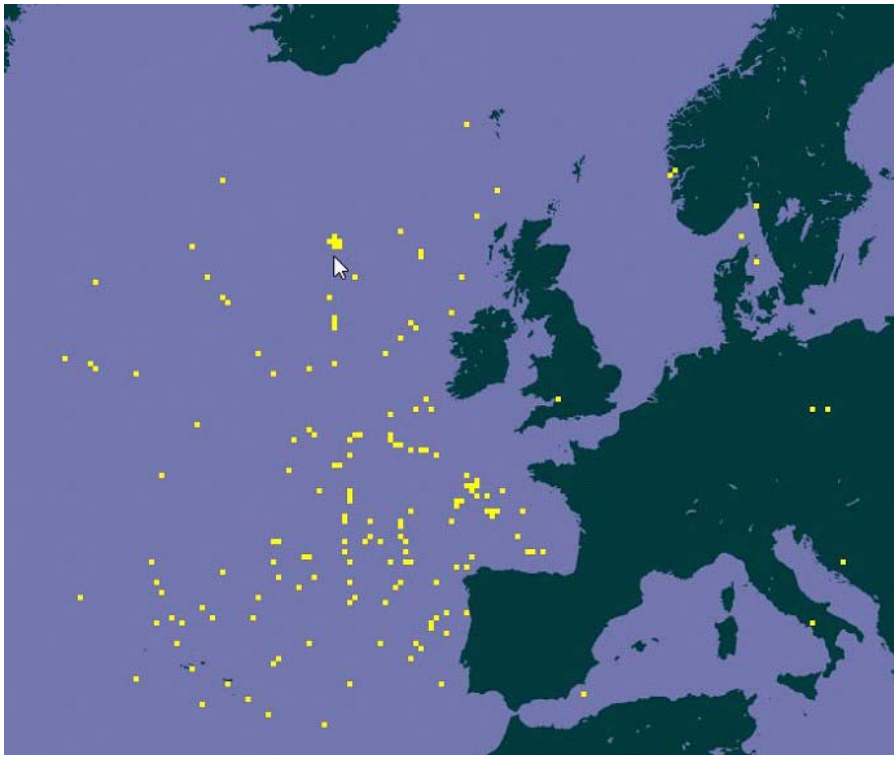

Nature in Avon
Volume 76

Bristol Naturalists' Society

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The Bristol Naturalists' Society aims to stimulate a greater awareness of natural history and geology in the Bristol area. It is a thriving and friendly Society with something of interest for everybody, young or old, professional or amateur. It is actively involved in a long term programme of education, research and conservation. Each year its talks, trips and publications are enjoyed by hundreds of people wanting to find out more about our natural world.

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ISSN 0068-1040

Nature in Avon

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Editorial

Databases are wonderful things. I remember the days when reading an article from any journal consisted of lengthy searches of indexes and library shelves. Although there is still a place for the serendipity which characterises thumbing through a physical book, the advent of the search function has placed history literally at our fingertips. We can read the Bristol Naturalists' Society reports right back to 1863 and several of this issue's contributors have made good use of this and other natural history databases.

Jon Mortin has been delving through some of the Bristol Museum and Art Gallery records and discovered a fascinating report of the deep sea Silver Hatchetfish being found in the Severn Estuary. Jon has also been searching the new national database, iRecord and has contributed quite a number of records to the Invertebrate survey.

Richard Bland has been looking at records of first flowering dates going right back to Gilbert White's forays on horseback. (Quite how Gilbert White recorded when riding, I find it hard to imagine, but maybe his eyesight was better than mine!). Mike Bailey has been updating his own report published in Nature in Avon about birds trapped in the Helgoland Trap at Chew Valley Lake.

Modern technology doesn't provide the records though, that's the job of the dedicated band of recorders. I had no idea there were so many beetles! Bob Fleetwood has been working hard to identify the large numbers that occur around the estate at Tyntesfield and John Burton shares with us his detailed observations made over many years at Sheep Wood, Westbury on Trym. Rupert Higgins has been surveying badgers at the Bommie and Glyn Vale sites.

Lucy Wallis-Smith reports on a project to interest students in the identification of Fungi. We now have a real shortage of experts in this field so this work is much needed. Jean Oliver, who acted as a mentor, has provided a description of the Crown Gall, found locally.

Ray Barnett provides a comprehensive report on the Invertebrates and notes that 2016 was a poor year. Maybe this is linked to the recent announcement by the World Meteorological Organisation that global average temperatures were the hottest since 1880. They believe a combination of the El Nino and Global Warming is responsible.

An understanding of the changes that occurred in our flora and fauna during past climate changes is essential and Mark Howson has been looking at some very interesting and unusual local trace fossils, which occur near Portishead.

I hope you will enjoy this issue. My thanks go to the committee for their help and advice.

Dee Holladay

Some Insects at Tyntesfield National Trust

Bob Fleetwood

The National Trust property at Tyntesfield, between Bristol and Clevedon, is justifiably well-known for its house and gardens. However, there is also an extensive estate surrounding the main property which, from an entomological perspective, is of greater interest. This article is an account of one person's individual approach to exploring what the estate has to offer in terms of beetles (Coleoptera), bugs (Hemiptera) and moths (Lepidoptera).

I am strictly an amateur; having been freed from the shackles of engineering through retirement, I am now able to indulge a new-found interest. I am indebted to several experienced entomologists for their assistance, but the journey so far has been largely self-taught and, consequently, very rewarding. I started the study of beetles in 2014, but this account largely summarises the results of the period from spring 2015 to summer 2016, exploring the beetles on the Tyntesfield estate, as a Wildlife Volunteer.

Beetles

National Trust were keen to discover the extent of biodiversity at the estate and this gelled neatly with my objective of finding as many species as possible, in order to widen my knowledge of British beetles. Hence I have employed a variety of catching techniques, each of which targets a different group of our 4000-odd species.

I started in the spring by using a newly-acquired suction sampler (a modified garden leaf blower/vacuum). I had been warned that this could result in a large amount of material to process and this was, indeed, the case. Ten minutes "hoovering" the grass verges round the car park led to many hours searching through books and the internet for identification keys. These initial samples were largely ground beetles, rove beetles, leaf beetles and weevils.

As spring progressed to summer, I added a sweep net and beating tray to my armoury and these further expanded the range of families, including click beetles, soldier beetles and longhorns, as well as a number of other smaller families.

The height of summer is when many insects are on the wing, both in the day and at night, and so other trapping methods came into play. I have undertaken several moth-trapping sessions using 125W Mercury Vapour light traps and these invariably produce a number of beetles and bugs as "by-catch". I have had water beetles turn up, even if the trap is a long way from water.

The other method I have used for catching flying beetles is in a flight interception trap. There are numerous designs of such traps, but I have used only two, both based

on the principle of a crucifix of transparent plastic or perspex, fitted above a collecting tray and located in a tree. These two vane traps have produced some surprising and quite valuable results, particularly the one I positioned near to a large pile of logs which have been left undisturbed by National Trust as a contribution to habitat enrichment.

Beating tray

Sweep net

Vane trap

Another method of catching that I employed was pitfall traps. These were simply empty, dry 300ml yoghurt pots, set in the ground with the rim at ground level, then covered to keep rain out while allowing insects to walk under and into the trap. A small disc of chicken mesh also covered the trap to prevent small mammals from dropping in. I located these in two areas: around the buildings near the walled garden and along the edge of a meadow at the top end of the estate. This method was successful in catching a number of ground-dwelling species, but eventually I took the traps away, as too many smaller beetles were being eaten by the large

Devil's Coach-horse *Ocypus olens*, which seems to be ubiquitous in the areas I sampled.

I have also found specimens by sieving through leaf litter, woodchip piles and grass tussocks. This had the advantage that bags of material could be collected and taken home to be gone through at leisure without having to kneel for protracted periods.

Another technique I have employed has been to take home chunks of decaying wood and small samples of fungus. These can be stored in suitable containers in the hope that beetle larvae may pupate and eventually emerge as adults. This worked particularly well with a small puffball fungus that produced an adult *Lycoperdina bovistae* – a beautiful, shiny, mahogany red, Nationally Rare beetle (known from less than fifteen 10km squares across Great Britain).

