Grebe *P. cristatus* An uncommon visitor.
After a blank year in 2014 it was a more typical season for this scarce Farnes bird, with two autumn records. A single bird was on the sea just north of Seahouses harbour on 11 November, with another individual north through Inner Sound on 21 November.

Red-necked Grebe *P. grisegena.* A well represented winter and passage visitor.
This species has become much scarcer in Northumberland in recent years, which has been reflected in Farnes records. This season however produced the best showing since 2011. A bird in the Kettle on 21 January was followed by another on 24 March, which showed well before it drifted south. All other records were in November, with singles

on the sea in Inner Sound on 14 and 21 November, and one bird north through Staple Sound on 22 November, with it or another present in the Kettle later that day. Finally, two birds were on the sea around Inner Farne on 24 November, one off Lighthouse Cliffs and a second off North Rocks.

Fulmar *Fulmarus glacialis.* A common breeder, abundant on passage.
Birds were back on site from 20 March. For a second year in a row the number of breeding pairs has declined, down 29.86% from last year to 209 (278.8) pairs, representing the second largest decline, after the crash of 2004, since records began in 1971. Pairs nested as follows: Inner Farne 21 (22.4), West Wideopens 9 (13.8), East Wideopens 14 (17.8), Knoxes Reef 5 (22), Staple 46 (49.8), Brownsman 52 (70), North Wamses 22 (32.6), South Wamses 25 (35.4), Big Harcar 8 (10.8) and Longstone End 7 (4.2). The first chick was seen on 9 July on Knoxes Reef. The last birds had departed the islands by mid-September. Autumn produced the most significant passage when 425 flew north on 2 September. The first bird returned on 30 October and thereafter numbers increased, rising to 46 birds around the Inner Group by late November, with some pairs back on nesting sites.

Great Shearwater *Puffinus gravis.* A rare visitor.
This large shearwater was spotted just after 07:00 on 1 September, approaching the south end of Inner Farne before cruising through Staple Sound. This represents the fifteenth record for the islands.

Manx Shearwater *P. puffinus.* A common passage visitor.
This season produced one of the poorest showings in recent years for this normally abundant tubenose. 1-68 were recorded on 43 dates between 16 March and 22 November, with the only higher counts being 151 on 8 June, 205 on 5 September and 109 on 6 September. Unlike the previous two years, no loafing flock formed around the islands.

Balearic Shearwater *P. mauretanicus.* An uncommon passage visitor.
It was an exceptional autumn for this Mediterranean seabird, with eight individuals seen across four dates. The first bird was recorded on 27 July, settling on the sea off the south end of Inner Farne with a flock of Kittiwakes. Strong northerly winds then produced an influx in early September, with a single on 5 September and three on both 6 and 7 September, all heading north through Staple Sound or behind the Outer Group.

Sooty Shearwater *P. griseus.* A well represented to common passage visitor.
Despite an early start, with the first individual flying north through Staple Sound on 8 July, it was another quiet year for this globetrotting shearwater. There were two more north on 27 July, but a single bird north on 31 August was the only record of the month. Passage picked up in September, with 1-6 seen on eight dates from 1-20 September, during which time records peaked at 53 on 5 September, 25 on 6 September and 50 on 7 September, all heading north. The final sighting was of a single late bird heading south behind Longstone on 24 October.

Storm Petrel *Hydrobates pelagicus.* An uncommon passage visitor.
The first bird of the season was discovered feeding in Inner Sound on 28 July, lingering for 35 minutes and allowing all the Rangers to enjoy good views of Britain's smallest seabird in action. All subsequent records concerned birds in the ringing net, with 12 caught during three nocturnal sound-luring sessions: five on the night of 30 July, three on 11 August and four on 12 August.

Leach's Storm Petrel *Oceanodroma leucorhoa.* A scarce visitor.
For the second year running sound-luring for Storm Petrels attracted a Leach's Petrel into the nets, with a single bird trapped and ringed at 02:10 on 12 August. This was the fifth of the species to be ringed on the islands, after three in 2014 and one in 2011.

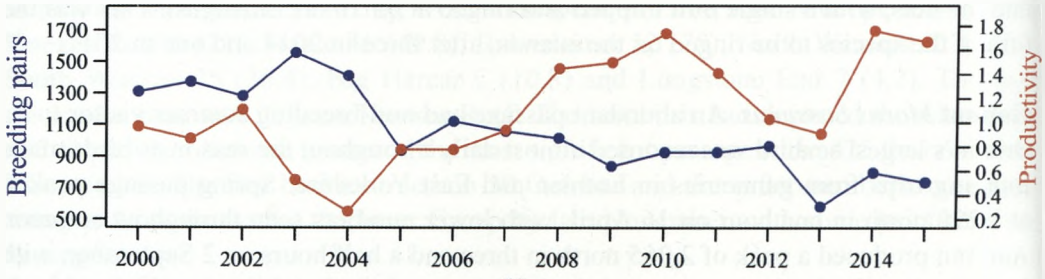
Gannet *Morus bassanus.* An abundant passage and non-breeding summer visitor.
Britain's largest seabird was recorded almost daily throughout the season as birds made foraging trips from gannetries in Lothian and East Yorkshire. Spring passage peaked at 1,220 north in one hour on 16 April, with lower numbers seen throughout summer. Autumn produced a peak of 2,065 north in three and a half hours on 2 September, with large feeding flocks forming around the islands, regularly involving hundreds of birds during October. Numbers then dropped again, though birds were still seen daily until the Rangers departed in December.

Cormorant *Phalacrocorax carbo.* A common breeding resident.
Present in small numbers throughout the year, with the population building in spring and summer as birds arrive to breed. Sadly, the decline in Cormorant numbers has resumed after a minor bounce back last year, and the number of nesting pairs was just 44% of the figure recorded in 2005, mirroring the decline of our native coastal subspecies *carbo* seen elsewhere in the UK. As usual, most birds were on fully built nests with eggs by early April. The policy of minimising disturbance means that getting exact first egg and hatching dates is not possible for this species. The 81 (115) pairs nested as follows: East Wideopens 34 (59.4), North Wamses 8 (21.2) and Big Harcar 39 (34.4). Of particular note was the apparent shift of the majority of the North Wamses colony back to Big Harcar, an island only regularly colonised by Cormorants in 2008. Autumn passage produced records on five dates, with a peak of 37 north on 6 September, when 72 also roosted on West Wideopens.

Shag *P. aristotelis.* A common breeding resident.
Present throughout the year, with a large roost forming on the north rocks of Inner Farne in autumn. The peak count of roosting birds was around 650 on 22 September, most of which were fledged juveniles. With 720 (838.6) pairs, the breeding population declined by 9.43% compared with last year but the population has yet to recover from the crash of 2013 (Figure 2). Shags nested across the islands as follows: Inner Farne 253 (255.2), West Wideopens 64 (72.2), East Wideopens 53 (80.6), Megstone 6 (17.6), Skeney Scar 42 (45.2), Staple 107 (137.2), Brownsman 84 (88.2), North Wamses 29 (32.8), South Wamses 26 (39.6), Roddam and Green 7 (7.4), Big Harcar 32 (46.4) and Longstone

End 17 (16.2). Nest building began mid-February/early March with completed nests on 20 March and the first eggs on 29 March. This year, 374 nests were monitored and produced 626 fledged young, giving an overall productivity of 1.67 (1.37), a good year. The Inner Group of islands fared better with an overall productivity of 1.96 compared to 1.34 in the Outer Group. A count of 120 juveniles was seen congregating around Inner Farne on 7 August and a few late broods were noted in the Outer Group well into October.

Figure 2. Shag breeding pairs and productivity 2000-2015.



Shags on the Farnes © Tabitha Burnett.

Grey Heron *Ardea cinerea.* A well represented visitor; bred in 1894.
Recorded on 45 dates this year, mostly from the undisturbed Knoxes Reef. All reports involved 1-2 birds, although a single over Brownsman on 20 September may have been a different bird from the two individuals on Knoxes Reef that same day. Almost all of these sightings occurred in autumn, with the only exceptions being two May and three June records.

Osprey *Pandion haliaetus.* A scarce passage visitor.
An individual on 14 September was first seen flying over Brownsman mobbed by gulls and then drifted across Staple Sound and continued west. This was the nineteenth record for the islands, nine of which have now occurred in the autumn months.

Marsh Harrier *Circus aeruginosus.* An uncommon passage visitor.
The British population has been expanding in recent years, including in Northumberland and this has been reflected by an increased number of sightings on the Farnes, with birds seen annually from 2008-2013. A female-type flew north close to Inner Farne on 26 August.

Sparrowhawk *Accipiter nisus.* An uncommon visitor.
It was a reasonable year for this small hawk, with migrants from northern Europe typically providing the bulk of the records. The only spring sighting involved a single bird west over Inner Farne on 10 April, with no further records until one was seen on Inner Farne on 3 August. This was followed by an individual lingering on Brownsman from 23-24 August, and another flying over Inner Farne on 15 October. A few days later a female was seen first on Brownsman and then later Inner Farne on 19 October, with the final bird of the year flushed from Inner Farne on 25 October.

Kestrel *Falco tinnunculus* A well represented passage visitor; may have bred in 1916.
Spring passage is typically light, but this year it was non-existent, with no birds seen until a female perched on the Inner Farne Pele Tower on 12 July. Thereafter it became a regular feature across both the Inner and Outer Groups, with 1-3 seen on 38 dates between 18 July and 25 November. The only higher count came on 24 October, when one was present on Brownsman while another three flew west.

Peregrine Falcon *F. peregrinus.* A well represented passage and winter visitor; may have bred around 1925.
Birds were recorded on seven dates from 24 March to 20 April, with no further sightings until 9 July when an individual was present on Longstone. Sightings then became regular until the end of the season, as at least two birds were resident around the islands (adult and immature females). Feral Pigeons were often the prey of choice and an immature bird was seen to carry a fresh kill from Inner Farne to the mainland to eat. Interestingly, an individual was seen moving south on a seawatch from Inner Farne on 2 September, while a very tattered juvenile flew west on 17 October.

Merlin *F. columbarius.* A well represented passage and winter visitor.
The Farne Islands regularly host 1-2 birds over winter and this season was no exception, with birds resident throughout early spring and late autumn. A single individual was seen on seven dates from 20 March to 1 May, with the first autumn bird arriving on 23 September. Two birds were then seen regularly until the Rangers departed in December, with prey including Turnstone, Redwing, Goldcrest and Rock Pipit.

Water Rail *Rallus aquaticus.* An uncommon passage visitor.
A good year with Inner Farne producing four records, all occurring in autumn as migrants reached the UK. The first was discovered sheltering from a storm in the Pele Tower cellar on 12 September. When the weather improved it was released into the vegetation around Central Meadow Pond. All other records came from Inner Farne, with singles on 30 September, 6 November and 15 November.

Oystercatcher *Haematopus ostralegus.* A common winter and passage visitor and well represented breeder.
Numerous throughout the season, with all peak counts relating to birds roosting around the Kettle on Knoxes Reef, West Wideopens or Inner Farne (Table 3). Passage was observed on seven autumn dates, with a peak of 30 through Inner Sound on 2 September. At 32 (39.4) pairs, the breeding population had decreased by 18% on last year. The first nest with eggs was discovered on Brownsman on 14 May, the same date as last year. The first chick was seen on 10 June and the first fledged on 21 July. Only two fledged birds were seen, one on Brownsman on 21 July and one on Inner Farne on 16 August. The 32 pairs were distributed as follows: Inner Farne 6 (6.4), West Wideopens 2 (4.4), East Wideopens 1 (1.4), Knoxes Reef 3 (2.4), Staple 4 (5.8), Brownsman 8 (9.8), North Wamses 1 (1.2), South Wamses 1 (1.2), Big Harcar 1 (1.2), Northern Hares 1 (1.2), Longstone 2 (2) and Longstone End 2 (2.6).

Table 3. Peak counts of Oystercatcher abundance, Farne Islands 2015.

	March	April	May	June	July	Aug	Sept	Nov	Dec
Individuals	35	37	57	30	24	75	106	149	159

Oystercatcher chick on the Farnes © Tom Hibbert.

Ringed Plover *Charadrius hiaticula.* A common passage visitor, uncommon and declining as a breeding species.
The first of the season was recorded on Inner Farne on 20 March. A pair was seen displaying on 4 April with the first eggs discovered on 28 April on Inner Farne. Multiple breeding attempts were made by this pair in St Cuthbert's Cove and Ladies Path but all failed. The population remained stable with 6 (6.6) pairs distributed as follows: Brownsman 3 (3), Staple 2 (0.4), Longstone 0 (0.8), Inner Farne 1 (1.6), and East Wideopens 0 (0.8). All six pairs were unable to produce fledged young, with the majority being predated at egg stage. The Inner Farne pair produced four eggs on their last attempt but these were infertile. A post-breeding gathering of up to eight birds formed on Inner Farne throughout August and early September, disappearing later in the month. The final records were nine over the Kettle on 8 October and one on Northern Hares on 11 October.

Grey Plover *Pluvialis squatarola.* A well represented passage visitor.
A quiet season, with no records from spring and only five from autumn. Singles flew north on 15 August, 5 September, 24 September (with a second bird landing on Knoxes Reef) and 21 November. The final record was on 22 November when two flew north through Staple Sound.

Golden Plover *P. apricaria.* A common passage visitor.
As usual, numbers built throughout autumn as a post-breeding gathering formed on the Outer Group, with most of the 25 records from 3 July to 28 October relating to these birds. This gathering peaked at around 1,000 on 29 August, with 850 still present in early September. November produced a final three records as birds moved through the islands: 28 on 2 November, three on 15 November and 10 on 22 November.

Lapwing *Vanellus vanellus.* A well represented passage visitor; sporadic breeder in the past, last attempt in 1962.
The first of the season was flushed from West Wideopen on 11 October, with 28 October producing one east over Brownsman and seven west over Inner Farne. The next day four were seen around Inner Farne, with one still present on Top Meadow Pond on 30 October. November brought the highest count, with 12 south over Brownsman on 5 November, where a single was also seen heading west on 11 November. The final record was from Inner Farne when four flew west on 23 November.

Knot *Calidris canutus.* A well represented passage visitor.
As in most years, good numbers of this high-Arctic breeder were present throughout summer. A flock of 20 south on 25 April was followed by 1-3 on three dates in May and one in June. There were 22 on Knoxes Reef on 17 June which marked an increase in numbers; there were 1-31 recorded around the islands on 44 dates until 2 November, with high counts of 50 south on 27 July, 34 on 29 August and 43 on 16 September. Strong winds in November produced three final records, with three on 21, nine on 22 and one on 23 November, all flying north.

Sanderling *C. alba.* An uncommon passage visitor.
It was another good year for this elegant wader with records on 13 dates, with 2-4 present on Inner Farne from 15-19 May and an additional 11 birds flying north on 16 May. 1-2 were then recorded on two June, three July and two August dates, with a higher count of nine flying south on 19 July.

Purple Sandpiper *C. maritima.* A common passage and winter visitor.
The Farnes hold nationally-important numbers of this dumpy but endearing wader, with birds present in every month but June. Autumn produced the largest gathering, with 121 on Longstone on 30 August (Table 4).

Table 4. Peak counts of Purple Sandpiper and Turnstone abundance, Farne Islands 2015.

	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Purple Sandpiper	70	115	60	0	30	121	55	28	115	78
Turnstone	11	25	23	120	215	426	120	98	c250	-

Turnstone *Arenaria interpres.* A common passage and winter visitor.
Present all year, with large roosts forming on Longstone and Knoxes Reef. Greatest numbers were recorded in August as passage reached its peak (Table 4).

Dunlin *Calidris alpine.* A common passage and winter visitor.
The spring period produced 1-8 birds on 17 dates between 15 April and 30 June, with many in full summer plumage. Autumn provided more records, with 1-18 on 37 dates from 3 July to 18 November, and peaks of 30 across the islands on 19 July and 70 together on Knoxes Reef on 2 September. There were two final records when strong winds produced northward movements of 34 birds on 21 November and 45 on 22 November.

Green Sandpiper *Tringa ochropus.* An uncommon passage visitor.
It was a very poor showing of this distinctive wader with only three records. Singles were seen on Inner Farne on 9 and 24 August, while another was seen leaving Knoxes Reef on 13 August.

Common Sandpiper *Actitis hypoleucos.* A well represented passage visitor.
There were just three spring records of this summer migrant, with individuals around the northeast shore of Inner Farne on 29 April and 4 May, while Brownsman pond hosted a third on 13 May. Autumn migration produced 1-3 on seven July and 16 August dates, with the only exceptional count being nine together on Brownsman on 24 August. The final records were of a single on Inner Farne on 5 September and another lingering on Brownsman from 11-12 September.

Redshank *Tringa totanus.* A common passage and winter visitor; bred in nine years 1901-1943.
Redshank were present around the islands throughout the year with greatest numbers recorded in autumn. The peak count was 37 around the Outer Group on 14 October, with 34 on Longstone on 11 August.

Greenshank *T. nebularia.* A well represented passage visitor.
Another disappointing year for this species, with only eight records. Single birds were seen on five dates from 6-22 August, with two records from Inner Farne and three from Brownsman/Staple. The only multiple count came on 19 August, when singles were present on both Inner Farne and Longstone. The final record of the year was a late bird calling over Brownsman on 8 October.

Black-tailed Godwit *Limosa limosa.* An uncommon passage visitor.
Recorded on seven dates, but only in small numbers. An individual was flushed from Inner Farne on 9 May, with the first autumn record comprising nine south on 3 July, followed by 13 south on 5 July, singles south on 24 and 26 July, five south on 7 August and two on West Wideopens on 11 September.

Bar-tailed Godwit *L. lapponica.* A well represented passage visitor.
Recorded on 23 dates (three spring and 20 autumn), with most sightings involving 1-15 birds. The only exceptions were the peak counts of 25 over Inner Farne on 21 July and 55 on Knoxes Reef on 17 August.

Curlew *Numenius arquata.* A common passage and winter visitor.
Present throughout the year, with large numbers roosting on Knoxes Reef and West Wideopens in the Inner Group. The peak count this season was 464 on 10 November (Table 5).

Table 5. Peak counts of Curlew abundance, Farne Islands 2015.

	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Individuals	6	19	2	39	112	89	215	464	31

Whimbrel *N. phaeopus.* A well represented passage visitor.
An average year for this migratory wader, with records on nine spring and 37 autumn dates. 1-2 were around the Inner Group from 25-28 April, with three north on 2 March and singles on four further occasions that month. The first returning bird was on West Wideopens on 28 June, with 1-7 then recorded regularly until 2 October. During this period there were high counts of 22 on 3 August and 13 on 12 August. One final record was an individual on Inner Farne on the extremely late date of 28 October, just four days shy of the latest ever record.

Woodcock *Scolopax rusticola.* A well represented passage visitor.
A poor spring for this migrant wader, with only a single bird flushed from Inner Farne on 23 March. The first autumn bird was flushed from the same site on 9 October, with 11 October producing one each for West Wideopens and Brownsman. As usual, the first hint of easterly winds brought an influx, with the highest counts of the year on 26-30 October; with 15 on 28 October and at least 29 on 29 October. 1-4 were then recorded on seven November dates, with the last being a single bird on Inner Farne on 23 November.

Snipe *Gallinago gallinago.* A well represented passage visitor.
Spring passage was light, producing only singles on 20 and 23 March. Autumn provided more records, with 1-4 birds on 22 dates between 13 August and 27 November, and peaks of eight on 27 September, six on 27 October and 17 on 28 October, which included groups of five and six flying west. This was considerably quieter than an average year, in which birds are recorded on around 50 dates.

Jack Snipe *Lymnocryptes minimus.* A well represented passage visitor.
It was a relatively quiet season for this secretive wader with only seven records between 7 and 29 October. Inner Farne hosted individuals on four dates, mostly around Central Meadow Pond, while Brownsman produced two singles and North Wamses another.