The sampling I have done throughout the period has been in parallel with work commissioned by National Trust to survey the entomological populations of a selection of their older trees. This work has been undertaken by Dr Keith Alexander, national expert on saproxylic fauna (organisms which depend on dead or dying wood or the associated fungi), throughout spring-autumn 2016. I have been fortunate in being able assist in the fieldwork and look forward to seeing the results in due course.

The list of species identified during the period under consideration is given in Appendix 1 (all my local entomological records are submitted to the Bristol Regional Environmental Records Centre (BRERC) at the end of the year). The keen-eyed will notice that there are very few records of Aleocharine Staphylinids, Pollen Beetles, and some of the very small brown beetles. Although many have been caught, few have been identified, simply because they are too difficult! Until I become much more experienced, the subtleties of identification of Aleocharines are beyond me and trying to manoeuvre a 1mm long beetle under a microscope, using micro pins set in matchsticks is like undertaking eye surgery using a screwdriver. Beyond me!

The highlights of the list, from a scarcity point of view, are probably *Gauropterus fulgidus*, *Microrhagus pygmaeus*, *Ctesias serra*, *Phloiophilus edwardsii* and *Lycoperdina bovistae*.

Bugs

I have largely restricted my recording to the Heteropteran true bugs. I started to undertake identification of the various 'hoppers' (Auchenorrhyncha), but, frankly, I found it too much to undertake whilst still trying to get to grips with the true bugs and beetles. However, they are a fascinating group of insects for anyone who is looking for a challenge. I nearly changed my mind about this, however, when I caught an adult *Ledra aurita* in a moth trap. It is quite large, for a leafhopper, and has a most bizarre appearance.

The Heteroptera encountered at Tyntesfield are listed in Appendix 2. Most of the species were identified as adults, but some as larvae (nymphs). Relatively large numbers of nymphs are found when using a beating tray in summer, but many are too small or too early in their development to facilitate easy identification. The majority of bugs were found by beating or sweeping, but a few were obtained in vane traps and some ground bugs (Lygaeidae) were caught in the vacuum sampling.

Ledra aurita

Moths

The history of recent moth trapping at Tyntesfield started in the summer of 2003 when two of my colleagues, Paul Chapman and Howard Taffs, ran approximately five trapping sessions a year for the following four years. By the end of 2006 the total number species recorded was 224. There was then a break of four years until a Bioblitz in 2011 prompted a re-starting of regular, if *ad hoc*, trapping and that was when I became involved in surveys at Tyntesfield. This article concerns the period since spring 2015, when the total had reached 310; it now stands at 345 (a list of moths has not been appended).

It is not possible to draw any statistically relevant conclusions from these numbers, other than to say that the estate supports a reasonably healthy population of moths. A detailed study of the trapping results shows that there is a disproportionate number of new micro-moth species, compared to macro-moths, in the past few years. No doubt this is, in part at least, attributable to the publication of Sterling and Parsons very good 'Field Guide to the Micro-moths of Great Britain and Ireland' in 2012.

Most of the trapping has been carried out in, or adjacent to the woodland to the north and east of the main house. Future trapping should, perhaps, be tried in some of the other habitats in the estate. The catches may not be as species-rich, but may identify some species that are not normally found in woodland. (It may also reduce the likelihood of attracting hornets, which can be a nuisance in the woods).

Acknowledgements

I would like to thank Darren Mait and Janine Connor for their assistance and permission to survey at Tyntesfield; and Ray Barnett for his encouragement and assistance with identification.

Appendix 1 – List of Coleoptera

Carabidae
Carabus problematicus
Carabus violaceus
Leistus rufomarginatus
Leistus fulvibarbis
Leistus ferrugineus
Nebria brevicollis
Notiophilus biguttatus
Bembidion guttula
Bembidion lampros
Bembidion properans
Bembidion tetracolum
Bembidion quadrimaculatum
Bembidion obtusum
Ocys harpaloides
Poecilus cupreus
Poecilus versicolor
Pterostichus madidus
Pterostichus melanarius
Pterostichus minor
Pterostichus vernalis
Pterostichus strenuus
Abax parallelepipedus
Calathus rotundicollis
Calathus melanocephalus
Anchomenus dorsalis
Agonum muelleri
Amara plebeja
Amara aenea
Amara communis
Amara familiaris
Amara lunicollis
Amara similata
Badister bullatus
Demetrias atricapillus
Paradromius linearis
Dromius meridionalis
Dromius quadrimaculatus
Calodromius spilotus
Philorhizus melanocephalus

Helophoridae
Helophorus brevipalpis

Hydrophilidae
Sphaeridium lunatum
Cercyon analis
Megasternum concinnum

Histeridae
Abraeus perpusillus
Plegaderus dissectus
Dendrophilus punctatus
Paromalus flavicornis
Margarinotus merdarius

Ptilidae
Ptenidium laevigatum
Ptenidium nitidum

Leiodidae
Nargus velox
Nargus wilkinii
Sciodrepoides watsoni
Catops fuliginosus
Catops fuscus
Catops grandicollis
Catops nigricans

Staphylinidae
Scydmaenus tarsatus
Lesteva longoelytrata
Lesteva sicula ssp. heeri
Eusphalerum luteum
Omalium italicum
Metopsia clypeata
Megarthrus depressus
Proteinus brachypterus
Micropeplus fulvus
Micropeplus staphylinoides
Tachyporus chrysomelinus
Tachyporus dispar
Tachyporus formosus
Tachyporus hypnorum
Tachyporus nitidulus
Tachyporus obtusus
Tachyporus solutus
Tachinus laticollis
Tachinus rufipes
Lordithon lunulatus
Habrocerus capillaricornis
Drusilla canaliculata
Autalia longicornis
Cypha longicornis
Siagonium quadricorne
Anotylus rugosus
Anotylus sculpturatus
Stenus clavicornis
Stenus brunnipes
Stenus fulvicornis
Stenus nitidiusculus
Stenus picipes

Stenus impressus
Stenus ossium
Stenus subaeneus
Paederus littoralis
Sunius propinquus
Philonthus carbonarius
Philonthus cognatus
Philonthus decorus
Philonthus laminatus
Philonthus marginatus
Bisnius fimetarius
Gabrius appendiculatus
Ocypus olens
Ocypus aeneocephalus
Quedius cruentus
Quedius lateralis
Quedius fuliginosus
Quedius maurorufus
Quedius picipes
Quedius semiobscurus
Quedius umbrinus
Othius punctulatus
Othius subuliformis
Gauropterus fulgidus
Gyrohypnus fracticornis
Xantholinus linearis
Xantholinus longiventris

Lucanidae
Dorcus parallelipipedus

Scarabaeidae
Aphodius depressus
Aphodius rufipes
Aphodius fimetarius
Aphodius prodromus
Aphodius sphacelatus
Melolontha melolontha
Hoplia philanthus

Eucnemidae
Microrhagus pygmaeus

Elateridae
Agrypnus murinus
Denticollis linearis
Athous bicolor
Athous haemorrhoidalis
Agriotes acuminatus
Agriotes pallidulus
Agriotes sputator
Melanotus castanipes/villosus

Cantharidae
Cantharis cryptica
Cantharis decipiens
Cantharis nigra
Cantharis pellucida
Cantharis rufa
Rhagonycha limbata
Rhagonycha fulva
Rhagonycha lignosa
Malthinus balteatus
Malthinus flaveolus
Malthinus seriepunctatus
Malthodes flavoguttatus
Malthodes marginatus

Dermestidae
Ctesias serra

Ptinidae
Grynobius planus
Ochina ptinoides
Anobium punctatum
Anobium fulvicorne
Ptilinus pectinicornis

Phloiophilidae
Phloiophilus edwardsii

Dasytidae
Dasytes aeratus

Malachiidae
Malachius bipustulatus

Kateretidae
Brachypterus glaber

Nitidulidae
Epuraea aestiva
Epuraea biguttata
Epuraea melanocephala
Meligethes aeneus
Cryptarcha strigata
Glischrochilus quadriguttatus

Monotomidae
Rhizophagus bipustulatus
Rhizophagus dispar

Cucujidae
Pediacus dermestoides

Phalacridae
Stilbus testaceus

Cryptophagidae
Cryptophagus pubescens
Cryptophagus ruficornis
Atomaria linearis
Atomaria atricapilla
Atomaria testacea

Byturidae
Byturus ochraceus
Byturus tomentosus

Endomychidae
Lycoperdina bovistae

Coccinellidae
Rhyzobius chrysomeloides
Rhyzobius litura
Scymnus frontalis
Exochomus quadripustulatus
Halyzia sedecimguttata
Calvia quattuordecimguttata
Propylea 14-punctata
Harmonia axyridis
Adalia decempunctata
Coccinella septempunctata
Aphidecta obliterata
Tytthaspis sedecimpunctata
Subcoccinella vigintiquattuorpunctata

Corylophidae
Sericoderus lateralis

Latridiidae
Enicmus brevicornis
Enicmus testaceus
Enicmus transversus
Latridius minutus
Cartodere bifasciata
Cartodere nodifer
Cortinicara gibbosa

Ciidae
Cis boleti
Cis fagi
Cis nitidus
Octotemnus glabriculus

Tenebrionidae
Pseudocistela ceramboides

Oedemeridae
Oedemera nobilis
Oedemera lurida

Pyrochroidae
Pyrochroa serraticornis

Salpingidae
Salpingus planirostris
Salpingus ruficollis

Anthicidae
Stricticomus tobias
Omonadus floralis

Scraptidae
Anaspis frontalis
Anaspis garneysi
Anaspis fasciata
Anaspis maculata
Anaspis rufilabris

Cerambycidae
Grammoptera ruficornis
Arhopalus rusticus
Leiopus nebulosus

Orsodacnidae
Orsodacne cerasi

Chrysomelidae
Oulema melanopus sens. lat.
Oulema obscura
Oulema rufocyanea
Cassida rubiginosa
Gastrophysa polygoni
Gastrophysa viridula
Phaedon cochleariae
Phaedon tumidulus
Pyrrhalta viburni
Lochmaea crataegi
Phyllotreta atra
Phyllotreta flexuosa
Phyllotreta ochripes
Longitarsus atricillus
Longitarsus parvulus
Altica lythri
Neocrepidodera ferruginea
Crepidodera plutus
Chaetocnema concinna
Chaetocnema hortensis
Sphaeroderma testaceum
Apteropeda orbiculata
Psylliodes chalcomera
Oomorphus concolor
Cryptocephalus pusillus

Apionidae
Ceratapion onopordi
Protapion apricans
Protapion assimile
Protapion fulvipes
Protapion nigritarse
Protapion trifolii
Perapion hydrolapathi
Perapion marchicum
Perapion violaceum
Apion frumentarium
Ischnopterapion virens
Eutrichapion ervi

Curculionidae
Otiorhynchus clavipes
Phyllobius roboretanus
Phyllobius pyri
Phyllobius glaucus
Phyllobius argentatus
Polydrusus pterygomalis
Barypeithes pellucidus
Strophosoma melanogrammum
Graptus triguttatus
Sitona hispidulus
Sitona lepidus
Sitona lineatus
Sitona puncticollis
Sitona striatellus
Sitona sulcifrons
Hypera meles (to be confirmed)
Hypera nigrirostris
Hypera postica
Leiosoma deflexum
Euophryum confine
Acalles misellus
Rhinoncus castor
Rhinoncus pericarpius
Coeliodes rana
Mogulones asperifoliarum
Ceutorhynchus obstrictus
Trichosirocalus troglodytes
Nedyus quadrimaculatus
Curculio glandium
Curculio venosus
Tychius picirostris
Mecinus pyraster
Gymnetron pascuorum
Hylurgops palliatus
Hylesinus varius
Trypodendron domesticum

Appendix 2 – List of Heteroptera species

Saldidae
Saldula orthochila
Saldula saltatoria

Tingidae
Physatocheila dumetorum
Tingis ampliata

Miridae
Bryocoris pteridis
Monalocoris filicis
Campyloneura virgula
Dicyphus stachydis
Deraeocoris ruber
Deraeocoris flavilinea
Deraeocoris lutescens
Calocoris norwegicus
Capsus ater
Liocoris tripustulatus
Phytocoris longipennis
Phytocoris tiliae
Pinalitus cervinus
Stenotus binotatus
Leptopterna dolabrata
Notostira elongata
Stenodema laevigata
Dryophilocoris flavoquadrimaculatus
Heterotoma planicornis
Compsidolon salicellum
Harpocera thoracica
Orthonotus rufifrons
Plagiognathus arbustorum
Psallus varians

Nabidae
Himacerus mirmicoides
Nabis limbatus
Nabis ericetorum
Nabis ferus
Nabis rugosus

Anthocoridae
Anthocoris confusus
Anthocoris nemoralis
Anthocoris nemorum
Temnostethus pusillus
Lyctocoris campestris

Lygaeidae
Heterogaster urticae
Stygnocoris rusticus
Drymus ryei
Drymus sylvaticus
Scolopostethus grandis
Scolopostethus thomsoni

Rhopalidae
Rhopalus subrufus

Coreidae
Coreus marginatus

Cydnidae
Legnotus limbosus

Acanthosomatidae
Acanthosoma haemorrhoidale
Elasmucha grisea

Scutelleridae
Eurygaster testudinaria

Pentatomidae
Dolycoris baccarum
Palomena prasina
Pentatoma rufipes

Weather, Climate Change, and Clifton Down

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The purpose of this article is to provide some comparative data relevant to the debate about climate change.

1 Origin

In order to gather data on the impact of weather on plants I established a 2000 metre transect through square ST5673 in 2003, which has been walked on a weekly basis since then. The walk starts on the path just south of the Peregrine Watch Point on Clifton Down at ST5639 7400, and follows due south to ST5672 7300. The second leg starts in the Mall gardens at ST5676 7300 and continues due north via the Mall, Camp Road and College road to ST5671 7400. The highest point of the transect is 90m, and the average is 70m. The transect runs through secondary woodland and across open grassland along the lip of the Avon Gorge, and is exposed in places.

2 Method

On each walk all plants in flower are recorded, which provides both accurate First Flowering Dates (FFD) and data on duration and dormancy for 188 species. The dates are expressed as days after January 1st. Not every species flowers every year.

There are three local historic phenological surveys. In the journal of the Somerset Archaeological and Natural History no. 93 published in 1947 W Watson wrote an article entitled "The average time of first flowering of Somerset's plants". His fieldwork was not clearly specified, but he suggests that the figures are the average of the previous decade. Since 2008 S J Leach has published an annual comparative study for the same area. Secondly at Marlborough College between 1865 and 1885 a survey of all FFDs was kept annually, and the results were published in a volume available in the BNS library. Thirdly Rev. Gilbert White famously established Nature's Calendar for his parish of Selborne carried out between 1760 and 1780.

One of the reasons for the methodology used in this survey is the fact that FFDs vary considerably depending on the site, and its particular microclimate, and for some species, particularly trees, there is also great variation between individual specimens. Making comparisons over long periods of time, and widely differing sites and survey methods, introduces more variability into phenological results than is often understood.

3 Weather

All plants are affected by the weather they experience, and in the 14 years of the survey this has varied widely. I have historic monthly weather data for Clifton back to 1853, and in the past decade have used the data from a weather station in the heart of Bristol. This is likely to be warmer than the experience on the Downs, and is roughly two degrees warmer than the current Met Office date for Bristol, which is taken at Lulsgate Airport. For most of the twentieth century the data was taken from the Long Ashton Research Station. I have used the mean maximum temperature as the most useful temperature figure. The climate pattern over the 150 years, taking a thirty-year average, has been similar to that of the UK as a whole. Temperatures were falling in the late nineteenth century, partly because of cooling from the explosion of Krakatoa in 1883. In the first half of the twentieth century temperatures rose steadily by about a degree up to c 1955, and then fell by half a degree to 1995, before recovering to their previous level today. This broad pattern is also followed by the monthly and seasonal data, but with significant differences in detail.

Annual variation in weather conditions has been far more extreme than any change in climate, and each species has its own specific reaction to differing weather, some being very sensitive, others showing little variation. Plants also react to rainfall, or more particularly lack of it, especially in the summer, and it mainly affects the duration of flowering.

Table 1 shows the variation in monthly average temperature over the survey period. The months that have an impact on FFDs are November to June, and are shown in that order.