Ruff *Philomachus pugnax.* A well represented passage visitor.
Records on nine autumn dates made this season one of the best in a decade for this passage wader. The first sighting involved two birds west across Staple Sound on 12 August, followed by an impressive five juveniles west over Inner Farne on 15 August. Single juveniles were then recorded on 19, 23 and 24 August, with Knoxes Reef holding 1-2 on 26, 30 and 31 August, three being present on 1 September.

Great Skua *Stercorarius skua*. A common passage visitor.
A quiet year with records listed in Table 6 occurring between 20 April and 22 November; the peak count was 10 birds north on 5 September. All other records involved counts of between one and four birds.

Table 6. Great and Arctic Skua records on the Farne Islands in 2015.

	April	May	June	July	Aug	Sept	Oct	Nov
Great Skua - days recorded	1	2	3	5	4	10	5	1
Arctic Skua – days recorded	-	1	1	4	5	16	3	2

Arctic Skua *S. parasiticus*. A common passage visitor.
Birds were recorded between 6 May and 22 November (Table 6), with peak counts of eight and 14 birds north on 6 and 7 September respectively. All other records were of between one and six birds, the vast majority adults, with the first juvenile of the season seen on 19 September.

Long-tailed Skua *S. longicaudus*. An uncommon passage visitor.
After a blank showing in 2014, this season produced a single record, unusually in late spring, when a sub-adult bird flew north through Staple Sound on 26 June, having first been seen passing Newbiggin-by-the-Sea further south.

Pomarine Skua *S. ponmarinus*. A well represented passage visitor, common in some years.
A very quiet year, with the first of the season not recorded until 10 October, when an adult and juvenile flew north through Inner Sound. A productive spell of seawatching in late November produced an adult south through Inner Sound on 22 November, with three birds through Staple Sound the following day (two north, one south) including an immaculate full 'spooned' adult.

Black-headed Gull *Chroicocephalus ridibundus*. A well represented breeding species and common visitor.
The early spring roost of birds on Knoxes Reef produced counts of 1,300 birds on 14 April, 1,250 on 15 April and 1,280 on 20 April. In the breeding colony on Inner Farne, birds had settled down on nests by 24 March; the first eggs were found on 26 April and the first chicks on 29 May. A total of 475 (486.6) pairs nested, a decrease of 22% from last year. Birds were notably absent around the islands after the departure of breeding birds in early August, with most records coming from mid-September onwards, including 21 feeding around Knoxes Reef on 21 September, 60 feeding in Staple Sound on 15 October, 150 feeding in Inner Sound on 23 October and at least 80 roosting around Knoxes Reef on 12 November.

Bonaparte's Gull *C. philadelphia*. An extremely rare visitor.
Although well known for re-visiting previous wintering grounds, this returning American vagrant still managed to surprise everyone, appearing with impeccable timing when it returned to Knoxes Reef on 23 November, exactly a year to the day from its 2014 discovery! It was later seen on the mainland at nearby Monks Pool, and was seen flying through the Kettle six days later but did not linger.

Little Gull *Hydrocoloeus minutus*. A well represented passage and winter visitor.
After the record showing last year, 2015 proved to be a quiet year with birds recorded on just six dates. An obliging summer-plumaged adult was watched at close range calling opposite the Inner Farne jetty on 7 May, with further summer records from Brownsman flats on 26 May, and another adult feeding off the south end of Inner Farne on 30 July. Autumn records (all adults) were from Inner Sound on 10 September, with singles flying north through Staple Sound on 28 September and 24 October.

Mediterranean Gull *Larus melanocephalus*. An uncommon passage and winter visitor.
Another reasonable showing of this once rare visitor started with a displaying pair of second-summer birds frequenting Inner Farne on 2 April. Hopes of a breeding attempt were short lived, with the last sighting of both birds on 5 April. Birds were then recorded on a further four dates, with an adult on Knoxes Reef on 10 April, a first-summer bird

over Staple Island on 12 June, an adult feeding in Inner Sound on 23 October and a second-winter bird around Knoxes Reef on 25 October.

Common Gull *L. canus*. *A* common visitor; bred in four years 1910–1914 and possibly in 1916 with attempted breeding in 1974.
A late start by the Ranger team meant that only low numbers were recorded from the Knoxes Reef roost, with peaks of 36 on 14 April and 35 on 20 April. Birds were recorded in smaller numbers during the autumn, mostly in October, with a peak of 19 around Knoxes Reef on 24 October.

Lesser Black-backed Gull *L. fuscus*. A common breeding summer and passage visitor.
This year a full census and monitoring of breeding pairs was not possible. The first eggs were found on 14 May and the first chicks seen a few weeks later with fledglings around from late summer. Birds quickly dispersed from the islands after the departure of fledged juveniles, with the only notable autumn count being 53 birds roosting on Knoxes Reef on 31 August.

Herring Gull *L. argentatus*. A common breeding species, abundant winter and passage visitor.
As with Lesser Black-backed Gulls, the breeding population was not counted or monitored. Good numbers of fledged birds were seen on the wing around the colonies throughout the summer, indicating successful breeding. As usual, large numbers were present around the islands in autumn, with several thousand birds roosting around Knoxes Reef and the Wideopens; as an example, 930 birds were counted flying in to roost at dusk within a period of 10 minutes on 28 November.

Greater Black-backed Gull *L. marinus*. An uncommon breeder, common winter and passage visitor.
These gulls had an excellent breeding season, and a total of 20 (13.4) pairs nested as follows: West Wideopens 1(1.6), East Wideopens 5 (2.2), Knoxes Reef 0 (0.8), Staple 2 (1.0), Brownsman 1 (2), North Wamses 5 (1.8), South Wamses 3 (2.2), Big Harcar 3 (0.6), and Longstone End 0 (0.2). Good numbers of fledged birds were noted around the islands in late July and August, and as usual the local Feral Pigeon population and the odd adult Puffin provided a food supply. Records of roosting birds from around Knoxes Reef included 25 on 15 August, 87 on 24 October and 47 on 12 November. The peak count was on 26 October when at least 210 were observed around the outermost group of islands; many of these birds were taking advantage of the afterbirth provided by newly born seal pups.

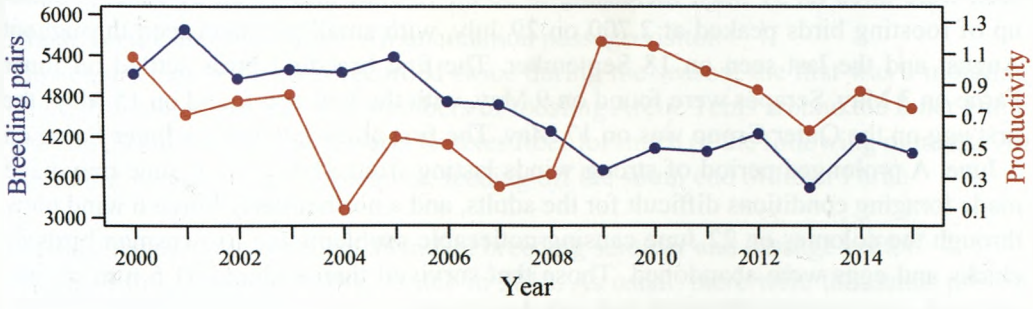
Glaucous Gull *L. hyperboreus*. An uncommon passage and winter visitor.
After a notable absence last year there was a good spring passage involving a minimum of two individuals, recorded on seven dates from the roost around Knoxes Reef. The first involved a faded first-winter bird, initially seen on 15 April, with a new second-winter bird seen in the roost the following day. First-winter birds were then recorded in

the roost on 17 and 29 April and 3 May, with the same second-winter bird seen again on 20 April, along with what was almost certainly a different second-winter bird seen briefly in the Kettle the same afternoon before flying off north.

Iceland Gull *L. glaucoides*. An uncommon winter and passage visitor.
A first-winter bird was seen on 22 March in Inner Sound feeding around the harbour entrance, later followed by a second first-winter bird that same evening, flying north through Staple Sound.

Kittiwake *Rissa tridactyla.* An abundant breeder and passage visitor, well represented in winter.
After the excellent season last year with a 21% increase in the population, the number of pairs has remained relatively stable in 2015 (Figure 3). The first eggs were recorded on 8 May, with the first chick on 26 May and the first fledgling seen around Lighthouse Cliff on 28 June. This year 3,956 (3,972) pairs nested as follows: Inner Farne 1,299 (1,253.2), West Wideopens 198 (189), East Wideopens 215 (228.4), Megstone 0 (1.4), Skeney Scar 131 (140.8), Staple 907 (1,008.8), Brownsman 1,101 (1,056.2), North Wamses 29 (27.6), South Wamses 0 (9.6), Roddam and Green 12 (10.2) and Big Harcar 64 (46.8). The Rangers monitored a record 723 nests which produced 545 chicks, giving a below-average productivity of 0.75 (0.9). The heavy rains of 2-3 July washed a number of nests clean off the cliffs. During the summer, a build-up of roosting birds on the Brownsman flats included 1,350 on 1 June, peaking at 1,700 on 25 June. Autumn passage was largely unspectacular, with notable counts of 640 north through Staple Sound between 06:40-08:10 on 15 August, 112 south through Staple Sound in just over one hour on 9 November and an all-day count of 2,210 north on 22 November.

Figure. 3. Kittiwake breeding pairs and productivity 2000-2015.



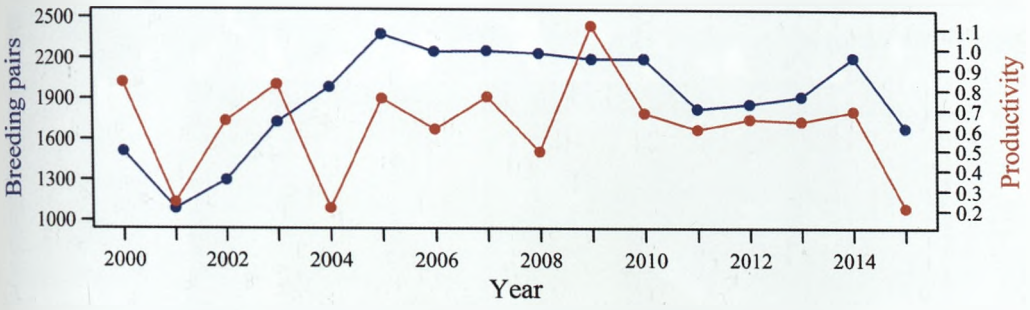
Little Tern *Sternula albifrons.* A well represented passage visitor.
The first of the year was an early individual, seen in the roost along Ladies Path on 14 April, the earliest record by eight days. A single bird was seen in the roost on 25 April, with numbers rapidly building at the end of the month, rising from eight birds on 30 April to 22 on 1 May, with 50 on 3 May and a peak count of 68 birds on 6 May. Numbers then gradually decreased, with 50 on 9 May falling to 29 on 16 May, and the final two birds of the season seen on 29 May.

Sandwich Tern *Sterna sandvicensis.* A breeding summer and passage visitor.
The first of the year arrived on Knoxes Reef on 26 March with the roost peaking at 800 birds on 7 May. Courting was first observed on 17 April with birds seen settling on Central Meadow for the first time on 27 April. In total 750 (862.4) pairs bred on Central Meadow on Inner Farne, contrasting with the previous year when they were split between Top Meadow and Central Meadow. This total represents a 21.79% decrease on last year and was the second lowest count since records began (the lowest was in 2011 when the population crashed to 544 pairs from 1,019 in 2009). The first egg was seen on 14 May, chicks appeared on time a month later and subsequently fledglings were seen gathering on 10 July. After the departure of breeding birds by 31 July, small numbers were recorded from early September, with a peak of 25 on 2 September, and 12 birds were still present on 17 September. The final record was of a late bird feeding in Inner Sound on 22 November.

Common Tern *S. hirundo.* A breeding summer and passage visitor.
Pairs were displaying back on Central Meadow on 1 May with the first eggs found in mid-May. 98 (96.2) pairs nested on Inner Farne compared with 88 the previous year. Fledglings were first noted on 10 July. After breeding, birds remained around the islands in small numbers throughout August and September with almost daily counts of 6–14 before suddenly building to 215 seen on 16 September feeding around Knoxes Reef at high tide. Numbers remained high for the following three days, with 100 still feeding off the Wideopens on 19 September, before the last record of nine birds on 30 September.

Arctic Tern *S. paradisaea.* An abundant breeding summer and passage visitor.
As with the previous two years, the first bird was seen on 13 April with 65 in the roost on 24 April increasing to 280 on 28 April and 750 on 29 April. The peak roost counts were in early May with 4,300 on 7 May and 4,500 on 9 May; the first first-summer birds seen were three on 31 May, increasing to 30 on 13 June and 43 on 21 June. A build-up of roosting birds peaked at 2,700 on 29 July, with small numbers seen throughout August and the last seen on 18 September. The first breeding birds settled on Inner Farne on 3 May. Scrapes were found on 9 May, with the first egg found on 15 May; the first egg on the Outer Group was on 17 May. The first chick hatched on Inner Farne on 5 June. A prolonged period of strong winds lasting from 31 May to 6 June may have made foraging conditions difficult for the adults, and a northeasterly Force 6 wind blew through the colonies on 22 June causing noticeable problems for Brownsman birds as chicks and eggs were abandoned. Those that survived then endured 31.5 mm of rain over 2-3 July, causing flooding and egg and chick mortality for most that were left. The effects of weather coupled with predation on the Brownsman colony resulted in a productivity of just 0.07 with only 36 chicks fledged. The Inner Farne colony fared slightly better with a productivity of 0.28 and 238 chicks fledged. Overall productivity was 0.21 (0.65) and the number of breeding pairs fell by 24% from last year's figure to 1,688 (2,005.8) (Figure 4). The distribution of nesting birds was as follows: Inner Farne 1,166 (1,237.2), Staple 0 (9) and Brownsman 522 (759.6).

Figure. 4. Arctic Tern breeding pairs and productivity 2000-2015.



Roseate Tern *S. dougalli.* A well-represented summer and passage visitor, uncommon breeder.

The first of the year was seen on 16 May with up to four birds recorded from Inner Farne during May. Subsequent records mainly relate to a pair which attempted to breed on Inner Farne; what were presumably the same birds were observed briefly nest scraping outside Brownsman Cottage on 11 June. On Inner Farne, possibly the same pair began to create a nest scrape on Ladies Path on 14 June; the following day the female was seen sitting tight and being brought food by the male. They were last seen on the nest at 09:30 on 22 June, and until then had been defending their nest from Arctic Terns and any Rabbits that strayed too close. Although the nest was probably predated, this represents the first breeding attempt since 2009. The first juvenile, probably from Coquet Island, was seen on 30 July, though unlike previous years a substantial evening roost of birds failed to materialise with a peak of only eight adults and seven juveniles on 31 July, when a first-summer bird was also seen. The highest count of the year came with the build-up of Common Terns on 18 September, when 12 adults and seven juveniles were recorded around Knoxes Reef, with the final record of two birds the following day.

Black Tern *Chlidonias niger* An uncommon passage visitor.

This dainty marsh tern was recorded twice during the season; the first was a moulting adult, discovered among large numbers of roosting Arctic Terns around the Inner Farne jetty on 29 July, remaining around Knoxes Reef for much of the following morning. An adult bird was seen on 3 September, feeding off the south end of Inner Farne.

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

The next full census of Puffins is due in 2018. As usual, there were thousands present on the water when the Rangers returned to the islands in mid-March and they were first noted on land in big numbers on 25 March. The first egg was found on 15 May and they were first seen bringing sandeels to burrows on 28 May. The first fledgling was found by a visitor on the boardwalk on 6 July and that night they were observed leaving burrows under the cover of darkness. Productivity estimates are based on 100 monitored burrows and was 0.46 (0.9) chicks per pair. We believe that the relatively poor productivity was largely a result of some torrential downpours, in particular over 2-3 July, when 31.5 mm of rain fell and flooded burrows across the islands. After the downpours, many dead Puffin chicks were found outside burrows on Brownsman and Staple. Once young birds

had departed the nest, small numbers (generally single birds) were observed either on the sea or flying past the islands, with sightings becoming notably scarcer from mid-September.

Puffins on the Farnes © Lana Blakely.

Black Guillemot *Cepphus grylle*. A well represented winter and passage visitor; bred in the 17th and possibly the 18th centuries.
A notably quiet season, partly due to a limited coverage of the Outer Group in late November when birds would normally be present around the islands. The only records involved an adult off the north rocks of Inner Farne on 28 June and a winter-plumaged adult north through Staple Sound on 10 November, which then landed on the sea.

Guillemot *Uria aalge*. An abundant breeding resident and passage visitor.
Guillemot is fast on its way to becoming the most numerous breeder on the islands, now numbering 35,820 pairs, a 3% increase on last year and a massive 2,555% increase since records began in 1971. Birds were back on the cliffs in their thousands as the Rangers arrived in mid-March, and the first egg was seen on Lighthouse Cliff on 19 April. The first chick was recorded on 23 May and the first 'jumpling' was seen leaving the cliffs of Staple on 9 June, six days earlier than last year. A total of 53,461 (49,067.8) individuals (representing an estimated 35,820 pairs) were counted as follows: Inner Farne 8,509 (6,899.8), West Wideopens 2,553 (2,185), East Wideopens 2,758 (2,941.8), Megstone 0 (290), Skeney Scar 2,500 (2,251.6), Staple 23,507 (23,100.2), Brownsman 10,948 (8,735.8), North Wamses 1,580 (1,542.4), South Wamses 516 (553.2), Roddam and Green 160 (135) and Big Harcar 430 (433). Wintering birds started to become more evident, lingering around the islands, from early September and included 52 birds north through Inner Sound on 5 September, though the largest movements came with northerly winds in late November; at least 500 past the islands on 22 November.

Guillemot colony on the Farnes © Chris Lockyer.

Razorbill *Alca torda*. A common breeding resident and passage visitor.
Birds were present on the islands upon our arrival in mid-March. Breeding pairs had decreased to 476 (427), down 5% from 501 in 2014, and were distributed as follows: Inner Farne 247 (190.6), West Wideopens 59 (84.2), East Wideopens 29 (23), Skeney Scar 16 (14.4), Staple 71 (47.4), Brownsman 17 (16.2), North Wamses 3 (11.6), South Wamses 12 (18.8), Big Harcar 21 (19.2), Roddam and Green 0 (0.8) and Longstone End 1 (0.8). The first egg was found on 4 May and the first chick on 4 June on West Wideopens. Of 28 monitored nests, 24 chicks hatched with 17 fledging. Productivity on the Outer Group of islands was slightly lower with 0.59 compared with 0.64 on the Inner Group. Overall at 0.61, productivity was slightly lower than the mean for the last five years of 0.65. As with breeding Puffins, small numbers were found feeding around the islands once breeding birds had departed including at least 15 in Staple Sound on 3 September.

Little Auk *Alle alle.* A well represented winter and passage visitor.
The first records of the season were on 12 November, when five birds (two singles and a group of three) passed north through Staple Sound. Strong northerly winds on 21 November produced the largest movement of the season, when 602 were counted moving north between 08:46–16:15, mostly through Staple Sound. Numbers had dropped by the following day, when 301 passed north, after which small numbers were seen on a daily basis, either flying north or resting on the sea, until the Rangers departed on 3 December.

Feral Pigeon *Columba livia.* A well represented breeder.
A stable population of Feral Pigeon breeds on the islands, providing a good food source for visiting falcons and breeding gulls.

Woodpigeon *C. palumbus*. An uncommon passage visitor.
Birds were recorded on four dates, all in spring, with singles on Inner Farne on 16 and 29 April. Subsequent records were from Inner Farne on 8 May and Brownsman on 16 May.

Collared Dove *Streptopelia decaocto*. An uncommon passage visitor.
A species that remains scarce on the islands produced two records, with one on Brownsman on 3 May and another on Inner Farne on 17 May.