	Max	**Min**	**Diff**
November	13.5	8.7	4.8
December	13.3	3.4	9.9
January	9.8	4.1	5.7
February	10.1	6.4	3.7
March	14.9	7.6	7.3
April	18.7	12.3	6.4
May	18.7	15.7	3.0
June	22.6	18.6	4.0
Winter	10.6	5.7	4.9
Spring	16.1	12.3	3.8
Summer	22.9	19.4	3.5

Table 1: The differences between the mean maximum temperature for Bristol 2003-2016

Table 2 looks at the average variation in FFD over the 14 year period of 138 species using the assumption that the variation in weather in the previous month will be the cause of the variation in date. Clearly plants flowering near the end of a month will be affected by the temperature during the earlier days of the month. The key feature is dividing the variation in the number of days by the variation in degree. This gives a measure of the sensitivity of each group of plants to the conditions. It is impressive that the average variation in FFD of plants flowering in every month is more than five weeks, and that the overall average variation per degree is ten days.

	Average variation *days*	**Number of species**	**Days per degree**
January	35	3	3.5
February	75	9	13.2
March	59	8	15.9
April	47	38	6.4
May	45	25	7.0
June	39	42	13.0
July	37	13	9.3
		138	
Total avg	48		10

Table 2: The variation between maximum and minimum dates for 138 species on the Downs transect compared with the monthly variation in temperature 2003-14.

4 The FFD of spring flowers in Clifton in 2016 compared with the average for 2003-16 and the coldest winter during the survey, 2010

December 2015 had the highest average temperature yet recorded at 13.3ºC and the figure for the whole winter was 10.6ºC equalling the previous record. The results were very striking. Eight species flowered throughout the winter, including for the first time the Rock Rose. No fewer than 16 species recorded their earliest ever FFD in 2016. Three species on the Downs were in flower in December, *Garrya elliptica*, Hazel and Perennial Wallflower. *Iberis* sp. came into flower by the Suspension Bridge on 3rd, 65 days early, as did *Cornus* mas., 35 days ahead of average. On January 10th Alexanders (46 days early) and Cherry Plum (43 days early) came into flower and Daffodils on 17th, 31 days early. Blackthorn, Yellow Corydalis, and Magnolia (36, 45 and 39 days early respectively) flowered on Feb 7th. Cherry Laurel followed on the 17th, and, like Magnolia, stayed in flower until April. January temperature was close to normal, and as a result FFDs became more normal in February.

Table 3 lists 14 species showing their average FFD, and the figure for 2010 and 2016. The 2010 winter average was 5.7ºC, five degrees colder than 2016. It is a reasonable assumption that the FFD figures for the two years roughly mark the anticipated extreme dates, and they also indicate the degree of sensitivity of each species to temperature difference. The five degree difference in winter temperature produced an average of 49 days difference in timing, showing that a one degree change in temperature produced a ten day difference in timing. But perhaps the most striking feature of the table is the variation between species, from as little as four days per degree to as much as sixteen days.

Average FFD in Clifton					
	2016	**2003-16**	**2010**	**Difference**	**Sensitivity**
	FFD	*FFD*	*FFD*	*Days*	*Days/degree*
Forsythia	-4	14	38	42	8
Hazel	-4	15	31	35	7
Snowdrop	10	17	31	21	4
Crocus	24	25	44	20	4
Lesser Celandine	-4	36	77	81	16
Daffodil	17	47	79	62	12
Vernal Whitlow Grass	45	48	73	28	6
Yew	52	53	73	21	4
Cherry Plum	10	53	87	77	15
Barren Strawberry	52	54	73	21	4
Alexanders	10	55	77	67	13
Perennial Wallflower	-4	64	80	84	15
Blackthorn	38	75	100	62	12
Yellow Corydalis	38	80	104	66	13
Average FFD	20	45	69	49	10

Table 3: The average FFD of 14 species in Clifton, showing the figure for 2016, for the average for 2003-16, and for 2010

5 The average FFD in Clifton 2003-16 compared with the FFD of Taunton in 1947

The Taunton record involves 339 species, but of those only 88 are shared with Clifton. I have excluded from the analysis 13 species that now frequently overwinter, and hence have no FFD. They include both Sow-thistles, Daisy, Dandelion, Petty Spurge, Shepherds Purse, Chickweed, Red Valerian, Groundsel

and both Adria and Trailing Bellflowers. In cold winters some of these species do become dormant, in others they don't. There is a nice correlation between the number of species overwintering and winter temperature; each degree change sees two more species overwintering. If these species were included in the averages it would distort the comparison.

The average of these 88 species for Clifton is day 131 and for Taunton 138. The extremes are striking. Yellow Corydalis is 73 days earlier in Clifton and Alexanders 53 days. There are eleven other species where Clifton is more than a month earlier. At the other end it seems reasonable to suppose that the weather data I have for Bristol for the decade preceding 1947 will be very similar to that in Taunton. For what they are worth the average annual maximum temperature for Taunton 1937-1946 is 14.0ºC and for Bristol 2003-2016 it is 14.6ºC. If the calculations made above are correct, a difference of half a degree in temperature should make a difference of about five days in the average FFD. For those who favour climate change as a cause, it is worth noting that the climate, *i.e.* the thirty-year average maximum temperature, in Taunton in 1947 was 13.9ºC, whereas in Bristol in 2016 it is 14.3ºC.

6 The average FFD in Clifton 2003-2016 and Marlborough 1865-1885

This comparison features only 40 species. The fieldwork at Marlborough over twenty years was to encourage staff and pupils to record their first sighting of all forms of wildlife. The figures given are the average of twenty years of observation. The habitat within three miles of the town is chalk Downland, and the ancient woodland of Savernake forest and West Woods, as well as water plants of the River Kennet and water meadows around it. Accurate weather records were kept. The difference between the average FFD of the 40 species is that Clifton, at day 116, is seven days earlier than Marlborough, at day 123. The Marlborough average annual temperature over the twenty years was 13.4ºC and in Clifton it was 14.6ºC.

7 The average FFD in Clifton and that recorded in Selborne in Hampshire by Rev Gilbert White, 1760-1780

Attempting any comparison over 250 years is rash. White recorded over twenty years, presumably from horseback, and for most species he notes the earliest FFD that he recorded, rather than an average. The habitat is the village and farmland, and it is dominated by a great Beech hanger on a chalk escarpment. He had no way of measuring temperature accurately, and the maximum/minimum thermometer was not invented until *c*. 1815. There are just 27 species with comparable data, and the Clifton average is day 101, White's is 123, 22 days later. Virtually every species is recorded later than at Clifton, even though they are earliest dates rather than average

ones. The possible implication is that the weather was colder than now, possibly by two degrees.

Finally Table 4 shows the results for 19 species that were recorded by all four observers. The table is organised by the present Clifton FFD for each species. Although the Clifton average is earlier, all the dates lie within the range of dates recorded in Clifton over the period 2003-16 with the exception of the Selborne dates for Dog's Mercury and Horse Chestnut that are 22 days later than the latest date recorded in Clifton. I have divided the total difference by the number of years before 2016 that the other observations ended, to create rate of change per year. The rates are both very small, and remarkably consistent.

	Clifton	**Taunton**	**Marlborough**	**Selborne**
Years before 2016		**67**	**136**	**231**
	FFD	*FFD*	*FFD*	*FFD*
Hazel	15	15	31	27
Snowdrop	17	46	28	23
Lesser Celandine	36	41	38	77
Dogs Mercury	48	30	45	102
Yew	53	41	49	65
Elm	63	58	66	86
Sweet Violet	75	67	64	70
Ash	90	101	101	107
Cowslip	93	104	94	93
Bluebell	97	102	102	112
Horse Chestnut	106	116	126	150
Sycamore	107	122	125	120
Garlic Mustard	109	93	111	113
Wayfaring Tree	111	144	121	131
Hawthorn	120	111	133	135
Elder	131	140	147	160
Wild Privet	149	156	171	184
Ragwort	168	185	173	196
Harebell	176	204	188	189
Average	93	99	101	113
Rate of change *p.a.*		0.08	0.05	0.08

Table 4: The FFD for 19 species recorded over the past 240 years

8 Conclusion

Careful standardised long term observation is essential if the impact of the continual process of climate change is to be understood. As climate is normally measured as a thirty-year average, a thirty-year run of exactly comparable data will provide just one reference point for comparison. No such study has as yet been undertaken. FFDs are a simple statistic, standing in for far more fundamental changes. But, combined with duration of flowering, they can have a substantial impact on the amount of seed produced, and hence on the struggle for supremacy in the habitat in which all plants are involved. Changes in the structure of populations will inevitably result. But, as flowers are a crucial resource for invertebrates, date changes will affect the whole structure of invertebrate population growth, which in its turn will have an impact on bird breeding success. Everything is connected.

Crown Gall

Jean Oliver

This gall was found in 2016 and was a new record for the BRERC region. It was on a species of *Euonymus* in an Abbots Leigh garden. The gall is caused by the bacterium *Agrobacterium tumefaciens* entering through damaged areas. The bacterium transfers part of its DNA to the plant, and this DNA integrates into the plant's genome, causing the production of tumours and associated changes in plant metabolism.

Fig.1: Gall

Fig.2: Section through gall

Because of the way that it infects other organisms, this bacterium has been used as a tool in plant breeding. Any desired genes, such as insecticidal toxin genes or herbicide-resistance genes, can be engineered into the bacterial DNA, and then inserted into the plant genome. This process shortens the conventional plant breeding process, and allows entirely new (non-plant) genes to be engineered into crops.

Trace Fossils in the Devonian Black Nore Sandstone of Portishead, North Somerset, UK

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Abstract

Trace fossils have been found in continental alluvial cross-bedded channel sediments of the Black Nore Sandstone Formation of early to middle Devonian age. These are exposed along 3.5km of the Portishead coast of North Somerset. It is believed that fossils from this formation have not been described before. In the youngest trace fossil bed, vertical burrows of up to 3cm diameter and 30cm in length with a calcite-cemented fill may be classified as *Skolithos*. Lower down stratigraphically, two beds include more unusual and remarkable clustered forms where multiple vertical burrows are arranged in radial or dendritic patterns. Individual burrows are usually vertical but may also be horizontal, are around 5mm in diameter, may exceed 0.5m in length, have darker-coloured non-carbonate fill and may have a dolomitic lining. A fourth, older bed contains what appear to be fossil plant debris.

The clustered trace fossils, which have yet to be identified, appear to reflect the feeding, reproduction and colonial living of the organisms that created them. Clearly, re-processing of the fill was avoided, possibly due to exhaustion of food. A working hypothesis is that the organisms, perhaps polychaete worms, could reproduce asexually. If this was systematic and successful, it led to progressive outwards growth of the radial form. More random growth, with the demise or disappearance of some individuals led to the dendritic form.

Introduction

The 'Black Nore Sandstone' (BNS), part of the Old Red Sandstone (ORS) succession, is one of the oldest formations of rocks that crop out in the Bristol District. It may be inferred to underlie most of this area. It was deposited during the Devonian Period around 400Ma. The best quality accessible exposures may be visited along the Portishead coast from the south-western end of Kilkenny Bay, below The Windmill Inn, to Charlcombe Bay, about 3.5km to the south-west, towards Clevedon. The first half of these exposures lie within the 'Portishead Pier to Black Nore' Site of Special Scientific Interest (SSSI) whose citation focuses on the geological features.

Pick (1964) described the BNS, which is assigned to the Lower ORS, together with the overlying Portishead Beds, of the Upper ORS. He divided the ORS stratigraphy into divisions A to J, with the BNS sub-divided into J1, J2 and J3, in order of increasing age. A disconformity lies above J1 which is at least partly erosional and

which may be seen at each end of the BNS outcrop, where it is overlain by the Woodhill Conglomerate, division I, at the base of the Portishead Beds. Associated with, and just below, this surface are calcrete deposits, locally known as cornstones, which receive further mention later in this paper.

Pick studied the cross-bedding in the BNS. Most conspicuous is trough ('festoon') bedding in sandstones, where "most of the beds are formed of lenticular troughs of cross-beds, each unit resting on a scoured surface cut into the underlying deposits." Also, "planar ('torrential') cross-stratification … is commonly associated with pebbly sandstones or conglomeratic rocks". Pick concluded that they "indicate continual reworking of sediment which was probably deposited on wide alluvial floodplains by rivers that constantly altered their direction of flow." These features characterise the beds in the BNS where the trace fossils are found.

An earlier paper by Pick (1963) on the ORS describes the unconformably overlying Dolomitic Conglomerate of Triassic age which obscures the ORS at several places along the Portishead coastal exposure. The geology of the Portishead coast, especially along the SSSI, is described more comprehensively by Williams and Hancock (1977), drawing on Pick's work in the well-known compilation "Geological Excursions in the Bristol District". The BNS is tentatively assigned to the Breconian stage, which in modern stratigraphic classification is the Emsian stage, the youngest sub-division of the Early Devonian.

Since Pick's work the BNS appears to have had little attention from researchers. Perhaps this is because it is considered to be devoid of fossils, unlike the famous Woodhill Bay Fish Bed, or Pick's division F of the Portishead Beds, which is exposed nearby.

This paper describes trace fossils (ichnofossils) and a few plant fossils, found in the BNS along the coastal exposure. The trace fossils were apparently formed by burrowing organisms and are found at several sites in at least three distinct beds. Once the investigator has his 'eye in', these fossils are easily recognisable, and the clustered forms may appear quite remarkable. While informative examples have been selected for illustration here, many more have been found than can be shown. It is understood that this paper is the first to describe any fossils from the BNS.

Ashdown Bay - Bed 1

Trace fossils occur in Ashdown Bay in two generally similar, but stratigraphically distinct, beds. The bay can be accessed from the northern end of Nichols Road at grid reference ST 449766. Take the short footpath to the coastal path then left about 40m to steps onto the pebbly beach. About 60m to the right or east, Bed 1 may be seen in the cliffs.

Bed 1 is just over a metre thick and consists mainly of reddish-brown fine-grained laminated sandstone. It has pebbly conglomerate units of 0.1 - 0.5m thick both

above and below with mudstone or claystone clasts. Also known as 'mud-flake conglomerates', these provide evidence that the river system could dry up entirely, to create desiccation polygons. Later, in periods of high rainfall, torrential erosion and inundation these were ripped up, transported, rounded and deposited as conglomerates. The sandstone between represents a fluvial period of steadier erosion and sedimentation. Because of the clays in the conglomerates they are much less resistant to wave action and develop cavernous erosion features. This undercuts the sandstones, causing boulders to break off at fractures that are perpendicular to the bedding. These split along bedding planes into slabs. Many of these lie on the beach near the Bed 1 exposure, some with striking examples of trace fossils.

Like most of the exposures described in this paper, the dip/direction of the bedding is around 25°/140°, but it is difficult to measure accurately because of the cross bedding. However, Bed 1 may be followed in the beach for about 50m along strike in a north-east direction, until it disappears beneath the beach pebbles about 20m from the cliff.

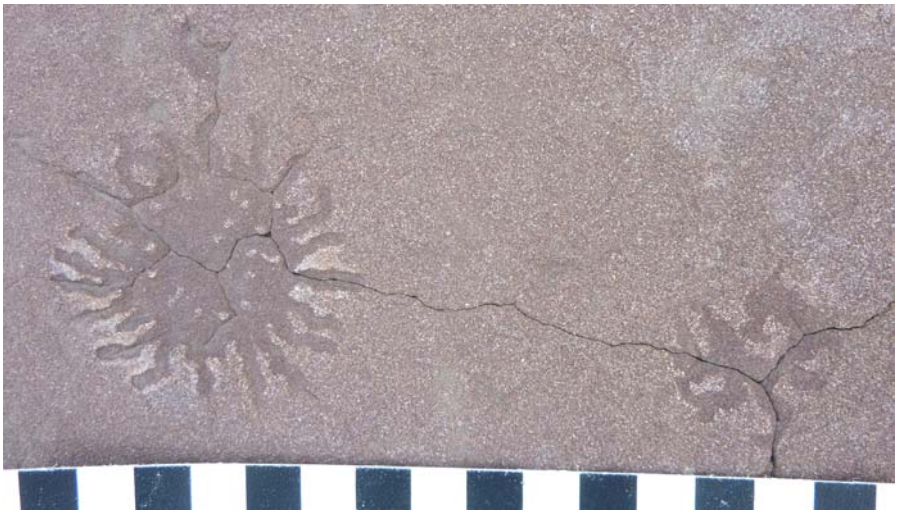

Figure 1: Bed 1 beach slab bedding plane view of a large radial trace fossil cluster (left) and a smaller one (right). The scale is in centimetres.