Cuckoo *Cuculus canorus*. An uncommon passage visitor.
A juvenile on Brownsman, first seen on 23 August flying in from the north to land in the sticks outside the Cottage, was joined by a second bird the next day when both were seen together in the early morning. One then lingered around the island until 30 August, and was frequently seen gorging on the plentiful supply of caterpillars.

Long-eared Owl *Asio otus*. An uncommon passage visitor.
After a blank year in 2014, the 2015 season fared little better; the only record was a bird on 31 August, flushed from the Brownsman sticks before moving out west over Staple Sound.

Short-eared Owl *A. flammeus*. An uncommon passage visitor.
An excellent showing, with birds recorded on a total of 12 dates during the season, consisting of a minimum of 35 individuals. May produced the first record, with one circling Inner Farne before moving off west on 24 May, followed by an unseasonal bird on 12 July passing west over the Outer Group. The start of a good run of records began on 13 October, with a single over Inner Farne followed by multiple sightings on 14 October; a combined day count of 11 birds recorded from the Inner and Outer Group on 16 October surpassed the previous highest day count of eight birds in 2011. Six birds were watched moving west past Brownsman Cottage on 29 October, with the last record involving two seen together on West Wideopens on 15 November.

Short-eared Owl on the Farnes © Tom Hibbert

Swift *Apus apus*. A well represented summer and passage visitor.
An outstanding season for this species on the Farnes with records on 14 dates, with heavy passage in late August substantially overtaking the previous third highest day count for the islands. The first sighting, of a single bird, was from Inner Farne on 12 June, with 10 south over Staple on 28 June, and a group of 12 again south over Staple the next day. A late afternoon surge of 281 birds on 26 August, 224 of which were recorded moving southwest over Inner Farne in the space of an hour, was eclipsed the following day, with 424 moving southwest over Staple Sound and the Inner Group throughout the day. Smaller numbers were recorded over the next two days, with 41 west on 28 August, and 106 birds west on 29 August; the last record was a very late bird feeding over Inner Farne on the evening of 1 November.

Wryneck *Jynx torquilla*. Uncommon passage visitor.
This season produced three sightings, all from the Inner Group, during a favourable spell for scarce drift migrants, with the first seen briefly, skulking in the Inner Farne vegetable garden on 14 August. One was seen the following day and then on 19 August one was flushed on West Wideopens.

Skylark *Alauda arvensis*. A common passage visitor.
A quiet spring produced records on four dates, all of single birds, except for two on Inner Farne on 5 May. The first autumn record was on 19 September, with small numbers then recorded throughout the month, increasing during October with peak counts of eight west over Inner Farne on 15 October, 20 north (13 Staple Sound, 7 Inner Sound) on 19 October, 13 west over Brownsman on 28 October and 12 east over Inner Farne on 1 November.

Sand Martin *Riparia riparia*. A well represented summer and passage visitor.
Spring produced just two records, with two birds north through Inner Sound on 15 April and another two north on 20 May.

Swallow *Hirundo rustica*. A common summer and passage visitor. Scarce breeder.
There was very little in the way of passage during the spring and the majority of records refer to breeding birds. After the first spring bird on 15 April, two were inspecting the chapel on 22 April and one was collecting mud on 4 May. A record 10 (4) pairs nested, compared with six the previous year, as follows: Inner Farne 5 (1), Brownsman 3 (0.4), Staple 0 (0.2) and Longstone 2 (2.4). Multiple second broods were noted during the season. Buildings used included the Fishe House, Pump House, Information Centre, St Cuthbert's Chapel and the Carbide Store. Breeding birds remained throughout July and into August, with 18 birds around Inner Farne on 22 August, and small numbers throughout September with the last bird recorded on 3 October.

House Martin *Delichon urbicum*. A well represented summer and passage visitor. Six pairs attempted to breed in 1950.
Birds were recorded on five spring and four autumn dates, with the first of the year north

past Inner Farne on 16 April. All records thereafter concerned single birds, except for five north over Staple on 22 May and six north through Inner Sound on 30 May. The final record was of three over Inner Farne on 13 September.

Richard's Pipit *Anthus richardi.* A scarce visitor.
After a blank year in 2014, this season produced two records of this robust Asian pipit: the first flew west over Inner Farne on 27 September, alighting briefly in Central Meadow, but could not be found again despite a thorough search. The second, equally brief sighting was of an individual found the following day on Brownsman, first seen flying in from the direction of Longstone, where it landed on the east rocks, before flying off and later returning to land behind the pond.

Rock Pipit *A. petrosus*. A common resident, well represented as a breeding species.
Most records relate to the breeding population. Birds were present upon the Rangers' arrival on the islands in mid-March and breeding displays were noted on 23 March with evidence of nest construction on 24 April. A total of 17 (24.8) pairs bred this year, a decrease from the 28 pairs last year, as follows: Inner Farne 6 (5.6), West Wideopens 1 (2), East Wideopens 0 (1), Staple 2 (3.8), Brownsman 5 (8.8), North Wamses 1 (0.8), South Wamses 2 (0.8), Longstone Main 0 (1) and Longstone End 0 (1). Fledglings were first seen on 29 May around Lighthouse Cliff. Evidence of autumn passage was recorded in late October, with five west over Inner Farne on 25 October, and nine west over Brownsman on 26 October during a period of notable thrush passage.

Meadow Pipit *A. pratensis*. A common passage visitor. Rare historic breeder.
Spring passage produced counts from Inner Farne (all of birds moving north) of 16 on 26 March, 32 on 4 April, 28 on 7 April, and 72 on 16 April. The last of the spring was recorded from Brownsman on 3 May. The first autumn birds were seen on 6 September, when five passed southwest over Inner Farne, with another six birds on the island. Passage thereafter was light, with the exception of 64 birds south over Brownsman on 13 September, and 23 south over Inner Farne the same morning. Small numbers were recorded in October, with a peak of 22 on Brownsman on 6 October, and the final record consisting of five heading west over Inner Farne on 15 November.

Tree Pipit *A. trivialis.* A common passage visitor.
As with many of the summer migrants this year, spring produced a paucity of records, with two birds on 3 May (one Inner Farne, one Brownsman) and a single on Inner Farne from 4-6 May being the only sightings. Autumn birds were recorded on 12 days, all relating to singles except for two on Brownsman on 19 August, with three birds present there on 23 August and two over Inner Farne on 27 August. The final record was from Inner Farne on 6 October.

Pied Wagtail *Motacilla alba yarrelli.* A well represented summer and passage visitor and uncommon breeding species.
As well as breeding birds present on the islands, signs of spring passage were recorded,

all from Inner Farne, with six birds west on 26 March, 14 north on 7 April, and five north on 16 April. The breeding population increased to a record 9 (6.2) pairs. The first evidence of nest construction was on 18 April and the first fledged young were on Inner Farne on 6 May from a nest box in the Lighthouse compound. Pairs in the Lighthouse compound and Courtyard on Inner Farne also started second broods. The nine pairs nested as follows: Inner Farne 5 (2.6), West Wideopens 1 (0.2), Staple 1 (1), Brownsman 2 (1.4) and Longstone 0 (1). The usual post-breeding increase was noted from Inner Farne during late August, with a peak count of 32 birds on 28 August. The species became notably scarce during the autumn, the final records being a single on Inner Farne on 10 October and two present the following day.

Yellow Wagtail *M. flava flavissima*. An uncommon passage visitor.
After a blank spring, the autumn produced records on just two days, with two birds on Longstone and a single on Brownsman on 11 September. The bird on Brownsman was seen again the following day, when a single bird was also seen on Inner Farne.

Grey Wagtail *M. cinerea*. An uncommon passage visitor. May have bred in the 1980s.
The autumn produced records on five dates, mostly from Inner Farne, where the first of the season passed overhead on 29 September. Three birds were around the Inner Farne Quarry on 5 October with one remaining until the next day, when another bird was also seen on Brownsman. The last records were from Inner Farne, where two birds were seen on 7-8 October.

Dunnock *Prunella modularis*. A common passage visitor. May have bred in the 1980s.
A quiet spring produced a single on Inner Farne on 24 April, with all other single records coming from Brownsman where two were present on 14 May. Most records during the autumn related to single birds, with the first on 26 September. Three birds were recorded on Inner Farne on 4 October and 1 November, with four across the islands on 19 October and two were still present on Inner Farne at the time of the Rangers' departure.

Robin *Erithacas rubecula*. A common passage visitor. Bred in 1951.
A late start to the season meant that only low numbers were recorded during the peak migration period of March and early April, with eight birds on Inner Farne on 23 March being the highest count. The last of the spring was recorded from Inner Farne on 19 May, with the first of the autumn on 8 August; birds were then recorded on a near daily basis from 4 September with the peak count of 14 across the islands on 11 October. As usual, birds remained to winter on the Inner Group, with four still present on Inner Farne on 2 December.

Thrush Nightingale *Luscinia luscinia*. An extremely rare visitor.
The undisputed passerine of the year was discovered in the Brownsman vegetable garden on 15 August, where it gave close views to a stunned observer trying to relocate a Red-backed Shrike seen a few minutes before. After brief initial views it was trapped and ringed later that evening, when it was easily aged in the hand as a first-year bird. It

was still present the following day, being seen in flight around the Cottage sticks. This was the tenth record for Northumberland, with three now having been found on the Farnes, the previous two occurring in 2010 (14 August) and 2002 (8 May).

Redstart *Phoenicurus phoenicurus*. A common passage visitor.
Birds were recorded on seven spring dates, with three on Inner Farne on 5 May increasing to four the next day, the last spring record being a late bird trapped and ringed on Inner Farne on 24 May. The first of the autumn appeared on Brownsman on 19 August, with birds recorded on a further 12 dates, the peak count being of 10 birds (six Brownsman, four Inner Farne) on 12 September. Two on Inner Farne on 7 October were the last records for the season.

Black Redstart *P. ochruros*. A well represented passage visitor.
The first was from the Inner Farne Lighthouse on the unseasonal date of 28 June. More typical autumn records began with a single on Brownsman on 26 October, where four were present on 28 October as well as a single on Inner Farne. All remained until the following day, when two were on Inner Farne; singles were then recorded on a daily basis until 4 November, with the last of the Brownsman birds seen on 30 October. The final record was from Inner Farne, where a new bird was present on 8 November.

Wheatear *Oenanthe oenanthe*. A common passage visitor. Bred in six years 1931-1959.
A quiet spring, with birds recorded on 30 dates between 10 April and 2 June, all of single figure counts; the peak of just five birds was on Inner Farne on 3 and 6 May. Two recently fledged juvenile birds were seen on Staple Island on 9 July, with the first returning migrant bird appearing on Inner Farne on 12 August. Autumn passage was light, with the exception of 26 birds which dropped into Inner Farne during late afternoon on 1 September; other notable counts were of 22 birds across the islands on 11-12 September. Five were recorded on 11 October, and the final record was a single on Inner Farne on 21 October.

Whinchat *Saxicola rubetra*. A common passage visitor.
Females on Inner Farne on 5 May and Brownsman on 12-13 May were the only records for the spring, while a recently fledged juvenile was seen on Staple Island on 24 July. Autumn passage began on 14 August, with records on a further 22 dates, the last on 5 October. The peak count was of seven birds (four Inner Farne, three Brownsman) on 24 August.

Stonechat *S. torquatus*. An uncommon passage visitor. Bred in 1946.
Records have become notably scarce since the cold winter of 2010 so it was a welcome surprise to discover a female on 23 March, favouring the Central Meadow of Inner Farne.

Song Thrush *Turdus philomelos*. A common visitor; extremely rare breeder.
There were spring records of single birds from Inner Farne on three dates before the first autumn birds appeared on 10 September, with the main passage from 6 October

and consecutive day counts of 54, 38, and 26 birds, all from Brownsman, where most were counted moving west. Small numbers were recorded from Inner Farne during this period, with a peak of 20 on 7 October; small numbers were recorded across the islands throughout October, with notable peaks of 88 from Brownsman and 29 from Inner Farne on 11 October, and 60 birds west over Brownsman on 28 October. Birds were still present at the time of departure, with three on Inner Farne on 2 December.

Redwing *T. iliacus.* An abundant passage visitor.
The only record for the spring was of nine birds west over Inner Farne on 23 March. The first bird of the autumn was from Inner Farne on 30 September. Peak autumn counts (Table 7) coincided with northeasterly winds on 26 October when 1,197 were counted moving west throughout the day over Brownsman. Frequent thick fog and drizzle on October 28 brought a further 1,119, many of which alighted around the Cottage, before continuing west across Staple Sound. Small numbers were recorded until the end of the season with the last double figure count of 44 birds west over Inner Farne on 15 November.

Table 7. Autumn Redwing migration 2015.

Date	5/10	6/10	7/10	11/10	16/10	26/10	27/10	28/10	5/11
Brownsman	60	48	34	100	276	1,197	322	1,119	60
Inner Farne	65	60	17	374	22			145	40

Fieldfare *T. pilaris.* A common passage visitor.
Spring records were from Inner Farne on 19 April with two on 5 May, and an early autumn bird seen on 14 August; singles were then recorded on six dates, before the peak count of 1,321 which passed over Brownsman on 26 October. Birds were recorded on a further 19 dates, with peak counts being mostly of birds moving west over the islands (Table 8).

Table 8. Autumn Fieldfare migration 2015.

Date	26/10	27/10	28/10	29/10	4/11	5/11	15/11
Brownsman	1,321	166	825	80	15	380	
Inner Farne			14	11	525	200	63

Blackbird *T. merula.* An abundant passage visitor; bred in the 1880s, 1893-1914, 1934, 1962 and 1964-1974.
A light spring passage peaked at nine birds on Inner Farne on 20 March, with the last of the spring seen on 5 May. Two fresh juveniles arrived on Inner Farne on 19 June, before the first of the autumn appeared on 5 October. Subsequent passage was light, with a notable peak of 310 west over Brownsman on 28 October. At least 150 were recorded from Brownsman the following day, while 48 were counted leaving Inner Farne at dusk on 5 November. Birds were recorded in single figures thereafter, apart from 93 west over Inner Farne on 20 November as the last movement of the season.

Ring Ouzel *T. torquatus.* An uncommon passage visitor.
A quiet season, with just one spring record of a male on Inner Farne on 5 May. Autumn produced records on four dates, all from Brownsman, where two birds were present on 5 October, increasing to three the following day and then back down to two on 8 October. The last record was on 28 October, when two flew west over Brownsman as part of a significant thrush passage.

Barred Warbler *Sylvia nisoria.* An uncommon passage visitor.
This classic east-coast drift migrant put in two appearances during the season, the first being found in the Brownsman vegetable garden late on 14 August. The same garden also played host to the second individual, found in early morning on 28 September.

Garden Warbler *S. borin.* A common passage visitor.
A poor spring total of just four birds, with a peak count of two on 3 May. The first of the autumn arrived on 19 August (singles on both Inner Farne and Brownsman) with three on Brownsman the following day. Birds were then recorded on a further 13 dates with a peak count of five on 13 September, and the last on Brownsman on 2 October.

Blackcap *S. atricapilla.* A common passage visitor.
The quiet spring produced birds on only 10 dates, with peaks of three recorded on 29 April and 3 May. An equally quiet autumn for this species brought birds on 25 dates from 24 August to 3 November, the only double figure count being on 11 October when 11 were recorded across the islands.

Whitethroat *S. communis*. A common passage visitor.
Spring produced birds on 11 dates from 24 April to 9 May, all of singles except for three birds on Inner Farne on 5 May. Like the spring, autumn produced almost exclusively single birds, the first seen on 13 August, with singles on both Inner Farne and Brownsman on 24 August the only multiple occurrence. The final record was from Brownsman on 17 September.

Lesser Whitethroat *S. curruca.* A common passage visitor.
The first spring bird was on Brownsman on 3 May, followed by two which arrived on Inner Farne during a small fall of migrants on 5 May; one of these birds lingered until 9 May. Autumn records from Brownsman on 24 August and 14 September gave a combined total for the year of just five birds.

Sedge Warbler *Acrocephalus schoenobaenus.* A well represented passage visitor.
Another species which made the slimmest of appearances, with spring records from Inner Farne on 3 May and from Brownsman on 13 May where another was present on 4-5 June. The sole autumn record was from Inner Farne on 27 August.

Grasshopper Warbler *Locustella naevia.* A well represented passage visitor.
After just two appearances in 2014, only one was found in 2015, flushed on Brownsman on 24 August.

Reed Warbler *Acrocephalus scirpaceus.* A well represented passage visitor.
Despite the lack of spring records, overall a slight improvement on the quiet 2014 season with birds recorded on eight autumn dates, all involving singles except for two on Inner Farne on 24 August.

Marsh Warbler *A. palustris.* A scarce visitor.
One was feeding alongside a Reed Warbler on Inner Farne on 28 August. It showed well enough for observers to be as confident as they could be about the identification in the field, however given the difficulty in separating young Marsh and Reed Warblers in the autumn, it was trapped for identification on biometric criteria, which confirmed it as the Farnes' twelfth Marsh Warbler, the first for Inner Farne and also the first autumn record for the islands as a whole.

Icterine Warbler *Hippolais icterina.* An uncommon passage visitor.
After a blank year in 2014, the islands produced records of two individuals. The first frequented the Inner Farne vegetable garden on 19-20 August and was trapped and ringed on its first day. The second was found outside Brownsman Cottage on 24 August, where it gave excellent views.

Icterine Warbler, ringed on the Farnes © Ed Tooth.

Willow Warbler *Phylloscupus trochilus*. A common passage visitor.
The first birds of the year appeared on Inner Farne on 14 April with peak counts of at least 10 on Inner Farne on 5 May, and of seven birds there on 25 April. Birds were recorded on most days up to 11 May, with the last of the spring on Brownsman on 6 June. Autumn migrants were first seen on 6 August, peaking at 18 on 24 August, after which all records came in single figures, with the final sighting being of a late bird which lingered on Brownsman until 19 October.

Chiffchaff *P. collybita.* A common passage visitor.
The first of the year was found on 11 April; most subsequent records were of just two or three birds, with singles on Brownsman and Longstone on 16 June being the last of the spring. Autumn birds were recorded on 7 and 10 August, and again on 7 September, before the main autumn arrival on 3 October, with birds recorded most days until 2 December. Peak autumn counts were all in October, with 14 on 12 October, 17 on 13 October and 10 on 14 October.

Yellow-browed Warbler *P. inornatus.* An uncommon passage visitor.
The UK status of this Siberian sprite seems to be changing to that of regular migrant and good numbers were again seen on the islands in 2015. Two on 9 September were the earliest autumn records by two days, with birds then recorded on a further 12 dates, involving a minimum of 17 individuals. Seven were recorded on 4 October (four Brownsman, three Inner Farne) with three new birds on 11 October and the last of the season on Inner Farne on 18 October.

Dusky Warbler *P. fuscatus.* A rare visitor.
As last year, the islands played host to a skulking individual, found in vegetation around the Brownsman jetty on 16 October. Like the 2014 bird it remained for three days, moving up to the Cottage where it spent the rest of its time hiding within the surrounding nettles but giving away its presence through its distinctive call.

Goldcrest *Regulus regulus.* A common passage visitor.
Birds were recorded on eight spring dates between 20 March and 24 April, all involving singles, except for two on 23 March. Autumn passage commenced on 9 September with peak numbers in two waves between 6-8 October and again from 11-18 October (Table 9). An additional 32 birds were recorded across the islands on 11 October giving a combined peak count of 74, several of which were seen to fall victim to hunting Kestrels.

Table 9. Autumn Goldcrest passage 2015.

October date	6	7	11	12	14	16	17	18
Inner Farne	15	11	26	17	9	30 – 40	26	12
Brownsman	8	10	16	12	15	17	6	3

Wren *Troglodytes troglodytes.* A common visitor and passage migrant; a rare breeder.
Spring records comprised mainly wintering birds that had lingered on the islands, with four still present on Inner Farne on 20 March but increasing to five on 6 April. The last of the spring was on Inner Farne on 11 May. In autumn the first seen was on 26 August and the peak count was 11 on 9 November; seven were still present on Inner Farne at the time of leaving on 2 December.