Figure 1 is a photograph of two trace fossils seen in a beach slab that has broken along a bedding plane. The fossils appear to be clusters or perhaps colonies of vertical tubes with an irregular radial pattern when seen in a bedding plane view. The rock containing the fossils has weathered to a mid-brown colour and the trace fossil interiors or 'fill', which is also of sandstone, is darker. The outlines have a whitish, slightly raised outer rim or halo, which is evidently slightly more resistant to erosion than the surrounding sediment, whereas the fill is slightly depressed, and

is less resistant. There are fractures crossing the trace fossils and it appears that the fossils create weaknesses perpendicular to the bedding.

The sides of the Figure 1 slab (too large to move manually) show that the bedding plane is about 10cm above a mud-flake conglomerate layer. By the absence of an erosional contact it is inferred that the slab is the right way up. Since the vertical extent of fossils elsewhere in Bed 1 tends to be around 0.5m (see below) it seems that this bedding plane provides a cross-section of the fossils towards the lower end.

Figure 2: Bed 1, *in-situ* eroded sloping face, sub-parallel to bedding above and sub-perpendicular lower down, showing how the horizontal dendritic pattern is made up of vertical tubes.

Figure 2 shows an *in-situ* part of Bed 1 in the beach which has been eroded to create rounded surfaces. Several clusters with a tree-like pattern that may be described as 'dendritic' are seen in the upper surfaces which are sub-parallel to the bedding. Lower down, the surfaces are sub-perpendicular to the bedding and show sub-vertical tube-like structures. In these examples, the outer rims are slight or not

apparent. But it can be seen that some of the paler laminae in the sediment persist to some extent in the fill of the tubes.

Figure 3 shows a weathered and eroded in-situ Bed 1 rock face at the base of the low cliffs which is perpendicular to the bedding, or 'vertical'. Five yellow arrows have been added to point out tube-like structures that with careful inspection can be seen to be groups of tubes. They appear to be the vertical expressions of clusters as seen in the previous two figures.

The 2nd and 3rd from the left are both more than 0.5m in length. At the bottom end of the 2nd, the group appears to splay out, but this may be due to the angle at which the intersecting rock face cuts through the cluster.

Figure 3: Weathered and eroded Bed 1 in-situ rock face showing vertical clustered tube-like structures (arrowed).

Figure 4 shows another beach slab with a dendritic cluster and more irregular shapes on a bedding plane above. Below, joint faces perpendicular to the bedding show vertical tubes and, above the left corner of the scale card, trace fossil structures that are parallel to the bedding or 'horizontal'.

The slab is about 10cm thick, and turning it over, a similar dendritic shape may be seen on the other side. It appears from this and other specimens on the beach that fossils of this type feature clusters of vertical sub-parallel ribbon-shaped excavations, of about half a metre in length.

Figure 4: Bed 1 beach slab showing a bedding plane above, with a dendritic cluster and other more irregularly-shaped trace fossils. Below, perpendicular fracture faces show vertical tubes and a horizontal structure.

Figure 5 was photographed looking down onto a bedding plane on a wave-worn beach slab showing a cluster of curved sub-parallel elongated trace fossil structures. These appear to originate from a location on the right and generally progress to the left. In some cases they are branched, but where they become crowded branches seem to either terminate or merge with adjacent branches to form what appears to be a thicker branch, but which may simply be two very close together. Opposite to the scale card is a vertical face where the vertical expression of some of the burrows can be seen. Several examples of such elongated flat-lying clusters can be seen at the site, but this is the largest.

Figure 5: Bed 1 beach slab showing an elongated cluster of sub-parallel trace-fossil structures.

Hand-lens (20x) examination of the sediment in Bed 1 shows well-sorted grains of about 0.2 mm, angular to sub-rounded, with finer-grained interstitial matter and little pore space. The grains are mainly of translucent quartz (>70%) but some are pink or cream, possibly feldspar; greenish, possibly chlorite or glauconite; blackish, possibly iron oxide minerals, and there are also a few shiny muscovite flakes. They generally have a reddish-brown coating that is probably the iron oxide mineral hematite. This may be the principal cement, but thin-sections would be required for further detail.

Testing the sediment with 10% hydrochloric acid produces virtually no reaction, but testing the whitish rims or halos of the trace fossils produces tiny bubbles which gives a reasonable field diagnosis of dolomite. This cements the clasts, and may have either been secreted by the organisms to support the walls of their burrows, or has replaced another secreted substance such as calcite or aragonite. Testing the fill of the trace fossils gives no reaction.

In a freshly broken face, there is less visible contrast between sediment and burrow-fill. With a hand-lens the fill grains seem slightly finer, there seem to be fewer non-quartz constituents and there is either less interstitial material or it is darker. Microscopic examination would be required to account for its colour, its weakness and its lower resistance to erosion.

Ashdown Bay - Bed 2

Bed 2 appears about 110m east of the Ashdown Bay steps in the cliff where it is loosened by a holm oak tree. This bed is perhaps 3m stratigraphically above Bed 1 and slightly thinner, around 1m thick. The outcrop may be traced intermittently in the beach rocks about 80m along strike to the north-east, to about 60m down and 50m to the left of the concrete slipway of the Portishead Yacht and Sailing Club at ST 450767.

Figure 6 shows a cross-section of Bed 2, at a fracture face that is approximately parallel to the strike. Cavernously eroded conglomerates above and below, and cross-bedding are seen clearly. Arrows point out sub-vertical tube-like trace fossils that appear in a slightly darker brown colour than the sediment which, like Bed 1, is fine-grained sandstone.

The reddish-brown of most of the ORS is characteristic of ferric iron (Fe^{3+}) oxide, probably present as hematite. However, in places, especially in Bed 2 but also in Bed 1, the colour switches to a paler, greenish-grey, probably due to chemical reduction to ferrous iron (Fe^{2+}) minerals that are green. This occurs in streaks that emphasise the cross-bedding when seen in cross-section, as shown in Figure 6. Also, the lowest arrow indicates a trace fossil that is mainly within sandstone of the paler greenish colour, but which itself is brown.

Figure 6: Bed 2 viewed at a face perpendicular to the bedding, showing cavernous erosion of mud-clast conglomerates above and below, cross-bedding, and (arrowed) trace fossils.

Figure 7: Bed 2 bedding-plane view with isolated trace fossils of which two appear as curvilinear.

At vertical fractures parallel to the dip direction of the bedding, it was found that the 'tubes' dip steeply to the north-west at about 70°, which is perpendicular to the bedding. This shows that they are not relatively recent erosion or weathering features. They would have been vertical before the beds were tilted, which, it is understood, took place as part of the folding during the Hercynian orogeny in the late Carboniferous and Permian periods.

Trace fossils in Bed 2 generally seem less elaborate than in Bed 1 and from what can be seen, they do not extend so far vertically. Figure 7 shows an in-situ bedding plane – the top of the bed shown in Figure 6 - with isolated structures, of which two appear to be curvilinear.

However, there are more complex trace fossils. Close by, on the same bedding-plane, Figure 8 shows (to the left of the scale card) a compact, less regular version of the radial or dendritic patterns seen in Bed 1. Above the card is an elongated cluster, one of a few seen in both beds. It is not known to what depth these or the linear features in Figure 7 extend below the bedding plane. However, vertical tubes in Figure 6 seem to connect with similar horizontal features at bedding planes, so it could be several centimetres.

Figure 8: Bed 2 bedding-plane view with more complex trace fossils.

With reference to the geological sketch-map in Pick (1964), it seems clear that Beds 1 and 2 in Ashdown Bay lie within stratigraphic sub-division J3 and close to the top.

South-West Kilkenny Bay – Bed 3

This site is accessed from Fisherman's Steps onto the beach below The Windmill Inn. From 110 to 150m to the left or north-east of the steps, the trace fossils are found around a minor promontory in the cliffs at ST 458768.

The fossils are cylindrical and vertical relative to the bedding which dips at about 20° to the south-east. They measure up to 3cm in diameter and 30cm in length. As shown in Figure 9, they are generally solitary, but a loose cluster can be seen. Nearby, they protrude slightly from a few eroded in-situ bedding-planes at a frequency of up to 8 per square metre.

Figure 9: Bed 3 trace fossils; a solitary specimen and a loose cluster.

The fossils pass through a sediment of reddish-brown poorly sorted coarse sandstone, typically with grains of over 0.5mm, with coarser cross-bedded units including gritstone and local pebble conglomerates. These give no reaction with acid. The fossils themselves are generally of slightly finer sandstone and stronger than the surrounding sediment. They are mostly greyish and react strongly with 10% hydrochloric acid, which suggests that the cementing material is calcite. No outer cemented rims or halos were seen.

The upper half of the cliff at this site is the Woodhill Conglomerate, or Pick's formation I. Below the irregular erosional disconformity at its base are the calcretes in a very irregular layer around a metre thick. Clear trace fossils tend to be found 1.8 to 4 metres below the disconformity. Both from this and from Pick's geological sketch-map, it seems clear that they are in Pick's J1 sub-division. It is considered that all the fossils in Bed 3 have suffered deterioration by weathering and mineralization due to their proximity to the disconformity.

In and around the calcretes at this site there are many 'pipes' as described by Pick (1964). These can be similar in dimension and appearance to the trace fossils found lower down, and a related origin is discussed further below.

Other Occurrences of Fossils in the Portishead BNS

Searches along the 3km exposure of the BNS from Kilkenny Bay to Charlcombe Bay found more occurrences of fossils that were less conspicuous than those described above.

About 80m to the south-west of the Black Nore Lighthouse, around ST 445465, a well-sorted, fine-grained, laminated sandstone bed is eroded by waves in the beach. This is stratigraphically below Beds 1 and 2 in sub-division J3 of Pick (1964) and is almost the oldest stratum of the BNS that can be seen along this coast. Several blackish elongated twig-like structures that appear to be of goethite are exposed. As seen in Figure 10, the largest is 55mm in length and 8mm wide with transverse fractures. Another has lengthways striations and appears to be branched. On adjacent bedding-planes, faint rust-coloured, probably goethite linear markings appear in random orientation. The assemblage appears to be fossils of thicker and thinner plant-stem fragments that were transported before being deposited in the fluvial sand. It is suggested that after burial in reducing conditions they were replaced by pyrite which, when nearly uncovered, oxidised to goethite. In view of the paucity of these remains and sensitivity to damage near to the SSSI, they were not investigated further.

Figure 10: Possible plant fossils perhaps deposited as transported plant litter

Below the low cliffs from 170m to 330m to the south-west of the Black Nore Lighthouse, around ST 443463, there are fine-grained laminated sandstone beds with a few single and locally clustered trace fossils similar to those in Beds 1 and 2. These occur on either side of an interval that is obscured by the overlying Dolomitic Conglomerate.

The map in Pick (1964) indicates that like Beds 1 and 2, these beds lie within sub-division J3, but lower in the stratigraphy, or older. Pick recorded a "marked reduction in thickness … as … J2 is traced south-westwards from Ashdown to Redcliff Bays". Pick did not find the trace-fossil beds, and the measurement of true

dips and thickness in these strata is hampered by the cross-bedding. Therefore it seems possible that these trace-fossil beds to the south-west of Black Nore are the south-western continuation of Beds 1 and 2 in Ashdown Bay.

At Charlcombe Bay (ST 432751), the disconformity at the base of Pick's division I is exposed. About 5m stratigraphically below, to the seaward side of the sea cave, two cylindrical fossils of greyish cemented sediment, vertical relative to the bedding, were found at a joint face in moderately coarse brown sandstone. The larger is just less than 1cm in diameter and about 45cm in length. This occurrence is similar to Bed 3, and both from Pick's map and from the position relative to the discontinuity, it seems likely that this is the south-west continuation of Bed 3 in Pick's J1 sub-division.

Discussion

Beds 1 and 2 in Ashdown Bay, and possibly also at 170m to 330m south-west of the Black Nore, lie within stratigraphic sub-division J3 and close to the top. The Bed 3 trace fossils at south-west Kilkenny Bay and at Charlcombe Bay are in J1 and therefore much younger and higher up in the stratigraphy.

With reference to the website by Martin (2016), many of the fossils described here may be labelled as "*Skolithos* a simple, tube-like, vertically-oriented burrow that typically shows a much greater length versus width. *Skolithos* is interpreted as a dwelling burrow made by a suspension-feeding animal." The beds containing them correspond to a '*Skolithos* ichnofacies' defined by Hasiotis (2014) as a "trace fossil association used to denote loose shifting media, typically in the lower shoreface. Burrows are frequently deep and require modification to compensate for frequent erosion and deposition." Using other definitions by Hasiotis, these beds are in the continental realm, in an alluvial channel environment.

The more complex cluster types found in Beds 1 and 2 prompt the question of whether they are formed by multiple organisms as a colony, or one or more organisms that repeatedly processed fresh adjacent sediment. An answer may be suggested by Bradshaw (1981) who studied Devonian trace fossils in the Taylor Group of Antarctica. *Heimdallia* was described as "Infilled vertical burrow structures that appear on bedding surfaces as straight to gently curved ribbons due to progressive lateral migration of the active burrow chamber." The BNS examples are more tightly curved, but could have formed through lateral migration.

Woolfe (1990) also studied the trace fossils in the Taylor Group of Antarctica and found that the *Skolithos* were consistent with a fresh-water origin. Earlier authors had considered *Skolithos* to be an indicator of marine conditions. The sediments and trace fossils described in the present paper also seem certain to have a fluvial, or fresh-water origin which accords with Woolfe's conclusion that *Skolithos* cannot be termed a "marine indicator".

Perhaps the nearest documented trace fossils to these in the BNS, in terms of location, age and environment, and found in a brief literature search, are described by Morrissey and Braddy (2004). Several types are preserved in mainly fine-grained alluvial sediments of the Lower ORS of South Wales, including *Skolithos*, but nothing comparable to the clustered types described here.

Fossils in Beds 1 and 2 vary in character somewhat, and this may be due to different species of organism or simply response to slight variation in environment. In Bed 1, the clusters are larger and have a greater vertical extent. In Figures 1, 2, 3 and 4, vertical fractures are seen to run between the fossils which appear to have created planes of weakness. These become joints where breakage occurs when the bed is undercut by wave action on the mud-flake conglomerates. An overall increase in susceptibility to erosion due to this mechanism may be a reason for the existence of Ashdown Bay as an indentation in the coastline. This effect is reduced in Bed 2, which seems more resistant where it projects in the beach at the north-eastern end of its outcrop.

The Bed 3 fossils are considerably larger in diameter and the organisms appear to have tolerated higher-energy conditions than those in Beds 1 and 2. However, it seems certain that the Bed 3 tubes could not have been formed during the torrential conditions indicated by pebble conglomerates, but were excavated downwards during lower-energy conditions through previously deposited and often coarser sediments. Because they are calcite-cemented, the fossils have little or no weakening effect on the rock.

Calcretes in the cliffs above Bed 3 were formed while this location was dry land during the mid-Devonian. Pick (1964) explained that "…the cornstones represent deposits associated with the formation of ancient calcareous soils of the pedocal group, and are thus directly comparable with the Plio-Pleistocene caliche formations of the semi-arid, south-central part of the U.S.A." 'Pedocal' means an un-leached soil in a region of low rainfall. It is understood that the calcite which is the cementing material of the calcrete was introduced in solution by groundwater and was precipitated either through evaporation or chemical change as it moved upwards by capillary action through the sub-soil. Pick mentioned pipe-like structures in the calcretes, and many of these can be seen at the Bed 3 site. It is conjectured that these were trace fossils in alluvial sediments that later became sub-soil and sites of calcite precipitation during the formation of the calcrete.

Working Hypothesis for the Origin of the Clustered Forms

In Beds 1 and 2, both the radial and dendritic clustered forms suggest that after a burrow was filled, re-processing or re-excavation of the fill was avoided. Presumably the fill no longer had a favourable composition and perhaps it was sediment that had been exhausted of food. Bradshaw (1981) suggested that "*Heimdallia* represents a line of conjoined, successively inhabited vertical living

shafts. The organism that produced *Heimdallia* may have gathered food by scraping off algal films around sand grains (which would also explain the sediment cohesion indicated by the depth of some of the burrows) or by preying on smaller creatures within the sediment or adjacent to the mouth of its burrows." He indicated that "Previously, the most popular explanation for *Heimdallia* was as a result of worm activity.", but preferred the explanation that the burrows were created by a crustacean.