Waxwing *Bombycilla garrulous*. An uncommon winter and passage visitor.
A poor year with only a single seen flying over the Outer Group on 26 November.

Spotted Flycatcher *Muscicapa striata.* A well represented passage visitor.
Having gone through the whole of May without a single record, two birds appeared around the Brownsman pond on 13 June. Autumn birds were recorded on nine dates between 18 August and 12 September, with a peak count of three on 11 September.

Red-breasted Flycatcher *Ficedula parva.* An uncommon passage visitor.
Another good showing this year, with three discovered during the autumn. The first was an obliging first-winter bird which favoured the Hemlock clump at the top of the Inner Farne beach from 11-13 September. The other two were both brief visitors, with one on the cliffs above the Brownsman jetty on 17 September and the third found before dusk around the edge of the Inner Farne boardwalk on 3 October.

Red-breasted Flycatcher on the Farnes © Tom Hibbert.

Pied Flycatcher *F. hypoleuca.* An uncommon passage visitor.
Given that good numbers were recorded elsewhere on the east coast it was a quiet season, beginning with a single spring record from Inner Farne on 5 May. Autumn birds were recorded on 12 dates, with a peak of five on 12 September; a count of just three birds on the islands on 24 August was in marked contrast to the 230 recorded at Spurn in Humberside on the same day.

Red-backed Shrike *Lanius collurio.* An uncommon passage visitor.
The autumn produced two records, both from Brownsman, with the first bird spending all of 10 seconds in the vegetable garden on 15 August before flying off. The second, more obliging individual was found on 23 August and stayed until the following day.

Jackdaw *Corvus monedula*. A well represented visitor; former breeder, last in 1966.
All but one record came during the spring, where birds were seen on eight dates, and included a pair which lingered on Inner Farne from 17-21 April, frequently inspecting the Chapel roof. Four were recorded north over the Inner Group on 7 April and 14 April. The only autumn record was of two birds on Inner Farne on 27 September.

Carrion Crow *C. cor*one. A well represented visitor and rare breeding species.
Following the usual pattern, peak counts were during the beginning of the season, when birds were observed flying out from the mainland and over the islands, frequently returning west after reaching the Outer Group. Peak counts were 25 on 16 April, 18 on 20 April and 21 on 21 April. For the third year in a row a pair attempted to breed, but unlike the previous two seasons the nesting attempt was on West Wideopens rather than Brownsman Tower. Two eggs were discovered on 20 May but there was no further activity after this date.

Rook *C. frugilegus*. A well represented visitor.
Spring birds were recorded on six dates between 20 March and 16 April, all single birds except for three west on 20 March and four towards the Outer Group on 16 April. Autumn birds consisted of two west on 20 September, with another two west on 24 September, and finally three birds west over Brownsman on 17 October.

Starling *Sturnus vulgaris*. A common visitor; extremely rare breeder.
The first five birds of the year appeared on Inner Farne on 6 June and groups of post-breeding birds then maintained a regular presence on the islands throughout the summer, with frequent counts of 50-70 birds, and a peak of 97 on Inner Farne on 12 July. Numbers decreased during September, with small numbers noted among the passage of thrushes on 27-28 October and subsequent counts of 45 and 79 birds west over Brownsman.

Chaffinch *Fringilla coelebs*. A common passage visitor.
The only spring record came from Brownsman where two were seen on 3 May. Autumn produced birds on 13 dates between 10 October and 1 November, mostly singles but with a peak count of four on 11-12 October.

Brambling *F. montifringilla*. A common passage visitor.
A single on Inner Farne on 17 April was followed by a reasonable autumn showing of records on 23 dates between 27 September and 12 November; the peak count was of 148 birds moving west over Brownsman on 26 October (Table 10).

Table 10. October Brambling counts 2015.

October	5	6	7	11	26	27	28	29
Inner Farne	7	7	14	19			25	11
Brownsman	5	9	2		148	36	38	13

Linnet *Carduelis cannabina*. A common passage and winter visitor; bred in the 1890s. Spring records were notably scarce with a peak of 17 birds, recorded on two dates from Inner Farne. Autumn birds were recorded regularly from 27 September, mostly from the Inner Group, where there were frequent counts of 50-65 birds and a peak of 86 on 23 November.

Lesser Redpoll *C. cabaret*. An uncommon passage visitor.
Just three confirmed records with singles from Brownsman and Inner Farne on 12 October and another from Inner Farne on 14 November.

Common Redpoll *C. flammea*. An uncommon passage visitor.
A quiet season produced two single records, with one discovered on Big Harcar on 14 October and the second coming from Inner Farne on 2 November.

Redpoll spp.
Records mostly referred to flyover birds that could not be assigned to species. Autumn birds were recorded on six dates between 28 September and 7 November with a peak count of four over Inner Farne on 30 September.

Twite *C. flavirostris*. A well represented passage visitor.
Only seen in the last few days of the season: one appeared on 22 November and after flying past the Lighthouse Cliff alighted on the wire fence in front of those undertaking a memorable all-day seawatch. Two birds were seen with the Inner Farne Linnet flock on 2 December before flying off towards the mainland.

Goldfinch *C. carduelis*. A well represented passage visitor.
Birds were recorded on five spring and seven autumn dates, with peak counts of four birds on 16 April and 12 October. A slightly unseasonal bird was found dead outside Brownsman Cottage on 28 June.

Siskin *C. spinus*. A common passage visitor.
The first of the season finally came on 27 September, with a male in the Inner Farne vegetable garden; birds were then recorded on just three dates, involving one on Brownsman on 30 September, two west over Inner Farne on 4 October, and the last one south over Inner Farne on 19 October.

Crossbill *Loxia curvirostra*. An uncommon passage visitor.
After a blank showing in 2014 two juveniles flew west over Staple Island on 27 July; one of these was later found calling over the Chapel by the Inner Farne team before continuing southwest along the Dock Bank.

Reed Bunting *Emberiza schoeniclus*. A well represented passage visitor.
Spring records were all from Inner Farne, involving a singing male on 4, 12 and 18 April. Autumn birds were recorded on nine dates between 4 October and 11 November and included five birds on 7 October and four on 12 October.

Little Bunting *E. pusilla*. An uncommon passage visitor.
The islands' reputation for attracting this eastern vagrant was again upheld, with two records in October from both the Inner and Outer Group. One on Brownsman from 5-7 October gave excellent views, while the second was discovered on Inner Farne on 11 October.

Snow Bunting *Plectrophenax nivalis*. A well represented passage visitor.
The first autumn record involved three west over Brownsman on 27 October, followed by singles there on 30 October and 5 November. Six on 12 November included five flying south over Inner Farne; a single on 27 November was followed by the last record on 30 November, when an obliging individual was found on the Inner Farne jetty feeding on a moth.

Snow Bunting on the Farnes © Tom Hibbert.

Lapland Bunting *Calcarius lapponicus*. An uncommon passage visitor.
As with the previous season, the islands produced just one record of a single bird, initially seen in flight past the Brownsman Cottage, but which settled to feed and gave close views on the north rocks.

Ortolan Bunting *Emberiza hortulana*. An uncommon passage visitor.
A skulking individual, the second record in two years after a three-year absence, was discovered outside Brownsman Cottage on 23 August, minutes after a Red-backed Shrike. Though generally skulking, it allowed close views on some occasions.

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Farnes 2015 Team

GREY SEALS ON THE FARNE ISLANDS IN 2015

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The Farne Islands saw another bumper year for Grey Seal *Halichoerus grypus* pup production as numbers born continued to increase, reaching 1,876, an increase of over 700 in just 10 years and 136 more than in 2014. The season started on 18 September with two pups found on South Wamses. Unfortunately these did not survive the first 24 hours and were probably swept away by the large spring tides at the time. It was not until late October that pupping really got going, and as usual it rose rapidly, reaching a peak in late November. The Rangers had a slightly frustrating time maintaining the monitoring work, as the unsettled weather continued and meant that visits to the colonies were not as frequent as hoped. Seal monitoring was carried out using the standard procedure: at each visit (Table 1), newly born pups were counted and marked by spraying with a coloured dye; at the next visit, pups from previous visits were counted and new ones marked with a different colour. For the calculation of mortality statistics, the % mortality is a minimum value representing the % of those born that go missing before reaching the end of their 16-day minimum weaning period.

Continuing the trend of recent years, the proportion of the Farnes seals on Brownsman and Staple Island increased. For the two islands combined, the mean number of pups born over the last five years was 835; this year the combined total was 1,221, representing 65% of the total pup production on the islands, compared with 55% for last year. There also appears to be a shift away from the more traditional sites of North and South Wamses, where the five-year mean for pup production was 645 compared to just 489 this year. At the turn of the twenty-first century 1,032 pups were born on North and South Wamses while just 10 were born on Brownsman, with none on Staple. This change is already having adverse effects on soil erosion in important areas for Puffins *Fratercula arctica* on Brownsman and will have to be closely monitored and managed in years to come.

Also of note are the 147 pups born on the Inner Group this year. Pup production has historically been sparse to non-existent on the Inner Group, but numbers took off in 2012 (44) and have been increasing since then. The Inner Group, particularly Inner Farne and West Wideopens, offer a well sheltered place to pup, and it would not be surprising to see numbers increase there in future years.

Table 1. Individual Grey Seal pup counts by date and island in 2015.

	B'man	Staple	South Wamses	North Wamses	North Hares	Big Harcar	Longst	Knoxes	Wide-opens	Inner Farne	
18 Sep	0	0	2	0	0	0	0	0	0	0	
27 Sep	2	0	0	0	0	0	0	0	0	0	
14 Oct	0	0	2	4	0	0	0	0	0	0	
17 Oct	0	1	2	6	0	0	0	0	0	0	
20 Oct	0	4	4	7	0	0	0	0	0	0	
23 Oct	0	2	10	9	1	0	0	0	0	0	
1 Nov	43	72	76	51	1	0	1	0	0	0	
5-6 Nov	92	69	39	32	1	0	0	0	0	0	
11 Nov	104		43	37	2	0	1	2	1	0	
16-17 Nov	119	206	56	21		0		0	2	0	
25-26 Nov	187	139	58	30	9	3	0	19	33	0	
30 Nov	51	48						6	14	0	
14 Dec	57	25						22	27	21	**Total**
Total	**655**	**566**	**292**	**197**	**14**	**3**	**2**	**49**	**77**	**21**	**1,876**

N.B. Blank dates for certain islands indicate that landing was not possible that day because of poor weather.

MORTALITY

The bad weather that prevented the Rangers getting out to the colonies seemed to have a limited impact on the seal pups, with an overall mortality rate this year of 27.5%. This is slightly lower than the average mortality rate of 30% for the previous five years and may reflect the movement of the colony on to the more sheltered islands of Staple and Brownsman. However, as the risk of being washed away is reduced on the more sheltered islands, other factors may come into play: of the 218 dead pups found, 75% came from Staple and Brownsman. Coulson and Hickling (1964) and later Bonner and Hickling (1971) found correlations between mortality and the number of pups per metre of accessible shoreline. Therefore, if the shift towards Staple and Brownsman continues, the rising numbers of animals could result in increased mortality.

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

	2015	2014	2013	2012	2011	2010
Total Pups Born	1,876	1,740	1,575	1,603	1,555	1,499
Surviving	1,360	1.419	1,165	1,166	1,077	806
Unsprayed Dead	139	71	55	54	62	56
Sprayed Dead	79	66	78	71	61	54
'Missing'	298	184	277	312	355	583
Mortality	27.5%	18%	26%	27.2%	30.7%	48.2%

OTHER ENGLISH EAST COAST COLONIES

The Grey Seal pup count at the National Trust's Donna Nook colony in Lincolnshire has also increased, to 1,889, which is 90 more than last year (http://www.lincstrust.org.uk/donna-nook/weekly-update, accessed 24 January 2016). Conversely, further south, at the Trust's Blakeney Point colony, the number of pups born during the winter has decreased by 73 to 2,343 but with a mortality of less than 3% (http://norfolkcoastnationaltrust.blogspot.co.uk/, accessed 24 January 2016). However, at the recently established Horsey Beach colony further south in Norfolk, there have been at least 1,018 pups this winter, an increase of 214 on the previous year, which more than compensates for the slight reduction at Blakeney (http://www.bbc.co.uk/news/uk-england-norfolk-35262254, accessed 24 January 2016). Clearly, numbers of Grey Seals breeding at the English east coast colonies continue to increase overall.

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FARNES MARINE LIFE IN 2015

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CETACEANS

2015 was an excellent year for sightings of whales and dolphins. For a season that was plagued by unpredictable weather patterns and periods of unusually strong winds, the team still managed to spot a large number of cetaceans despite the rough seas and poor visibility.

We monitor the location and number of cetaceans sighted around the islands because it raises awareness and provides an insight into the health of our marine environment. Cetaceans are sensitive to environmental change making them key indicator species for factors such as chemical pollution, noise disturbance, overfishing and climate change.

Surveys lasted for a minimum of 30 minutes and were usually conducted from the Picnic Site which offers clear views over Inner Sound. At the start of each survey we recorded time, visibility (Poor, Average, Good, Very Good and Excellent) and sea state (Beaufort Scale). For each sighting we noted species, time, number of individuals and direction of travel. At the end of the year all sightings data were uploaded to the Sea Watch Foundation (http://www.seawatchfoundation.org.uk/) and North East Cetacean Project (http://www.northeastcetaceans.org.uk/) to contribute to the national cetacean database.

Four cetacean species (Minke Whale, Bottlenose Dolphin, White-beaked Dolphin and Harbour Porpoise) were observed this year, along with one Basking Shark. Most sightings were in Inner Sound with a few seen in Staple Sound. This year has been a good year with a record-breaking 157 sightings compared with 97 last year (Table 1). Harbour Porpoise numbers at 45 were about average for the last 10 years (54); conversely, as with the White-beaked Dolphin, the 76 sightings of Bottlenose Dolphin were well above the 10-year average (8.7; Table 1).

Bottle-nosed Dolphins in Inner Sound, Farne Islands
© Andrew Douglas/Serenity Boat Tours.

White-beaked Dolphin

This was certainly an amazing year for White-beaked Dolphin with over 30 observed in one sighting. Northern England/Scotland represents the southernmost extremity of the species' current range, but with global warming rising sea temperatures may push the species distribution to the north. Therefore it is surprising and exciting to have recorded such high numbers this far south.

Basking Shark

Basking Shark are still regarding as uncommon visitors to our waters. Basking Shark follow plankton, their food source, so any changes in the number of sightings could reflect changes in the distribution of plankton, resulting from large scale water movements (*i.e.* storms) or climate change. There were two sightings this year, off Megstone and Crumstone on consecutive days; we believe that this was likely to be the same individual that stayed around to feed.

Minke Whale

Minke Whales are generally solitary with larger groups of up to 10 sometimes seen. Their deep dive and pronounced arching of the back mean that sightings are rarely of more than the back and relatively small dorsal fin. The total of four sightings this year is below average for the previous 10 years (8.4; Table 1). Reduction in sightings in Hebridean waters may be due to reduced prey availability (2008); similarly, fewer sightings around the Farnes could reflect variations in prey abundance.

Table 1. Cetacean and large fish sightings around the Farne Islands 2005-2015.

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Humpback Whale *Megaptera novaeangliae*	-	-	-	-	1	-	-	-	-	-	-
Minke Whale *Balaenoptera acutorostrata*	14	1	7	6	5	2	3	11	30	5	4
Risso's Dolphin *Grampus griseus*	-	1	1	-	1	-	1	-	-	1	-
Bottlenose Dolphin *Tursiops truncates*	10	3	5	3	7	1	-	13	10	27	76
Common Dolphin *Delphinus delphis*	-	-	-	-	-	-	-	-	1	-	-
White-beaked Dolphin *Lagenorhynchus albirostris*	1	2	2	2	-	-	1	2	-	2	30
Dolphin *spp.*	-	-	-	-	-	2	1	-	2	-	-
Harbour Porpoise *Phocoena phocoena*	59	42	49	26	24	37	93	61	95	58	45
Basking Shark *Cetorhinus maximus*	-	-	5	-	-	-	-	2	-	2	1
Sunfish *Mola mola*	-	-	1	-	-	-	-	-	-	2	-
Grand Total	**84**	**49**	**70**	**37**	**38**	**42**	**99**	**89**	**138**	**97**	**157**

PLANKTONIC SPECIES

Monitoring the first appearance of jellyfish, sea gooseberries and comb jellies is important for understanding water movements and the impacts of climate change. Rising sea temperatures cause plankton to bloom earlier, and shift the distribution towards the planets' poles. Long-term monitoring of planktonic species will therefore provide insights into the impacts of global warming. Records of planktonic species since 1996, although a very incomplete series (Table 2), suggest a trend for the large jellyfish species to arrive earlier in the year, conforming with climate change predictions.

Table 2. The first dates for some large planktonic species were recorded at the Farne Islands from 1996–2015.

Species		1996	1997	1998	1999	2001	2002	2015
Cyanea capillata	Lion's Man Jellyfish	26 July	7 June	4 June	29 May	2 May	28 May	30 May
Cyanea lamarckii	Blue Jellyfish	-	7 June	3 June	13 May	20 May	27 May	28 May
Aurelia aurita	Moon Jellyfish	Late summer	13 June	2 June	3 June	6 June	4 June	29 May
Staurophora mertensii	Cross Jelly	Present but no date	15 May	18 May	Mid May	30 April	17 May	19 May
Pleurobrachia pileus	Sea Gooseberry	Mid summer	28 May	18 May	15 May	13 May	12 May	21 May
Bolinopsis infundibulum	Common Northern Comb Jelly	27 May	-	-	-	22 May	8 May	20 May
Beroe cucumis	Comb Jelly	-	15 May	19 May	12 May	4 May	9 April	18 May

INTERTIDAL SPECIES

Rocky shores provide an accessible habitat for monitoring the stability and health of the marine environment. The Farnes also represent a relatively undisturbed ecosystem for comparisons with other sites around the UK. Annual monitoring also provides data on the encroachment of invasive species. Regular monitoring of the abundance and diversity of species around the Farnes will be vital for basing the case for greater marine protection on clear scientific analyses.

This year, surveys were conducted according to the Shoresearch method; this involves surveying with a core species list of 20 species comprising rare protected species, invasive/non-native species and climate-change indicator species. In addition all other interesting species observed were noted. Most surveys lasted for one hour and during each survey the date, time, location and zonation were noted. At the end of the season the data was uploaded to the Marine Sightings Network run by the Marine Biological Association.

In total, 145 species were observed this year, and the data provides indicators of relative species abundance. In addition the surveys provided an excellent opportunity to engage with the public and interest others in the diversity of marine life. Two highlights of the season are described.

Olive Squat Lobster *Galathea squamifera*

Galathea squamifera is the most commonly found squat lobster on north European shores, and is well represented throughout Britain and Ireland. This species is chiefly nocturnal and catches fish with its small claws. This individual was located under a medium sized boulder off the jetty on Inner Farne, in an area known as St Cuthbert's Cove.

Dendronotus frondosus

This colourful looking nudibranch (sea slug) is highly predatory with its bright colour reflecting the food it feeds on. Most nudibranchs feed primarily on hydroids and this particular species is abundant across all the British Isles. We also found five other species of nudibranch on Inner Farne, all within the same area. This is excellent news as nudibranch diversity is regarded as an indicator to the health of the marine environment because of the species' close association with other organisms, such as sponges and bryozoans. This high nudibranch diversity indicates that we have a healthy marine environment.

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White-beaked Dolphin, Farne Islands
© Andrew Douglas/Serenity Boat Tours.

Dendronotus frondosus (nudibranch)
© Daniel Wynn.

FLORA OF THE FARNE ISLANDS 2015

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INTRODUCTION

The study of plants is vital in understanding changes in the health of island ecosystems. Plant communities form the vegetation structure of the island, create habitat and nesting material for breeding birds and sustain resident and visiting wildlife by providing shelter from the weather, protection from predators, and energy-rich food sources in the form of seeds, berries and the diversity of insects which also live there. The island vegetation also protects the soil from erosion by wind and water runoff, and reduces the waterlogging of soil around Puffin burrows and other nest sites.

PREVIOUS STUDY

Surveys of the flora of the Farne Islands have varied in effort, with extensive surveys in some years separated by gaps of many years in which little survey of plant life has been made. Hirons (1994) carried out detailed species surveys and mapping of plant growth on the islands to monitor plant distribution in relation to nesting bird activity, with particular focus on plant growth around Puffin *Fratercula arctica* burrows. Plants such as Sea Campion were noted as having great importance in preventing soil erosion, demonstrated by measuring the percentage plant cover within quadrats on set transects over several consecutive seasons. Wire cages provided areas protected from bird activity and illustrated how much of an effect birds can have on plant growth. Extensive mapping of scurvy grasses was also taken with the same aim (Hirons 1994).

Sea Campion on the Farnes © Wynona Legg.

PLANT OBSERVATIONS IN 2015

No formal survey was conducted on the flora of all islands in 2015 but observational study has been conducted throughout March to September. A list of species observed has been recorded along with notes on distribution and status. The majority of recordings were taken from Inner Farne as time constraints limited surveys of other islands. However casual observations of plants seen on other islands were recorded and are included in the species list (Table 1). It is important to stress that an exhaustive survey has not been carried out and some plant species or plant locations will have been missed.

Table 1. List of flora observed on Farnes 2015.

Scientific name	Common Name	IF	B	ST	WO	WA	L	KR
Acaena novae-zelandiae	Pirri Pirri Burr*	■						
Alchemilla millefolium	Yarrow	■	■					
Amsinckia lycopsoides	Scarce Fiddleneck	■						
Anchusa arvensis	Bugloss	■						
Arctium nemorosum	Lesser Burdock	■	■					
Atriplex glabriuscula	Babington's Orache	■	■	■	■	■	■	■
Avena fatua	Wild Oat		■					
Bellis perennis	Daisy	■						
Cakile maritime	Sea Rocket	■						
Chenopodium rubrum	Red Goosefoot	■						
Cirsium arvense	Creeping Thistle	■						
Cirsium vulgare	Spear Thistle	■						
Cochlearia danica	Danish Scurvygrass	■	■	■				
Cochlearia officinalis	Common Scurvygrass	■	■	■				
Conium maculatum	Hemlock	■	■		■			
Galium aparine	Goosegrass					■		
Glaux maritima	Sea Milkwort	■	■					
Holcus lanatus	Yorkshire Fog	■	■					
Iris pseudacorus	Yellow Iris	■						
Lamium purpureum	Red Dead Nettle				■			
Leymus arenarius	Lyme Grass			■				■
Malus pumila	Apple	■						
Matricaria discoidea	Pineappleweed	■	■					
Myositis arvensis	Field Forget-me-not	■						
Persicaria maculosa	Redshank	■						
Plantago coronopus	Buck's-horn Plantain	■						
Poa annua	Annual Meadow Grass	■						
Polygonum aviculare	Knotgrass		■	■				

Scientific name	Common Name	IF	B	ST	WO	WA	L	KR
Potentilla anserina	Silverweed	■						
Potentilla reptans	Creeping Cinquefoil	■						
Puccinellia maritima	Saltmarsh Grass	■	■	■			■	
Ranunculus ficaria	Lesser Celandine	■						
Ranunculus hederaceus	Ivy-leaved Crowfoot	■						
Ranunculus repens	Creeping Buttercup	■						
Ranunculus sceleratus	Celery-leaved Buttercup	■						
Rheum x rhabarbarum	Rhubarb	■						
Rumex acetosa	Common Sorrel	■	■	■				
Rumex crispus	Curled Dock	■	■					
Rumex obtusifolius	Broad-leaved Dock	■	■					
Sagina procumbens	Procumbent Pearlwort	■						
Sambucus nigra	Elder	■						
Senecio jacobaea	Common Ragwort	■						
Senecio vulgaris	Groundsel	■						
Silene uniflora	Sea Campion	■						
Sinapsis arvensis	Charlock	■	■					
Sonchus arvensis	Perennial Sow Thistle				■			
Sonchus asper	Prickly Sow Thistle	■	■					
Sonchus oleraceus	Smooth Sow Thistle	■	■					
Spergularia marina	Lesser Sea Spurrey	■	■				■	
Stellaria media	Common Chickweed	■	■					
Symphytum officinale	Common Comfrey	■						
Taraxacum agg.	Common Dandelion	■	■					
Tripleurospermum maritimum	Sea Mayweed	■	■					
Urtica dioica	Common Nettle	■	■					
Urtica urens	Small Nettle	■	■					

IF, Inner Farne; B, Brownsman; ST, Staple; WO, Wideopens; WA, Wamses; L, Longstone; KR, Knoxes Reef.

*Found underneath the boardwalk on Inner Farne and immediately removed and destroyed.

Sandy beach

The presence of a sandy beach (St Cuthbert's Cove) on Inner Farne allows sand-tolerant plants to colonise the island. Sea Rocket is abundant here above the tideline. Sea Mayweed and Sea Campion are also abundant on the sand. Higher up the beach, generalist plants such as Common Nettle, Broad-leaved Dock, Lesser Burdock and Cleavers grow where a base of Yorkshire Fog and Annual Meadow Grass create a stable root base. Hemlock grows along the edges of the beach in small stands.

Rock

Rock ledges, gullies and clifftop makes up a large part of the habitat on Inner Farne. These rocky habitats lacking a soil cap provide perfect conditions for salt water tolerant plants such as Lesser Sea Spurrey and Sea Milkwort. Two species of scurvy grass are found on Inner Farne: Common and Danish. Sea Campion also grows here but mainly where rock meets soil and less so on more exposed sections.

Common Scurvy Grass on the Farnes © Wynona Legg.

Dock bank

The sloping embankment on the east side overlooking St Cuthbert's Cove is densely vegetated with Broad-leaved Dock and Common Nettle. As part of the annual conservation management each year, some of the vegetation is removed by strimming strips to create 'Puffin rides' to help fledged Puffins find their way to the sea once they have left the burrow. This has led to a slight increase in plant diversity. Sea Mayweed, Creeping Buttercup, Smooth Sow Thistle and Spear Thistle grow along these strips alongside Yorkshire Fog and Annual Meadow Grass. Small stands of Hemlock grow within the nettle. Charlock grows along the banks here in small but dense patches during summer.

Small ponds

A series of small ponds have formed within the ditches of the bank where water drains from the top meadow down towards the sandy beach. This has provided the perfect habitat for interesting water-loving plants such as Celery-leaved Buttercup, Ivy-leaved Crowfoot and dense patches of Yellow Flag. Yorkshire Fog and Annual Meadow Grass form the banks of these ponds which are kept short by grazing Rabbits *Oryctolagus cuniculus*. Creeping Buttercup, Spear Thistle and Sea Mayweed also grow on these banks.

Meadow

Inner Farne has the largest soil cap of all the Farne Islands with meadow habitat on the flats in the centre of the island. Puffins are abundant here and the meadow areas are covered in Puffin burrows and excavated soil. A circular boardwalk cuts through the grassy habitats and protects the ground from trampling and erosion, thus helping to retain the soil cap. The vegetation here has changed substantially over the years due to changes in bird populations and in land management and use. The dominant plants this year were Orache, Common Nettle, Sea Campion and Curled and Broad-leaved Dock. Common Nettle has become dominant in some areas of Inner Farne, growing in extensive stands and outcompeting other plant species. These stands provide dense cover for nesting Eider but are unsuitable for nesting terns. Control of Common Nettle on the island is crucial to prevent excessive spreading to areas where there are breeding terns, but some small stands are important to provide cover and insect diversity. Broad-leaved Dock and Curled Dock both provide cover for nesting birds with particular benefit to the Eiders. These species also provide cover for migrating birds.

Sea Campion is a beneficial plant for the islands as it can prevent waterlogging and erosion of the soil. The growth of this plant is strongly affected by adverse weather conditions and damage from breeding birds.

Hemlock has spread extensively on Inner Farne, and due to its height and dense foliage it is becoming a problem for ground-nesting birds such as terns which require a short sward to nest in. Hemlock has caused nest abandonment and has reduced available breeding space on Inner Farne this year, and methods to control it were initiated.

Two species of *Cirsium* are found on the islands: Spear Thistle and Creeping Thistle. Both species grow abundantly on Inner Farne and there is a large stand of Spear Thistle on the Top Meadow of Inner Farne which provides an important food source for butterflies, moths and bird species which feed on the insects attracted by the rich nectar. This year, breeding Swallows frequented this area regularly to feed chicks throughout the breeding season.

There are two fairly large ponds on the meadows, one of which dries up for most of the spring and summer. Red Goosefoot grows abundantly in the basin of these ponds and Redshank grows in patches around the edges.

The picnic area at the top of the meadow is grazed by Rabbits. The dominant species are Annual Meadow Grass and Yorkshire Fog, but plants such as Silverweed and Daisy take advantage of the short sward height, and in some areas Silverweed carpets the ground.

Courtyard

The Courtyard boasts a fairly diverse plant community owing to its sheltered position nestled among the walls of the Chapel, Pele Tower and Visitor Centre. Scarce Fiddleneck, an introduced North American species, grows abundantly here and around the perimeter

of the Pele Tower. Bugloss grows quite profusely alongside the patches of Fiddleneck. Small Nettle is at its most abundant within the Courtyard despite growing in patches everywhere on the island. There are several large Lesser Burdock plants and Spear Thistle grows abundantly, providing food source for visiting butterflies. Patches of Sea Campion grow on the walls and between the cobbled path. Buck's-horn Plantain can be found growing on the top of the wall adjacent to the Pele Tower. Groundsel and Common Ragwort also grow within the sheltered walls.

OTHER SPECIES OF NOTE

Common Saltmarsh Grass grows most copiously on the rocks and edges of tidal pools on Brownsman. The plant is also present in less abundance on the other islands. From 1971 Saltmarsh Grass was noted as an important species for reducing soil erosion and waterlogging and was transplanted to areas of bare ground and encouraged to spread (Hirons 1994).

Elder is the only shrub species present on the Farne Islands and grows only on Inner Farne. The specimens were originally planted and there are seven plants which remain today, all within the enclosed former vegetable garden. The berries of the plant provide an important food source for migrant birds and insect species, the flower heads are a source of nectar for visiting insects, and the dense foliage provides excellent cover for sheltering migrant birds.

SUMMARY

Plant species on the Farne Islands are affected by the activities of birds, seals and people as well as by climate and soil conditions. In turn, changes in plant communities can have significant implications for the diversity of wildlife which depend on particular plant communities for food and successful breeding. Regular botanical monitoring is important for recognising and documenting changes in plant communities, and for understanding how these can be managed to benefit the wildlife that uses the islands. The need for regular plant monitoring has been recognised at a national level with the recent development of the National Plant Monitoring Scheme (http://www.npms.org.uk/; Botanical Society of the British Isles 2016). Establishing this methodology on the Farnes will enable a long term study of plant life on the islands, and is an important aim for the 2016 season.

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FARNE ISLANDS BUTTERFLIES IN 2015

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This was a quiet year for butterflies on the Farne Islands, with only 869 individuals recorded, the lowest abundance since regular transect monitoring began in 2010. Although abundance was easily the lowest on record (Table 1), species richness was slightly better with 11 species recorded. Four species that have previously been recorded on the Farnes were not seen this year: Dark Green Fritillary, Ringlet, Small Copper and Common Blue.

Table 1. Yearly totals by species from 2010.

Species	2010	2011	2012	2013	2014	2015
Large White *Pieris brassicae*	185	15	78	408	208	9
Small White *P. rapae*	669	173	276	702	537	35
Green-veined White *P. napi*	73	17	23	151	331	29
Small Copper *Lycaena phlaeas*	40	0	0	2	4	0
Common Blue *Polyommatus icarus*	0	0	0	1	0	0
Red Admiral *Vanessa atalanta*	323	1051	513	110	2039	676
Painted Lady *V. cardui*	20	136	8	24	39	26
Small Tortoiseshell *Aglais urticae*	312	138	391	355	229	74
Peacock *Inachis io*	45	30	102	62	47	11
Comma *Polygonia c-album*	2	1	1	0	0	1
Dark Green Fritillary *Argynnis aglaja*	1	1	0	0	0	0
Speckled Wood *Pararge aegeria*	0	3	2	1	10	1
Wall *Lasiommata megera*	17	6	0	37	7	3
Meadow Brown *Maniola jurtina*	0	30	4	4	1	4
Ringlet *Aphantopus hyperantus*	1	0	0	13	2	0
White Spp.				904		
Total	**1,688**	**1,601**	**1,398**	**2,774**	**3,454**	**869**

The low abundance of butterflies this season (Table 2) may in part result from the periods of poor weather, especially high winds and low temperatures, despite the fact that for this area (data for Boulmer weather station, approximately 15 miles south of the Farnes) the average temperature over the nine month season as a whole was, at 12.3 °C, 1.6 °C above the long term average for this period (Norwegian Meteorological Institute 2015). Nationally, butterfly abundances were also below average, with the Big Butterfly Count recording only 13.4 individual butterflies per count compared to 14.7 in 2014 (Big Butterfly Count 2015). This represents a 9% decrease for the UK as a whole, while Scotland experienced a 37% fall. As may be expected, the Farne Islands recorded below the national average, with 11.1 individuals per transect. Although this was considerably lower than the previous two years, 2013 and 2014 had been exceptionally good (Table 3).

Table 2. Combined transect and casual observations by month in 2015. Transects were conducted daily from 2 July until 17 October, when weather conditions were suitable. Casual sightings were recorded before and after these dates. Uncommon species seen outside of daily transects were also recorded as casual sightings.

Species	March	April	May	June	July	August	September	October	November	Total
Large White	0	0	0	1	0	8	0	0	0	**9**
Small White	0	1	2	2	1	29	0	0	0	**35**
Green-veined White	0	1	3	1	0	24	0	0	0	**29**
Red Admiral	0	0	0	6	430	22	156	62	0	**676**
Painted Lady	0	0	0	0	1	19	5	1	0	**26**
Small Tortoiseshell	1	12	2	2	9	30	15	2	1	**74**
Peacock	0	2	0	0	0	6	3	0	0	**11**
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	0	3	0	0	**3**
Meadow Brown	0	0	0	0	0	2	2	0	0	**4**

In the past, butterfly monitoring on the Farne Islands has been variable in intensity (Table 3), and in some years, including 2015, only Inner Farne was surveyed. Year-to-year comparisons are also confounded by different start dates, ranging from 29 March (2011) to 26 August (2012). The impact of weather has also been amplified by attempting to survey daily, as the number of days lost due to bad weather each year will be variable; in contrast, weekly surveys are more likely to be achieved and to facilitate better year-to-year comparisons. A weekly survey would also reduce the risk of 'pseudoreplication' (samples treated as independent but which actually sample

the same individuals) inherent in daily counts; this is most apparent with uncommon species such as Comma where counts of the same individual over several days would give inflated estimates of abundance. Therefore it is planned in the future to implement a more structured monitoring programme in line with methods used by the UK Butterfly Monitoring Scheme (UKBMS 2015).

Table 3. Butterfly monitoring transect data on the Farnes 2010-2015.

Year	Total Recorded During Transects	Days Surveyed	Individuals Per Transect
2010	1,697	93	18.3
2011	1,412	130	10.9
2012	1,398	No Data	No Data
2013	1,751	24	73
2014	2,759	57	48.4
2015	811	73	11.1

SYSTEMATIC LIST

Large White

First sighting: 27 June. Last sighting: 28 August. Peak count: 2.

It was a poor year for this species on the Farnes, with only nine recorded, a 95.7% decrease from last year. This is surprising as nationally it was a good year for the Large White, up by 46% from 2014 and the second most abundant species for the UK (Big Butterfly Count 2015).

Small White

First sighting: 22 April. Last sighting: 28 August. Peak count: 6.

The Small White also had a poor year on the Farnes, decreasing by 93.5% whereas nationally this species only decreased by 3% (Big Butterfly Count 2015). On the Farnes this species was the most abundant of the *Pieridae* with 35 individuals.

Green-veined White

First sighting: 22 April. Last sighting: 28 August. Peak count: 5.

Green-veined White rounded off a poor year for the 'Whites' on the Farnes, with only 29 individuals seen, a decrease of 91.2%. Nationally it was also a poor year for this species, with a decrease of 42% (Big Butterfly Count 2015).

Red Admiral

First sighting: 15 June. Last sighting: 1 November. Peak count: 58.

Red Admiral was by far the most abundant species on the Farnes this year, with 676 recorded; however, this is still a 66.9% decrease from the remarkable total in 2014. The change is not as pronounced compared with the average for the previous five years on the Farnes, decreasing by 16.3% compared to a national decrease of 28% (Big Butterfly Count, 2015). In 2015 only 17 individuals were recorded before the arrival of 430

individuals in July, which is quite late for migrants to arrive. Due to the abundance of Common Nettle *Urtica dioica* on the Farnes, it could be expected that high numbers of offspring would emerge in late summer. However, only 240 were seen after July; since rainfall for July to September differed by only 3% from the average for the Farnes, these low numbers could be due to late arrival and/or windy conditions and cold temperatures.

Painted Lady
First sighting: 28 July. Last sighting: 9 October. Peak count: 4.
At a national level this migratory species increased by 28% in 2015; although numbers on the Farnes decreased by 33.3%, this decrease was proportionally less than for most other species, thus in some respects reflecting the national trend.

Small Tortoiseshell
First sighting: 20 March. Last sighting: 28 November. Peak count: 6.
This species is regularly the first recorded as was the case this year. Although this was the second most abundant species on the Farnes, it was a poor year with only 73 recorded, a 67.68% decrease from last year. Although a familiar and common species nationally, Small Tortoiseshell has been classified as a species of conservation concern over recent decades by Butterfly Conservation (2015b).

Peacock
First sighting: 9 April. Last sighting: 25 September. Peak count: 3.
Another species that had a poor year on the Farnes, with a decrease of 76.6% from last year. The peak of six in August indicates that offspring were successfully produced, with caterpillars feeding on Common Nettle.

Peacock on Top Meadow on Inner Farne © Wynona Legg.

Comma
First sighting: 4 August. Last sighting: 4 August. Peak count: 1.
This species returned to the Farnes after a two-year absence and is the fifth record for the Farne Islands. Nationally the Comma continued its recovery from a severe decline in the twentieth century, with a 42% increase from last year (Big Butterfly Count 2015). This recovery includes an increase of their range northwards, which could result in

Comma becoming more common on the Farnes.

Speckled Wood
First sighting: 24 September. Last sighting: 24 September. Peak count: 1.
This woodland specialist was recorded as a casual observation. Speckled Wood was first recorded on the Farnes in 2008 and has been present each year since, except for 2009 and 2010.

Wall
First sighting: 6 September. Last sighting: 24 September. Peak count: 1.
This species is classified as high conservation concern by Butterfly Conservation (2015a), but as a predominately coastal species it is reasonably well represented on the Farne Islands. In addition to being an uncommon species nationally, it exists in relatively small, self-contained populations, with only limited numbers attempting to colonise new areas (UK Butterflies 2015), making it less likely to be seen in large numbers on the Farnes.

Meadow Brown
First sighting: 9 September. Last sighting: 18 September. Peak count: 1.
Although nationally common, this species is uncommon on the Farnes. The four Meadow Brown recorded this year is typical for the Farnes.

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MOTHS ON THE FARNE ISLANDS 2015

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Moths are a highly abundant species group, delivering some essential ecosystems services as part of the Farne Islands ecology. Many moth species can be used as 'indicator species' reacting to subtle changes in the environment over long and short term timescales; they also facilitate pollination of a number of plant species. Moths are an important part of the food chain, particularly for migratory birds, which feed on the moths and their larvae and also take advantage of the seeds produced as a result of pollination mediated by moths. As an archipelago, the Farne Islands support a unique assemblage of resident, non-resident and migratory moths which justifies study of these species.

Records of moths using constant-effort recording techniques on the Farnes have been kept every year since 1991. This has varied in intensity between the Inner and Outer Island Groups as well as between years. This year, most moth trapping records were from Inner Farne as a result of casual records and trapping using a Mercury Vapour Robinson light trap on 15 nights between 23 May and 30 September. No moth trapping was carried out on Brownsman or the Outer Group although some casual records were kept. As expected for an island location, wind and rain had a significant impact on the number of trapping nights with recording efforts limited by the wet spring and summer.

In total, 45 'macro' and eight 'micro' moth species were recorded, representing three macro moth families and five micro moth families. Several of these moth species are likely to be resident on the islands, whereas others will be non-resident, originating from the mainland and the occasional continental migrant.

HIGHLIGHTS

Convolvulus Hawkmoth *Agrius convolvuli*

A rare sighting on the Farnes, this continental migrant was found in the visitor centre at Inner Farne on 28 August; sadly, it was in poor condition and died soon after it was found (but put to good use in a nature display). A few hundred Convolvulus are seen in the UK each year, but the wind conditions were particularly favourable for the Convolvulus migration this year.

Convolvulus Hawkmoth on the Farnes
© Isabel Morgan.

Plain Pug *Eupithecia simplicita*
This moth was not recorded in the massive numbers of previous years (possibly as this moth does not readily come to light), but a couple of casual records suggests that the colony on Inner Farne, identified in 2011, may still be present. The abundance of *Orache* on Inner Farne, the favoured food plant, is likely to be the reason that this species exists so far north of its normal range.

Garden Tiger *Arctica caja*
With numbers declining in the UK, it is encouraging to confirm that Garden Tiger moths are still resident on Inner Farne, with the distinctive 'woolly bear' caterpillars seen and good numbers of adults caught in the light trap. The abundance of nettles, dock and other food plant no doubt plays a big part in its continuing presence.

SYSTEMATIC LIST

The tables of macro (Table 1) and micro (Table 2) moths were compiled using data collected in 2015 with historical notes. Macro moth species are listed in the order given by Waring and Townsend (2009) while micro moth species are listed in the order given by Sterling and Parsons (2012); the respective UK status of each species is also given. The Farne Island status (resident/non-resident etc.) and abundance has been summarised where possible using the method given by Scott (2012), and is as follows:

Residence status
Resident – Caught in sufficient numbers and time period with food plant present.
Non-resident (mainland in origin) – Caught in low numbers and/or no food plant present.
Unknown – Insufficient data to classify species, but food plant may be present.
Migrant – Known migrant from the continent.

Abundance
Abundant – Many (>20) individuals found on multiple dates.
Common – <20 individuals on multiple dates.
Scarce – Few individuals (<10) on a few dates.
Rare – Isolated records of single specimens, for example one individual on a single date.

Due to the low number of trapping days in 2015, classifying abundance levels could give misleading results, with rare or scarce abundances resulting from limited trapping days rather than genuine scarcity. For this reason only species that occurred in sufficient numbers have an abundance classification in this list. Similarly, some resident classifications have been based on historical records, mainly from Scott (2012) as well as from the presence of the food plant.

Table 1. 'Macro' moth species on the Farne Islands 2015.

'Macro' moth Species	First date found	Last date found	Total no. days	No. individuals and peak counts	UK Status/ Farnes status - Abundance
FAMILY: HEPIALIDAE					
Ghost Moth *Hepialus humuli humuli*	6 July	14 July	2	2 + 1 probable (2 peak)	Common/*Resident*
Common Swift *Hepialus lupulinus*	11 June	16 June	2	4 (3 peak)	Common/*Resident*
FAMILY: GEOMETRIDAE					
Flame Carpet *Xanthoroe designata*	26 June	26 June	1	1	Common/*Unknown*
Silver Ground Carpet *Xanthorhoe montanata*	16 June	7 Aug	4	5 (3 peak)	Common/*Resident*
Garden Carpet *Xanthorhoe fluctuata*	27 May	4 Aug	3	3 (1 peak)	Common/*Resident*
Dark Spinach *Pelurga comitata*	27 June	11 Aug	3	7 (5 peak)	Common/*Resident*
Spinach *Eulithis mellinata*	10 July	22 July	2	2 (1 peak)	Common/*Non-resident,*
Barred Straw *Eulithis pryaliata*	19 July	19 July	1	1	Common/*Non-resident,*
Spruce Carpet *Thera britannica*	10 July	10 July	1	1	Common/*Non-resident*
Lime-Speck Pug *Eupithecia centaureata*	10 July	10 July	1	1	Common/*Unknown*
Plain Pug *Eupithecia simplicita*	22 July	4 Aug	2	3 (2 peak)	Local/*Resident*
Magpie *Apraxas grossulariata*	26 June	16 July	4	4 (2 peak)	Common/*Non-resident*
Convolvulus Hawkmoth *Agrius convolvuli*	28 Aug	28 Aug	1	1	Migrant
Popular Hawkmoth *Laothoe populi*	23 July	23 July	1	1	Common/*Non-resident*
Hummingbird Hawkmoth *Macroglossum stellatarum*	21 July	11 Aug	2	3 (2 peak)	Common Migrant / *Non-resident*
Garden Tiger *Arctica caja*	12 July	4 Aug	7	23 (15 peak)	Common/*Resident*
White Ermine *Spilosoma lubricipeda*	27 June	27 June	1	1	Common/*Unknown*

'Macro' moth Species	First date found	Last date found	Total no. days	No. individuals and peak counts	UK Status/ Farnes status - Abundance
Buff Ermine *Spilosoma luteum*	17 June	27 June	2	2 (1 peak)	Common/*Unknown*
Cinnabar *Tyria jacobaeae*	8 June	8 June	1	n/a	Common/*Resident*
FAMILY: NOCTUIDAE					
Garden Dart *Euxoa nigricans*	8 Sept	8 Sept	1	3	Common/*Resident*
Heart and Dart *Agrotis exclamationis*	10 July	12 July	2	9 (8 peak)	Common/*Resident*
Flame *Axylia putris*	10 July	14 July	2	5 (4 peak)	Common/*Resident*
Large Yellow Underwing *Noctua pronuba*	10 July	8 Sept	6	10 (3 peak)	Common/*Resident - Common*
Double Square Spot *Xestia triangulum*	10 July	10 July	1	2	Common/*Unknown*
Six-Striped Rustic *Xestia sexistrigata*	7 Aug	7 Aug	1	1	Common/*Unknown*
Square Spot Rustic *Xestia xanthographa*	16 June	16 June	1	1	Common/*Non-resident*
Cabbage Moth *Mamestra brassicae*	16 June	21 July	7	13 (4 peak)	Common/*Resident - Common*
Marbled Coronet *Hadena confusa*	16 June	16 June	1	1	Local/*Resident*
Small Quaker *Orthosia cruda*	14 July	14 July	1	1	Common/*Non-resident*
Hebrew Character *Orthosia gothica*	25 May	25 May	1	1	Common/*Resident*
Bright-Line Brown-Eye *Lancanobia oleracea*	29 May	16 Aug	14	90 (21 Peak)	Common/*Resident - Abundant*
Smoky Wainscot *Mythimna impura*	4 Aug	4 Aug	1	1	Common/*Unknown*
Lunar Underwing *Omphaloscelis lunosa*	18 Sept	18 Sept	1	1	Common/*Resident*
Mouse Moth *Amiphipyra tragopoginis*	18 Sept	18 Sept	1	1	Common/*Resident*

'Macro' moth Species	First date found	Last date found	Total no. days	No. individuals and peak counts	UK Status/ Farnes status - Abundance
Angle Shades *Phlogophora meticulosa*	2 June	2 June	1	1	Common/*Non-resident*
Dark Arches *Apamea monoglypha*	10 July	18 Sept	10	46 (25 peak)	Common/*Resident - Abundant*
Light Arches *Apamea lithoxylaea*	14 July	14 July	1	1	Common/*Unknown*
Clouded-bordered Brindle *Apemea crenata*	16 June	14 July	3	4 (2 peak)	Common/*Non-resident*
Common Rustic *Mesapamea secalis*	10 July	4 Aug	4	9 (3 peak)	Common/*Resident*
Rosy Rustic *Hydraecia micacea*	8 Sept	18 Sept	3	30 (22 peak)	Common/*Resident-Common*
Frosted Orange *Gortyna flavago*	16 Sept	18 Sept	2	5 (4 peak)	Common/*Resident*
Mottled Rustic *Caradrina morpheus*	10 July	4 Aug	4	9 (3 peak)	Common/*Resident*
Pale Mottled Willow *Paradrina clavipalpsi*	14 July	14 July	1	1	Common/*Unknown*
Burnished Brass *Diachrysia chrysitis*	10 July	22 July	2	3 (2 peak)	Common/*Resident*
Silver Y *Autographa gamma*	2 July	30 Sept	9	26 (10 peak)	Common/*Resident - Abundant*
Spectacle *Abrostola tripartita*	4 July	30 July	6	15 (6 peak)	Common/*Resident - Common*

Burnished Brass Moth on the Farnes © Isabel Morgan.

Table 2. 'Micro' moth species on the Farnes Islands 2015.

'Micro' moth Species	First date found	Last date found	Total no. days	No. individuals and peak counts	UK status/Farnes Status - Abundance
FAMILY: UTELLIDAE					
Diamond Back Moth *Plutella xylostella*	10 July	10 July	1	2	Common/*Non-resident*
FAMILY OECOPHORIDAE					
Brown House-Moth *Hofmannophila pseudopretella*	23 June	22 July	4	11 (7 peak)	Common/*Resident-Common*
FAMILY: ELACHISTIDAE					
Agonopterix alstromeriana	17 April	18 April	2	2 (1 peak)	Common/*Resident*
FAMILY: TORTRICIDAE					
Eucosma canna	10 July	10 July	1	1	Common/*Resident*
FAMILY: CRAMBIDAE					
Grass Veneer *Chrysoteichia culmella*	10 July	12 July	2	9 (8 peak)	Common/*Resident*
Small Magpie *Anania hortulata*	1 July	4 Aug	6	23 (10 peak)	Common/*Resident-Common*
Mother of Pearl *Pleuroptya ruralis*	10 Aug	21 Aug	2	4 (3 peak)	Common/*Resident*

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LONG NANNY TERN COLONY, BEADNELL BAY, 2015

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INTRODUCTION

The Long Nanny tern colony is located on a 7.5-hectare scenic stretch of the Northumberland coast between the villages of Beadnell and Low Newton, extending south from the Long Nanny estuary. It is a Site of Special Scientific Interest (SSSI) consisting of a long section of sandy beach ending in a small, low lying sand spit at the mouth of the Long Nanny river, bordered by an accreting sand dune system to the west. From May to August each year the reserve is an important site for three species of ground nesting birds: Little Tern *Sternula albifrons*, Arctic Tern *Sterna paradisaea* and Ringed Plover *Charadrius hiaticula*. Little Terns and Ringed Plovers are highly susceptible to disturbance and nest destruction by recreational use of beach habitats, so a constant Ranger presence is maintained throughout the breeding season to protect the site from disturbance, predation and tidal inundation, and to monitor the population and productivity of the breeding seabirds.

The National Trust began protecting the site in 1977 when there were only three pairs of breeding Little Terns. Numbers have since increased to a current total of 30-50 pairs. There are thought to be three main reasons why the site has been chosen as a breeding area for Little Terns: a stable sand spit area of low level shingle, a strong population of Lesser Sandeels *Ammodytes tobianus* and good water clarity for foraging. The Long Nanny is a nationally important site for Little Terns, with approximately 2% of the British breeding population. The British population of Little Terns has shown a long-term decline between 1976 and 2005, and is the second rarest breeding seabird in Britain. The species has an Amber conservation status in the UK and is a Schedule 1 species under the Wildlife and Countryside Act 1981.

The protection of the Long Nanny site has also contributed to the large number of Arctic Terns colonising the area. The first recorded pair bred on the reserve in 1980. Since then the colony has grown considerably, reaching a high of 2,443 pairs in 2014, making it the largest mainland breeding colony in the UK. The breeding population of Ringed Plovers at the Long Nanny is also regionally important, with around 10 to 15 pairs nesting annually, spreading between the saltmarsh, spit and front dune system.

Little Tern © Mike Hodgson.

CONSERVATION AND MONITORING METHODS

Site management and monitoring

The annual programme of site management began on 6 May. Five Rangers were resident from 7 May until the end of the breeding season on 2 August. The usual tern nesting area was outlined with warning notices (requesting dogs to be kept on a lead and asking people not to disturb the birds) on large wooden posts at 15 metre intervals around the site. Public access on to the salt marsh was discouraged and the perimeter of the entire colony was subsequently marked out using posts 7 metres apart, 3-5 metres inland from the outer warning posts, and joined by rope to create a physical barrier. A hide was constructed overlooking the Little Tern breeding area on the sand spit. Electric fencing was erected to deter predators, people and loose dogs. Access routes in and around the site were regularly trimmed of vegetation, and the cuttings used to aid stabilisation of paths and decrease erosion. An experimental area was trimmed to allow Arctic Terns to nest out of the range of the high tide, and to allow visitors better views with minimal disturbance.

Species management and protection

Observations of courtship display, copulation and scrape building by Little Terns were recorded daily. Nests identified on regular counts were marked with numbered rocks and raised on to fish boxes filled with sand and Marram Grass *Ammophila arenaria* to help keep the nests stable. These boxes were later repositioned on wooden pallets which were pegged down to prevent tidal washouts. Shelters and cages were later placed around the site to protect Little Tern chicks from weather and aerial predators. Protection against tidal damage was carefully managed by monitoring and Ranger intervention.

The locations and dates of discovery were recorded for Ringed Plover nests which were subsequently monitored after securing a wire cage over each nest with metal pegs; these cages protect the nest from predators while allowing parents access.

In addition to monitoring nests, the nature and duration of disturbance events involving nesting birds taking flight from the colony were recorded; 'dreads' when the majority of nesting birds will take flight and leave the colony for no apparent reason were also included as 'disturbance'.

Weather and tide timetables were monitored to predict combinations of high tides and weather likely to flood the nesting areas. When nests were in direct danger of flooding, eggs and chicks were collected into marked boxes and bags and brought to the Rangers' hut to be kept warm. Once the water had receded, chicks and eggs were returned to the marked nests or relevant location.

Survey methods and monitoring

Daily checks of Little Tern nests were conducted in warm, dry and calm conditions; new eggs and hatched chicks were recorded. Later in the season, morning and afternoon nest checks were conducted so that new nests located in the morning could be raised on to boxes and pallets in the afternoon. When possible, nests were only raised when containing at least two eggs, as this reduces the possibility of nest desertion. Counts and general Ranger disturbance were spaced as far apart as possible, with a minimum interval of two hours; otherwise counts were conducted at the earliest time that conditions allowed.

Due to the large size of the Arctic Tern colony, only one full survey of breeding pairs was undertaken (4 June); six observers each walked a transect through the colony from the south, counting apparently occupied nests (AON) and recording the number of eggs in each nest scrape; empty but active scrapes (fresh material, signs of recent activity) were recorded with zero eggs. At the end of the season, the number of Arctic Tern fledglings was estimated as the average of a daily count.

Feeding observations

Rangers selected one Little Tern brood at a time to monitor feeding events over periods of at least 60 minutes, recording the timing, prey type, size of each feed and whether ingested. Some surveys were cut short by predator disturbance. When possible, adjacent Arctic Tern broods were also recorded simultaneously to compare feeding rates and prey size between species. A list of broods surveyed and their dates was updated daily to ensure regular observations of all Little Tern chicks.

SEASONAL OUTTURN

The 2015 summer was dominated by low pressure systems causing high winds, tides and stormy weather. High winds (above four on the Beaufort scale) were present on 35 of the 81 days of site occupation. Stormy conditions on 1 June caused all but five of the Little Terns to abandon nests for the evening; the number of eggs subsequently decreased from 32 to 16 on 5 June and 13 on 6 June. On 7 June, after the end of the stormy weather, five new nests were found. Low temperatures, reaching a low of 1.5 °C at the end of May, persisted well into June.

Breeding statistics: Little Terns

During the 2015 season, as a result of intensive management by the Ranger team, the Long Nanny tern site had a minimum of 27 breeding pairs of Little Terns and a minimum of 14 fledglings. There were 72 breeding attempts from the 27 pairs which laid a total of 135 eggs (Table 1). Of these, 26 eggs were predated (Table 3), 34 were deserted, 11 were washed away by the tide and 16 disappeared, probably taken by a predator. The average incubation period for the Little Tern was 22.4 days (n=26); 48 eggs hatched but 34 of the chicks were lost due to predation or other causes. Feeding statistics are summarised in Table 2 with a breakdown of diet composition in Figure 1.

Table 1. Breeding statistics for Little Terns, Arctic Terns and Ringed Plovers 2015.

Species	Pairs	Mean clutch	Eggs	Eggs lost	Hatchlings	Chicks lost	Fledglings	Productivity	Adults predated
Little Tern	27	1.88	135	87	48	34	14-15	0.52	0
Arctic Tern	1957	1.75	3418	251	3167	318	40	0.02	17
Ringed Plover	16	3.31	53	20	12-39	4	12-17	1.20	0

With the first eggs laid on the evening of 18 May, the first losses occurred a day later when 11 eggs, unknown to the Rangers and below the tideline, were washed out by the following high tide. Twenty-five eggs and 16 scrapes were present on the spit by 1 June, but many were subsequently lost during strong winds that day and on 5 June. Many Little Terns subsequently re-laid, with the first chick hatching on 12 June and subsequently fledged on 1 July. By this time, 18 chicks were present on the spit. From 3-9 July, encroaching high tides required the Rangers to intervene; all chicks and eggs were removed from the site to the hut for a total of 13 hours over the course of the week, and 31 chicks were rescued. Nest registers were essential to ensure that all chicks

were taken in, and splitting the site into zones was an effective way of collecting and replacing chicks with minimal disturbance; 11 chicks were ringed before being returned to the nest.

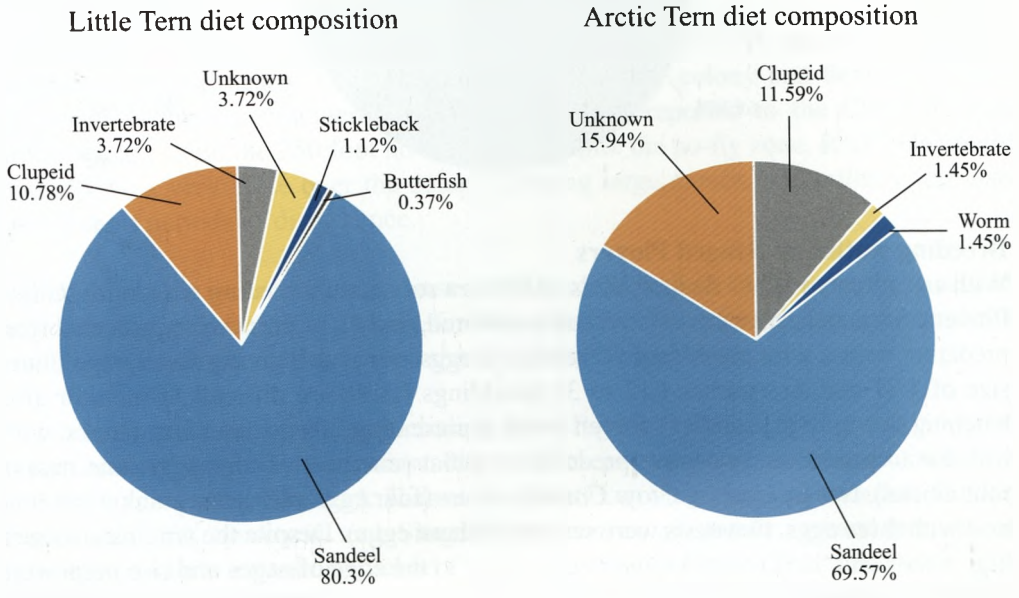
Arctic Terns were a significant cause of Little Tern predation, resulting in the loss of four chicks (Table 3). In May, once Little Tern nests were placed on boxes, the Arctic Terns disturbed and attacked some of the Little Terns in apparent competition for the boxes. As a result, nesting Little Terns were displaced farther into the spit and only a few remained close to the Arctic Tern nests. Those remaining close to the Arctic Terns were subjected to kleptoparasitism (food stealing) and there were 11 recorded such attacks. There were also incidents of chicks being chased and attacked by Arctic Terns, which resulted in the deaths of two Little Tern chicks. This behaviour may be linked to competition for nest spaces and trauma due to heavy Arctic Tern losses from flooding.

Table 2. Feeding statistics for Little and Arctic Terns 2015.

	Observation periods	**Total time (h)**	**Feeds/h**	**Mean prey length***	**Mean sandeel length***
Little Tern	77	84	2.67	1.14	1.38
Arctic Tern	13	12.75	5.54	1.47	1.54

*Prey length relative to bill length.

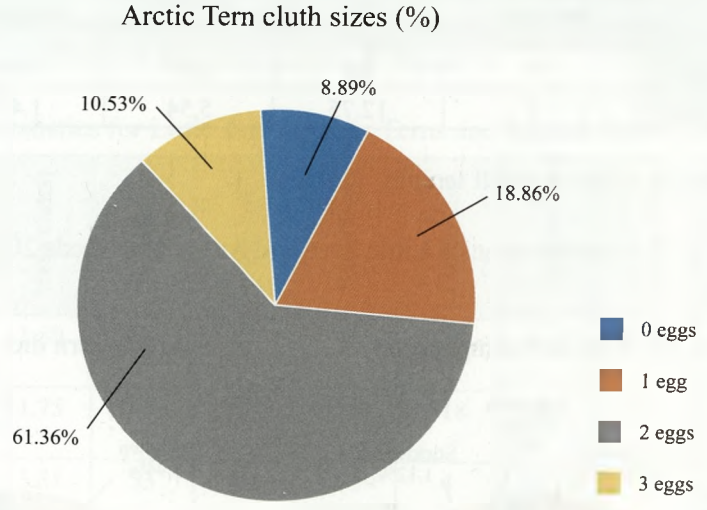
Figure 1. Diet composition of Little Tern and Arctic Tern feeds 2015.



Breeding statistics: Arctic Terns

The first egg date was 15 May, with hatching starting 8 June and the first fledgling on 27 June. This season 1,957 AON were counted, with a mean clutch size of 1.75 (mode 2). This is 196 pairs more than the mean of the last five years (1,761). Note that the average clutch size does not account for relays after tidal floods, bad weather and predation; the clutch size distribution is shown in Figure 2. Stoat *Mustela erminea* and Badger *Meles meles* caused significant predation (Table 3) and from the 1,957 pairs only 40 chicks fledged, giving a productivity of 0.02 chicks per pair (Table 1). This is the lowest productivity of any year since Arctic Terns started nesting at the Long Nanny reserve in 1980. The bad weather could have contributed to the death of many Arctic Tern chicks due to exposure. Feeding observations are summarised in Table 2; 36 Arctic Tern chicks were ringed.

Figure 2. Distribution of clutch sizes for Arctic Terns; not shown are six nests with four eggs (0.31%) and one nest with five eggs (0.05%).



Breeding statistics: Ringed Plovers

With an estimated 12-17 fledged birds, this was a successful breeding season for Ringed Plovers. Sixteen nests were located and monitored, and 11 of these were protected from predators with a wire mesh cage. Overall, 53 eggs were laid, giving an average clutch size of 3.31 and an estimated 12 to 39 hatchlings (these are difficult to monitor after hatching due to high mobility). Seven nests, representing 20 eggs and four chicks, were lost due to predation: two were predated by Stoat (one nest of four eggs, one nest of four chicks), two by Carrion Crow *Corvus corone* (four eggs each), three unknown (one nest with three eggs, two nests were scrapes without eggs). Despite the wire mesh cages, high winds and 'nest creep' brought eggs closer to the edge of cages and two nests were predated by Carrion Crow; this suggests that larger cages should be used in future so that predators cannot reach the nests.

Sources of disturbance to the breeding birds

Disturbance resulted from a range of activities. During their monitoring, site management and protection work, the Rangers inevitably cause some disturbance (Table 4). Other disturbance events were from a variety of causes and are broadly considered under two categories: non-predator and predator.

Non-predator disturbance, amounting to more than 58 hours, was due to human activities (aircraft, cyclists, kayakers, dog walkers and other beach users), other wildlife, weather events and tide (Table 4). For incidental walkers, most disturbances were caused when the tide was low enough for people to miss the signs and ropes. Some walkers approached the ropes at the boundary of the spit, and while most turned back, several would follow the ropes around the colony to reach the bridge over the Long Nanny River. When possible, the Rangers' priority was to intervene early to encourage beach users to use the diversion over the dunes, and avoid the spit altogether.

Many disturbance events were caused by beach users disturbing roosting birds on the beach; when these took flight, a 'domino effect' ensued which caused nesting birds to take flight as well. Many of these 'domino dreads' were caused by joggers, and there were occasional incidents of children running through the beach roosts deliberately to disturb the birds.

Despite notices requesting walkers to keep their dogs on a lead, free-running dogs caused substantial disturbance (Table 4b) and there were four incidents where dogs got into the colony, in one case killing two Arctic Tern fledglings. In these cases, the owners had little control over their animals and the Rangers had physically to remove the dogs from the site.

Overflying aircraft were also a problem and one large aircraft caused a period of disturbance lasting nearly 1.5 hours when terns left the colony and flew out to sea. In several disturbance incidents, microlight aircraft, reported to the Civil Aviation Authority, breached the 250 foot no-fly zone. Despite the no-fly zone, RAF helicopters regularly flew very close over the colony, causing large dreads, and military jets also caused short periods of disturbance.

Although jet skis were frequently present offshore throughout the season, these caused only one disturbance event lasting for two minutes. There were also two incidents involving speedboats, which caused short periods of disturbance.

Flyovers by other bird species, including Feral Pigeon, Little Egret *Egretta garzetta*, Mute Swan *Cygnus olor*, Meadow Pipit *Anthus pratensis*, geese species including Greylag *Anser anser*, Shelduck *Tadorna tadorna*, Lapwing *Vanellus vanellus*, Golden Plover *Pluvialis apricaria* and Shag *Phalacrocorax aristotelis*, caused periods of disturbance, while a passing Cuckoo *Cuculus canorus* caused a large dread on 7 July. Rabbits *Oryctolagus cuniculus* were the cause of several Arctic Tern dreads, but did not affect Little Terns.

Table 4. Disturbance events and time due to all causes in 2015 (a) with a breakdown of human-related disturbance (non-ranger; b) and by non-predatory wildlife (c).

(a)	Disturbance type				
	Ranger	**Public**	**Dog**	**Other**	**Unknown**
Duration[1]	23.5694	6.3347	3.85	8.6319	15.7019
Events	155	2838	151	172	1,270
(b)	**Beach user**	**Dog walker**	**Loose Dog**	**Vehicle[2]**	**Misc**
Duration[1]	1.5694	1.3347	2.8514	3.9653	0.7019
Events	77	64	87	81	24
(c)	**Large waders[3]**	**Grey Heron**	**Woodpigeon**	**Other bird sp.**	**Rabbits**
Duration[1]	0.5083	0.3111	0.2389	0.4708	0.2722
Events	38	17	13	33	13

[1] total duration in decimal hours; [2]aircraft/jet ski/boat; [3]Curlew and Oystercatcher.

Predator activity is summarised in Table 3, and accounted for in excess of 93 hours disturbance to the colony. A camera trap revealed that at least one Stoat bitch with two kits inhabited the site, becoming one of the most destructive predators of the 2015 season. While Stoats did not apparently predate any Little Terns, Arctic Terns and Ringed Plovers were significantly affected (Table 3); this does not include adult birds and chicks which may have been removed by Stoats to their dens. As a result of Stoat predation, Arctic Terns were expelled completely from the South Beach and Tern Garden areas.

Table 3. Tern losses by predators 2015.

	Little Tern		**Arctic Tern**		
Predator	egg	chick	egg	chick	adult
Stoat			160	102	13
Fox	12			1	1
Badger			100		
Black-headed Gull				3	
Lesser Black-backed Gull		1	0	7	
Arctic Tern	5	4	10		
Barn Owl					1
Carrion Crow			2		
Unknown	9	4			

Foxes *Vulpes vulpes* were responsible for some predation of tern eggs and chicks, but the impact of predation by Fox was reduced by the electric fence and by Ranger activity (chasing, shouting and lamping) during the night shift. Approximately 100 eggs were consumed by Badger (Table 3), contributing to the poor Arctic Tern productivity, but Little Terns were unaffected. An Otter *Lutra lutra* was seen on site twice but caused minimal disturbance and no predation was evident.

Crows made continuous attempts to steal eggs. In the north they were easily seen and could be chased away quickly but crows entering from the south were harder to spot. Two Arctic Tern eggs were confirmed predated by crows, but crows may have been responsible for numerous other egg losses. Towards the end of the season predation by gulls became a problem. A Lesser Black-backed Gull *Larus fuscus*, identified by missing half of one leg, predated Arctic and Little Tern chicks, and a Black-headed Gull *Chroicocephalus ridibundus* was seen to eat three Arctic Tern chicks (Table 3). Although causing considerable disturbance, predation attempts by a Kestrel *Falco tinnunculus* were unsuccessful. A Barn Owl *Tyto alba* was seen regularly on site during the season but was only seen to be successful on one occasion, taking an adult Arctic Tern. As described above, Arctic Terns were responsible for some losses of Little Terns.

Overall, 51% of disturbance due to predators was due to Stoat activity and 29% to gulls (all species).

Visitor Engagement

In 2015, the Long Nanny tern site had 2,227 visitors, who contributed financially to help the work through donations or by buying raffle tickets. Each visitor was informed about the site and the ground-nesting birds that use it. This spreads awareness of not only the Long Nanny site but also other sites across the UK that have ground-nesting birds. The media helped to further awareness of the site with several newspaper articles about the colony and the Rangers. A short video about the site is available on the National Trust website (http://ntnorthumberlandcoast.blogspot.co.uk/2015/06/the-long-nanny-tern-site-great.html), a separate YouTube video was created and the site was covered by BBC's *Countryfile* and ITV's documentary, *Robson Green's Northumberland.*

OVERVIEW

The 2015 season was mixed for the Little Terns, with unseasonable weather conditions, strong tides and predation resulting in fewer chicks fledging than in the previous year. Food appeared to be fairly scarce at the beginning of the season, and initial feeding surveys of early chicks showed worryingly small sizes and low feed frequencies. Sandeels were the most common prey, and made up most of the diet of later hatchlings when provisioning rates increased later in June, and remained consistently high. The season was also characterised by inter-species conflict with Arctic Terns predating Little Tern eggs and attacking and killing some chicks. From mid-July several Little Tern chicks disappeared, probably taken by aerial predators such as Carrion Crow and Lesser

Black-backed Gull. Despite such challenges, Little Terns were successful in fledging at least 14 chicks, with Ringed Plovers also raising up to 17 fledglings. In contrast, Arctic Terns had a disastrous year, with 1,957 pairs raising few fledglings. Stoats were the dominant predators of the season with a resident family decimating Arctic Tern numbers.

The 24 hour presence of the Ranger team on site is crucial to the success of the Long Nanny Little Tern colony, enabling predator impact and human disturbance to be minimised, and protecting the nesting birds from tidal inundation (Figure 3). The detailed recording of the causes and consequences of disturbance events is key to management of the site and it is clear that much needs to be done to reduce human disturbance, particularly the impact of dog walkers and other recreational beach users. This has to be achieved by continuing to work with the local community and providing educational resources at key coastline entry points to explain the importance of the site in a national and local context. It is also important to regulate the use of airspace over the site and to work with local flying clubs and the military to encourage aircraft pilots to avoid the area during the seabird breeding season. Conversely, facilitating regulated access of visitors is an important attraction for the area and provides an opportunity for people to experience the birds and understand the importance of conservation efforts.

Figure 3. The effects of high tide on the spit nesting area 2015.

ACKNOWLEDGEMENTS

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COQUET ISLAND: BIRDS AND MANAGEMENT FOR WILDLIFE IN 2015

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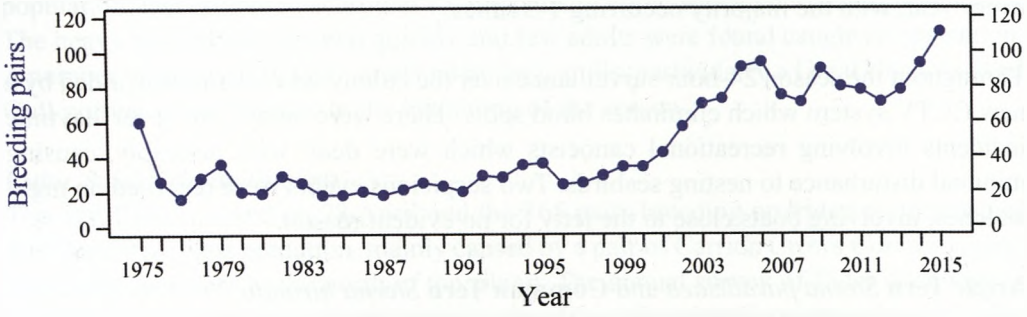
Coquet Island is a Special Protection Area (SPA) and a Site of Special Scientific Interest (SSSI) designated for its nationally important populations of breeding seabirds. The island is managed by the RSPB and, as well as being the breeding site of several tern species, Puffins, Eiders, Kittiwakes, Fulmars and a few pairs of Mediterranean Gulls, the island is home to the only breeding colony of Roseate Terns in the UK. Appropriate management of Coquet Island is therefore critical to the conservation of this species, which is listed on Annex I of the Birds Directive and Schedule 1 of the Wildlife and Countryside Act 1981. Although there is no public access on to the island, boat trips are run from Amble by a local boat company and allow the Roseate Terns to be seen and enjoyed from a safe distance offshore.

Roseate Tern *Sterna dougallii*

At the start of the season, RSPB staff prepared the breeding terraces by reinstating nest boxes in their allocated places and putting new boxes into additional nesting plots. Roseate Terns returned to the island on 15 April and the first egg was laid on 18 May, a day earlier than 2014; the last sighting was on 11 September. As the season progressed, the number of pairs returning and building new nests was consistently 20 above the curve (number week to week) compared to 2014, and continued to rise to a total of 111, the third consecutive year of increase and a 19% increase over 2014 (Figure 1).

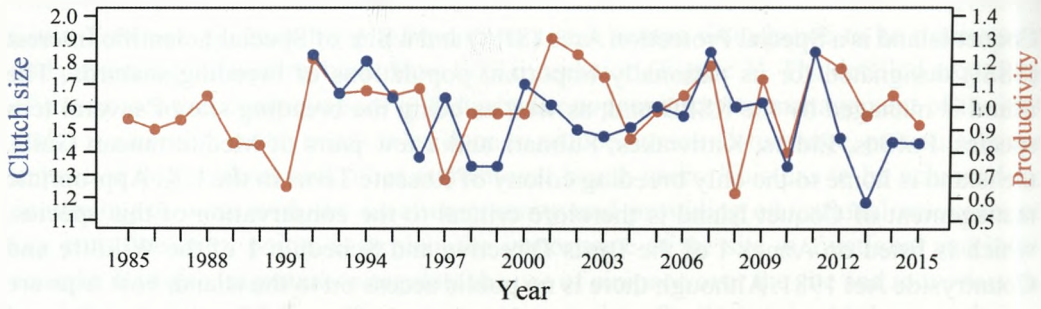
Figure 1. Roseate Tern breeding pairs on Coquet Island 1975-2015.



Only three pairs nested outside of the boxes, all towards the end of the season, and all of the chicks from these nests adopted boxes for shelter. Of the 160 eggs recorded, eight were missing/predated, 15 failed to hatch, 31 chicks were found dead and four chicks were missing (presumed predated). Two pairs re-laid in the same box after early failure, and were successful second time around. The clutch size decreased slightly (1.44), remaining below average (Figure 2), but clutches of three eggs were discovered in two nests this season. Productivity decreased from last year to 0.92 chicks fledged

per pair (Figure 2), with 102 chicks fledging. The main cause of failure was mortality of young chicks: although boxes provided some shelter, 29 chicks aged 1-5 days perished as a result of two consecutive storms which brought high winds and driving rain to the island for several days; two older chicks died after these storms.

Figure 2. Roseate Tern clutch size and productivity on Coquet Island 1992-2015.



All the fledged chicks were ringed with BTO rings on the left leg and a 'Rosy special' ring on the right. These special 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 2015 season over 215 unique rings were recorded, including a Spanish-ringed bird returning from last year. An estimated 15 adult birds were present without rings.

The ring-reading dataset for the last 10 years includes 639 unique rings and over this period the proportion of Coquet-ringed birds has increased, suggesting that the Coquet colony is being sustained and increased as a result of local production rather than immigration from the much-larger colony on Rockabill off the east coast of Ireland, where 1,388 pairs nested in 2015 (Rockablog 2015). Only three birds have been recorded every year, with the majority occurring 1-3 times.

Throughout the season 24-hour surveillance over the colony was maintained, aided by a new CCTV system which eliminates blind spots. There were many 'low level' daytime incidents involving recreational canoeists which were dealt with amicably, causing minimal disturbance to nesting seabirds. Two suspicious events were recorded on night watches, involving boats close to the jetty for no evident reason.

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

Arctic Terns returned to the island on 13 April and the first egg was found on 10 May. At 1,471 pairs, representing a 0.1 % increase on 2014, the population seems stable. Common Terns returned on 11 April with the first egg on 8 May; the population count of 1,160 pairs represents a decline of 3% on 2014 population. Predation pressure from large gulls was noted throughout the season, increasingly as Black-headed Gulls began to fledge and leave the island. With the combination of predation and the poor weather, the productivity of both species declined (2014 figure in brackets) with 0.59 (1.3) and

0.47 (1.5) chicks per pair for Arctic Terns and Common Terns, respectively. As part of a long-running study on the body condition of Arctic Tern chicks, initiated in 1995, body mass and total head length in a sample of chicks was measured: compared to the overall mean 2015 was a relatively poor year and this suggests that, in addition to the weather, food availability may also have been a factor in low productivity.

Sandwich Tern *Sterna sandvicensis*
Sandwich Terns arrived on 6 April and first nested on 29 April. The number of breeding pairs (1,624 in two colonies) declined by 7% from 2014. The first colony exceeded 1,300 nesting pairs and a peripheral colony developed a few weeks later taking the total to 1,624. Variation in lay dates within the main colony prevented accurate productivity estimates but casual observations suggested a good season, with few dud eggs or dead chicks discovered after breeding. The Sandwich Terns were left largely untroubled by predators until the end of July and the first week of August when later-breeding birds were subject to predation by Lesser Black-backed Gulls *Larus fuscus*.

A colour-ringing project to investigate the breeding site fidelity of Sandwich Terns was initiated in 2013 and is now in its third year. This year 144 chicks were ringed with lettered colour rings on Coquet Island and ring-reading efforts resulted in the identification of 50 individuals within the colony; these were birds colour-ringed as fully grown or adults after capture in mist nets on the Ythan Estuary, Aberdeenshire, but also included several birds ringed as chicks in Dutch colonies. Six ringed as chicks in Northumberland in 2013 were seen on Coquet Island and we expect that birds ringed in the first year of the project will return to breed next year. The project is also yielding detailed information on post-fledging dispersal before their southward migration.

Puffin *Fratercula arctica*
This was not a census year but Puffins returned to the island in good numbers and the population, last estimated at around 15,800 pairs in 2009, appeared to be in good health. The heavy rain in June drained quickly and few adults were found caught in vegetation. A number of birds (>50) were predated by large gulls, particularly a Great Black-backed Gull present on the plateau at the beginning of the season.

Eider *Somateria mollissima*
The first Eiders nested on 28 April and the 365 pairs breeding provided an increase of 4.6% on 2014. Nest predation, mainly caused by a pair of Carrion Crows *Corvus corone*, was more prevalent to the north of the island. The annual survey of Eider ducklings in Amble Harbour and the Coquet Estuary by Hilary Brooker-Cary started on 22 May 2015 (24 May in 2014) and finished on 31 July as usual: the highest daily count of 79 (142 in 2014) was recorded on 9 June 2015 (9 June 2014). Despite the increase of Eiders nesting on Coquet Island, the daily count total for Amble Harbour and the Coquet Estuary was low compared to 2014. This year there was an unusual number of small Eider ducklings present in the survey zones after the end of the survey, some of which were particularly small for this stage in the season.

Black-headed Gull *Chroicocephalus ridibundus*
The Black-headed Gull population decreased by 2.4% from the 2014 total to 4,627 pairs, with the first egg on 16 April, a day later than 2014. The mean clutch size decreased slightly from 2014 to 2.64 per pair and productivity fell from its peak in 2014 to 1.37 this year. Poor weather was the main cause of chick mortality but this species was also heavily predated by large gulls with almost continuous attacks.

Mediterranean Gull *Larus melanocephalus*
Three pairs of Mediterranean Gulls bred on the island this year, with two nests hatching three chicks each and one nest with two chicks. Of these, three small chicks were found dead when the nests were first visited and five chicks were ringed. At these initial visits the nests were enclosed with low plastic fences to allow the nests to be monitored. On subsequent visits four chicks were alive and were then each ringed on the other leg with a yellow colour ring inscribed with four alphanumeric characters. One of these birds was subsequently seen and photographed in Amble Harbour.

Fulmar *Fulmarus glacialis*
The Fulmar population increased from last year by 5.9% to 54 pairs. The first nest was on 27 May and productivity improved in 2015 to 0.69 chicks per pair. No signs were found of the polystyrene balls regurgitated in 2014, and a single chick had died from malnutrition.

Kittiwake *Rissa tridactyla*
Kittiwakes are on an upward trend on Coquet Island, and have increased by 13.2% on 2014 to 326 pairs this year, with colonisation expanding along the cliffs on the south and eastern sides of the island. Kittiwakes were first seen at nest sites on 11 March with the first eggs on 15 May. Clutch size increased to 1.9 and there was little evidence of gull predation compared with 2014; as a result, productivity increased from its 2014 level to 1.27 chicks per pair.

Large Gulls
A research project was initiated in 2012 to study the impact on breeding terns of the Lesser Black-backed and Herring Gulls *Larus argentatus* that also nest on the island. Since 2013 there has been an effort to ring parents and chicks to study predation by the nesting gulls on tern chicks. Ten adult gulls were trapped on the nest at the incubation stage; adults and surviving chicks from study nests were ringed with a BTO ring on one leg and a green ring (with white alphanumeric characters) on the other. A family party comprising an adult and two colour-ringed Lesser Black-backed Gull chicks was subsequently seen by birdwatchers at nearby Hauxley Nature Reserve, and one of these chicks has since been seen in Malaga on the Mediterranean coast of southern Spain. Some of the colour-ringed adults have also been reported from wintering sites on the Iberian Peninsula.

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 were present throughout the season, predominantly on the northeast of the island, and were seen in the tern colonies or over the Roseate Tern terraces on numerous occasions.

During the winter 36 Twite were present into March 2015 and the island supported Turnstone *Arenaria interpres* (varying between 20-75) and Purple Sandpipers *Calidris maritima* (peak count of 122 in March 2015). Grey Seals *Halichoerus grypus* were also present on and around the island during the winter and the size of the loafing population varied greatly depending on tide and weather, with a peak count of 520 in March 2015; in addition, two seals were pupped in November 2014.

Figure 4. Rock Pipit *Anthus petrosus* with sandeel © Wesley Davies.

OVERVIEW

Sandeels *Ammodytes tobianus* are an important food source for Coquet Island birds (and not just seabirds! Figure 4). Feeding for all species appeared good throughout the 2015 season, although a low body mass of Arctic Tern chicks suggests that sandeel availability for this species may have been more limited than last year. Two periods of strong winds separated by cold drizzle at the end of June, while terns were on small chicks, resulted in a high mortality rate which had detrimental effects on the productivity of Black-headed Gulls and Roseate, Arctic and Common Terns. For Arctic and Common Terns this was particularly evident in shaded areas or dense sward of Yorkshire Fog *Holcus lanatus*. Sandwich Terns fared better due to their slightly more advanced age and self-managed nesting area. Roseate Tern productivity was better than that of Common and Arctic

Tern; this better outcome was partially due to protection from the boxes but is also positively biased as a consequence of the continuous monitoring of all nests. For Arctic and Common Terns productivity estimates were based on the numbers of near-fledged birds in enclosed sample plots counted on a single date. Despite the poor weather, no flooded Puffin burrows were noted and Kittiwake nest failure was on par with previous years.

From a conservation management perspective, vegetation growth on the island remains the main concern, with wet weather conditions causing dense growth of Yorkshire Fog early in the season. Nevertheless the Eider 'walkways' though the vegetation remained usable by the birds for most of the season, facilitating access of family parties to the sea for their journey to the River Coquet estuary on the adjacent mainland. Greylag and Canada Geese have started to nest on the island in small numbers and graze vegetation in some areas. This can keep the Yorkshire Fog under control, but at the risk of excessive vegetation loss which could lead to erosion. With careful documentation, this will be an interesting 'natural experiment' which may help with future vegetation control on the island.

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 contributes his expertise for ringing the Roseate Tern chicks. We thank Anna Daniels for her efforts on the night watches as a Species Protection Assistant and the other volunteers who helped with this task. RSPB residential volunteers provided much-needed hard labour for vegetation management. We also thank our student placements Pedro Rocha and Hannah Tilley for help on the Gull project.

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RINGING FOR SEABIRD MONITORING AND CONSERVATION: FARNES, COQUET AND LONG NANNY

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INTRODUCTION

Given increasing pressure on the marine environment from fishing, recreational use, offshore energy generation and mineral exploitation, it is essential to understand how human activities conflict with the needs of wildlife. Although originally a tool to find out about the movements and migration of birds, ringing has become an essential tool for seabird conservation by allowing productivity, survival and return rates, colony connectivity and causes of mortality to be measured (Harris and Tasker 1999). The availability of colour rings with alphanumeric codes that can be read through a telescope now considerably increases the information and conservation value of ringing effort. Furthermore the continuing development of small electronic data loggers such as GPS trackers allows detailed study of foraging behaviour and how this relates to the physical characteristics of the marine environment. Ringing takes place on the Farne Islands, Coquet Island and the Long Nanny each year and addresses seabird conservation priorities from a range of perspectives. An overview of some of the main projects are given below, and seabird ringing totals are given in Table 1.

TERNS

Little Tern

The Long Nanny is one of a few sites in Northumberland where these rare terns breed. The National Trust and Northumberland County Council are partners in an EU-funded LIFE12 project, coordinated by the RSPB over five years, which aims to lay the foundations for the long-term recovery of the Little Tern in the UK. One objective of the project is to use colour ringing to understand Little Tern population structure: the survival rates, recruitment and connectivity between different breeding groups along the coast. Little Tern chicks at the Long Nanny are ringed by Mike Hodgson when opportunities allow, and although 11 were ringed in 2015, they were too small for colour rings to be fitted as well. Little Terns also roost on the Farne Islands before dispersing to their breeding sites, and over the last two years we have experimented with techniques for catching them safely so that colour rings can be fitted. This year we again caught a single bird, which was fitted with a yellow colour ring inscribed in black letters with a three-letter code.

Arctic Tern

Arctic Terns are ringed as chicks on the Farnes, Coquet Island and the Long Nanny, and adults are also trapped for ringing on the Farnes and Coquet Island. Samples of chicks on the Farnes and Coquet Island are also weighed and measured to establish objective measures of annual variation in body condition each year. The capture of adult birds

on a regular basis allows us to build up data for survival rate analysis and to monitor body condition, nesting site preferences, recruitment and movement between colonies. The project is beginning to generate results and this year we had our first example of breeding dispersal involving an adult bird trapped on a nest (2 eggs) on Inner Farne in 2012 which was trapped as a breeding bird on the Isle of May in 2015. In addition, in 2015 a sample of adult Arctic Terns on Inner Farne were fitted with tiny electronic geolocators (Figure 1). If we are successful in recovering some of these devices when the birds return in the 2016 season, we will be able to determine where the birds have been during the winter and to study their overwinter foraging behaviour.

Figure 1. Arctic Tern with geolocator (left leg) on Inner Farne in 2015.

Roseate Tern

Roseate Terns are a Northumberland speciality with over 100 pairs nesting on Coquet Island. Chicks are ringed each year for the RSPB by Tom Cadwallender of the Northumbria Ringing Group. These birds are also fitted with an additional metal ring which can be read more easily through a telescope and is giving important information on recruitment and survival rates.

Sandwich Tern

Sandwich Terns nest in dense colonies on Coquet Island and on Inner Farne. The number of breeding pairs can fluctuate markedly from year to year and in 2013 we initiated a colour-ringing project of chicks with the aim of measuring breeding dispersal by establishing cohorts of uniquely identifiable colour-ringed breeding adults in the Inner Farne and Coquet Island colonies. A by-product of this effort is that we are also building up an accurate picture of post-breeding dispersal and wintering movements from reports of these birds away from the colony (Figure 2). Some of the chicks from the 2013 cohort were seen in the North East towards the end of the 2015 breeding season and we would

expect to see these as breeding birds in the Inner Farne and Coquet Island colonies from 2016 onwards. One nice series of sightings concerned Red-UZA, a chick ringed on Inner Farne on 17 July 2013, which was seen for the first time in Normandy on 1 August 2015 and seven days later was at Dawlish Warren, Devon; by 27 August 2015 this bird was on Coquet Island, possibly prospecting for suitable breeding sites for next year. In the 2015 season, an additional 285 Sandwich Tern chicks were colour ringed (Table 1), giving a total for the project overall of 727 birds.

Figure 2. Blue-UHD: ringed as a chick on Inner Farne on 28 June 2014 and seen in Hermanus, South Africa (just south of Cape Town) on 25 October 2015. Photo © Naomi and Ronald Huig.

SHAGS AND AUKS

Since 2009, Shags ringed on the Farnes have also been ringed with plastic colour rings with three letters. This is a project coordinated by researchers from the Centre for Ecology and Hydrology based on the Isle of May to study colony recruitment, dispersal, wintering locations and mortality (Barlow *et al.* 2013). Shags seem to be particularly vulnerable to severe winter storms and the colour ringing programme allows effects on different age classes to be studied. Colour ring sightings are also confirming results from metal ring recoveries showing that Farnes Shags mainly disperse north in winter. However, a few do disperse to the south and a very unusual example is the recent recovery of a first-winter Shag (ringed as a chick in 2015 on Inner Farne) which was found well inland near Bedford on 7 February after hitting trees. The breeding season foraging behaviour of Farnes Shags is being studied by Liz Morgan for her PhD project (see page 100).

Small samples of Puffins are ringed each year, mainly on the Farnes but also on Coquet Island when time allows, with the aim of collecting biometric data on the adults and chicks which can help to indicate differences in food availability between Puffins (which forage throughout the water column) and surface feeders such as Arctic Terns and Kittiwakes.

GULLS

Kittiwakes have been the subject of a GPS tracking project in previous years (Redfern and Bevan 2014); since completion of the project, no further birds have been tagged with GPS loggers, but chicks and adults are regularly ringed on the Farnes and Coquet Island to maintain ringed birds in the population for the estimation of survival rates and causes of mortality from ring recoveries. Biometric data are also taken from adults and chicks to assess body condition. Samples of Black-headed Gull chicks in enclosed plots are ringed on Coquet Island each year as part of productivity monitoring. Coquet Island is also home to several pairs of Mediterranean Gulls and four chicks were ringed with colour rings in 2015 to monitor their dispersal and potential future recruitment into the UK breeding population.

Lesser Black-backed and Herring Gulls nest on the Farnes and Coquet Island and have the potential to affect the other breeding seabirds if their populations grow unhindered. To assess the impact on the Roseate Terns, a project was initiated in 2014 to study the feeding behaviour of large gulls nesting on Coquet Island. As part of this project the adult birds (caught on the nest) and their chicks are being colour ringed. Catching methods were refined in 2015 and 10 adults were successfully trapped and colour ringed, as were five chicks from successful nests. The purpose of colour ringing the adults is to identify individuals and their foraging strategies at their breeding site (Figure 3), but another consequence is that these birds can be identified elsewhere and several of the adult and juvenile birds have been seen on their wintering areas in Spain and Portugal.

Figure 3. Colour-ringed Lesser Black-backed Gulls from Coquet Island: parent and hungry chick feeding at Hauxley Nature Reserve. Photo © Alan Gilbertson.

Table 1. Seabird ringing totals for the Farnes, Coquet Island and the Long Nanny, 2015. Natural History Society of Northumbria except: [a]Mike Hodgson; [b]Tom Cadwallender. 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						17	30		48
Storm Petrel *Hydrobates pelagicus*	9			3						12
Leach's Petrel *Oceanodroma leucorhoa*	1									1
Shag *Phalacrocorax aristotelis*	28			22			195			245
Puffin *Fratercula arctica*	44			1			63			108
Razorbill *Alca torda*	1									1
Little Tern *Sterna albifrons*	1								11	12
Sandwich Tern *Sterna sandvicensis*	1						140	144		285
Common Tern *Sterna hirundo*								29		29
Roseate Tern *Sterna dougallii*								104[b]		104
Arctic Tern *Sterna paradisaea*	42	1		71	2		671	116	36	939
Kittiwake *Risa tridactyla*	12						187	55		254
Black-headed Gull *Chroicocephalus ridibundus*							11	41		52
Mediterranean Gull *Larus melanocephalus*								5		5
Lesser Black-backed Gull *Larus fuscus*		9					1	5		15
Herring Gull *Larus argentatus*		1					9			10
Totals	140	11	0	97	2	0	1,294	529	47	2,120

ACKNOWLEDGEMENTS

Many local organisations give their support to these various ringing projects and I am extremely grateful to the National Trust and to the RSPB for allowing ringing studies to take place on the islands in their care. I thank Mike Hodgson and Paul Morrison for details of ringing on the Long Nanny and of the Roseate Terns on Coquet Island, respectively. Most of the ringing of seabird chicks on the Farne Islands was done by the National Trust Rangers as part of their monitoring work and I am extremely grateful for their support, time and effort, and I thank Elizabeth Morgan for her work with colour ringing the Shags. I also thank William Shiel and his crews for transporting me and equipment across to the Farnes when necessary, and the BBC production team led by Hannah Hoare for their support of the Arctic Tern geolocator project. The Sandwich Tern study would not have been possible without the support of Paul Morrison and Wesley Davies on Coquet Island and I am extremely grateful for their enthusiasm, camaraderie and willingness to get involved.

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FARNES SHAG RESEARCH PROJECT: 2015 UPDATE

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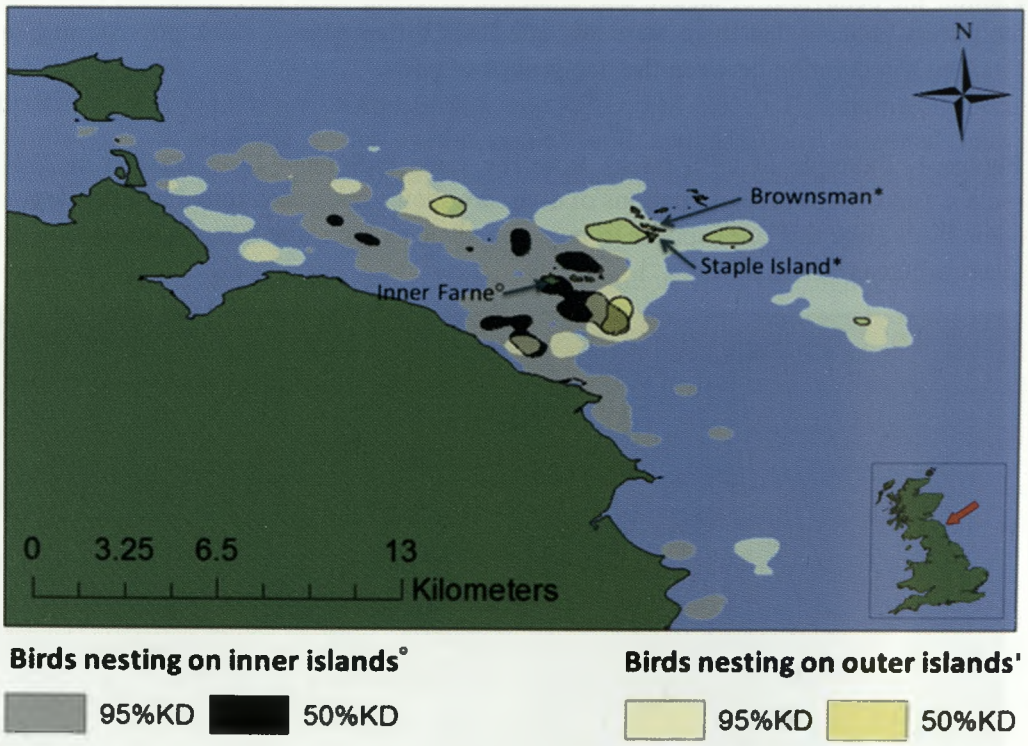
2015 was another good field season for Shag *Phalacrocorax aristotelis* research on the Farne Islands. We continued our tracking study, successfully catching and fitting 26 additional birds with global positioning system (GPS) devices and depth recorders. This takes our dataset up to 600 trips recorded, from 44 individual Shags. With an average of seven trips recorded per bird, we have a good set of results to examine how consistent birds are with respect to their foraging behaviour. We managed to catch (and re-catch) 14 of the same birds which were tracked in 2014; 10 of these individuals provided enough trip data to enable us to examine levels of repeatability in foraging locations between years (Fig 1). In addition, 100 additional pellets (regurgitated indigestible food remains) were collected for our diet analyses. This year, nest cameras were used to monitor the behaviour of tagged and untagged breeding birds on Lighthouse Cliff and the results indicate that there were no significant differences in chick provisioning or foraging trip duration between the two groups of birds.

Figure 1. Example of GPS tracks from the same individual Shag tracked in 2014 (yellow) and 2015 (blue). Locations of dives are shown as circles. Initial results suggest some birds (like this one) appear to be using some of the same foraging areas in both years, whereas others do not.

Despite this season being a good year for us, it seems that 2015 was a bit tougher for the Shags. Our tracking results indicate that, on average, birds travelled slightly further to forage overall (by around 1.86 km) in 2015 compared to 2014. We also recorded a higher level of chick mortality, indicating that foraging conditions may have been more difficult this year. In addition we found that in both years (2014 and 2015) birds nesting on the Outer Group travelled further to forage than those nesting on the Inner Group (average maximum range: Inner birds 2.8 km; Outer birds 3.4 km). When we plotted the distribution of birds' foraging areas, we discovered that there was much less overlap than one might expect in the areas actively used by the Inner- and Outer-Group birds (Fig 2). Interestingly, productivity has always been slightly lower on the outer islands, and we plan to explore this potential link between nesting location, foraging behaviour and reproductive success in future work.

Figure 2. Map showing the segregation in core foraging areas of Shags nesting on the inner and outer islands. Calculated using kernel density estimates from diving locations.



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Northumbrian *Naturalist*

Coastal Wildlife 2015: Farne Islands, Coquet Island and The Long Nanny

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