Professor N. Trewin [email to M Howson, 14 January 2017] has indicated that the clustered fossils are not *Heimdallia*, which, as well as features described earlier, has a vertical shaft that expands as a bell shape at the base and is not branched. However, to the author, the concept of conjoined, successively inhabited vertical living shafts and the feeding method seem reasonable in partly explaining the BNS fossils.

The symmetry of the radial pattern seen in Figure 1 suggests that the vertical burrowing started with a single individual that created a vertical shaft. As it grew it divided periodically. If most individuals survived then they would have had to move outwards for living space in a radial manner, to avoid re-processing burrow fill. However, if this asexual reproduction was less systematic, or individuals did not always survive or remain in place, then the pattern could become more random. It is described above as dendritic as seen in Figures 2 and 4. Examination of this pattern shows that branches that had access to outer untouched sediment continued to grow outwards and branch again. But branches whose access was closed off by adjacent branches ceased to grow. Eventually, the entire colony died, perhaps due to desiccation at a time of drought, as evidenced by the mud-flake conglomerates.

Crustaceans appear not to have reproduced in a manner required to create the branching and clustering of multiple conjoined shafts seen in the BNS. It is suggested that the organism responsible was a worm. Species of polychaete worms are variously understood to have been present during the Devonian, inhabited vertical burrows, lived in fresh-water environments and reproduced asexually by budding or division.

Conclusion

This paper has documented the presence of trace fossils and plant fossils in continental alluvial sediments of the BNS of early or middle Devonian age that crop out in the Portishead area. They have been described with field observation techniques without damaging in-situ rocks within the SSSI. Identification or naming of the BNS clustered trace fossils and better understanding of the organisms that created and lived within the burrows are subjects for ongoing investigation with anticipated microscope, laboratory and literature research. The author's email address is markphowson@btinternet.com should there be any comments.

Acknowledgements

Thanks are due to Professor Maurice Tucker of Bristol University and members of Bristol Naturalists' Society for review and assistance with this paper.

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Analysis of digitised Bristol Museum and Art Gallery specimens

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A selection of specimens from Bristol Museum and Art Gallery was digitised and formatted to international standards in 2016. This process involved transferring the data from the Museum's EMU database (via spreadsheet), re-formatting it to be compatible with the Bristol Regional Environmental Records Centre (BRERC) database and finally adding it to the BRERC species database. This work was carried out thanks to funding awarded to Bristol Museums Development Trust by the John Ellerman Foundation.

The records range in date from 1900 to 2014 and cover a variety of taxonomic groups including plants (932 records), hoverflies (589 records), birds (120 records) and mammals (115 records). It also includes more rarely recorded groups such as slime moulds (16 records), liverworts (18 records) and fish (1 record). All these records have also been uploaded to the National Biodiversity Network (NBN) Gateway where they now form part of a national dataset which is publicly accessible. From the NBN Gateway the records also contribute to the international Global Biodiversity Information Facility (GBIF).

An initial analysis of the dataset has shown many of the records to be of great interest and significance.

The fish record proved particularly interesting as it was a well-preserved specimen of the Silver Hatchetfish (*Argyropelecus olfersi*). Found on the coast near Portbury in 2003 it is the first UK record of this species on the NBN Gateway. Marine Hatchetfish are predominantly deep-sea species and a record from shallow inshore UK waters is particularly unusual. It is the subject of a separate article in this publication.

The 932 plant records comprise 490 different species of which 272 (56%) are of species new to the BRERC database. Many of the records are also of UK Biodiversity Action Plan (UK BAP) species: There are six records of Darnel (*Lolium temulentum*), three records of Caraway (*Carum carvi*), two records of Corn Cleavers (*Galium tricornutum*) and a single record of Red-star Thistle (*Centaurea calcitrapa*). These four species are all critically endangered archaeophytes and were the subject of a special report by the BSBI (Walker & Pearman 2012).

Many of the plant records significantly increase the known geographical and temporal ranges of the species concerned. One of the records of Corn Cleavers was recorded from Avonmouth Docks in 1962. The Flora of the Bristol Region gives the last known date for this species (in the Bristol Region) as 1906.

There is also a record of Least Lettuce (*Lactuca saligna*) from 1928: The Flora of the Bristol Region gives the last known date for this species as 1868. The record of Interrupted Brome (*Bromus interruptus*) from 1930 is also of significance as this species is now extinct in the UK (Stroh *et al.* 2014).

The bird records include species now locally extinct. The record of Corncrake (*Crex crex*) from Abbots Leigh in 1917 is only the second historical record of this species on the BRERC database and the first with a precise date and location.

The Corncrake from Abbots Leigh (1917)

The mammal records include 16 records of the Black or Ship Rat (*Rattus rattus*) from Avonmouth Docks: a species for which we had no previous records and which has largely now been replaced in the UK by the Brown Rat (*Rattus norvegicus*).

Insect records include only the 3rd record of the Nationally Notable *Leopoldius signatus* on the BRERC database (a specimen collected from Clevedon in 1942 by the renowned entomologist Henri Audcent).

Records of the slime moulds *Stemonitis nigrescens* and *Echinostelium minutum* are both the first records for these species on the BRERC database.

All these records have the added significance of the existence of museum specimens to allow further examination, verification and DNA analysis of the records if necessary.

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A marine Hatchetfish from the Bristol Channel

Jon Mortin

Introduction

An unusual fish was found on the coast near Portbury by Martin Sharp in 2003. It was donated to Bristol Museum and Art Gallery (where it currently resides) and subsequently identified by museum staff as a Silver Hatchetfish (*Argyropelecus olfersi*). It was recently added to the Bristol Regional Environmental Records Centre database* and is the first record of this species for the Bristol Channel. The record has also been uploaded to the National Biodiversity Gateway where it currently represents the only record of this species in the UK.

Fig.1: The Portbury specimen - Silver Hatchetfish (*Argyropelecus olfersi*)

* The Silver Hatchetfish record forms part of a dataset which was digitised and formatted to international standards in 2016 thanks to funding awarded to Bristol Museums Development Trust by the John Ellerman Foundation.

Marine Hatchetfish

Marine Hatchetfish (unrelated to freshwater hatchetfish) belong to the family Sternoptychidae. They are known as hatchetfish because their profile resembles a hatchet with the broad body being the blade and the narrow tail section being the handle (Fig. 1). They are relatively small (3-15cm long) deep-sea fishes with silvery bodies and bioluminescent properties: it is thought that they emit light to prevent both predators and prey from spotting them against the faint light filtering through from above (known as "counter-illumination"). They also have large eyes to enable them to find prey in deep water where little light penetrates. Their diet includes marine zooplankton such as copepods and ostracods as well as larger crustaceans and small fish. They have been found at depths of up to 1500m but have been known to ascend to shallower water (*e.g.* 50m) at night (Baird 1971; Hopkins & Baird 1985).

Portbury specimen

The Portbury Hatchetfish (Fig. 1) was found by local fisherman Martin Sharp while shrimp fishing off the coast near Portbury early on the morning of 22nd March 2003. The apparently live fish was washed upwards in the wake of the boat and caught by a seagull. Martin then waved a net at the seagull until it dropped the fish, at which point he was able to scoop the now dead fish up from the water with a net. The fish was kept in a freezer until donated to the Bristol Museum and Art Gallery where it was preserved in 70% Industrial Methylated Spirit. The fish measures 55mm in length (excluding the tail fin) x 39mm in (dorso-ventral) height x 5mm maximum (lateral) width (ie it is an extremely thin fish). There is a row of light organs running along the underside of the body (visible in the photo). It was subsequently identified as a Silver Hatchetfish (*Argyropelecus olfersi*), one of seven species in the genus *Argyropelecus*. The Portbury record is currently the only record of any species of *Argyropelecus* on the NBN Gateway. The record is also highly unusual as you would not expect a deep sea fish to be found in the shallow waters of the Bristol Channel. When caught the fish was only around 60m from shore in water no more than 8m deep (Martin Sharp pers. comm. 2017).

How the Portbury specimen came to be so close to shore in such shallow water is something of a mystery. Although Hatchetfish are often known to ascend to shallower water at night, they would then normally retreat back to much deeper water by day. The Bristol Channel would not seem anywhere near deep enough to be a suitable habitat for this species. It has been suggested, however, that the occasional reporting of hatchetfish inshore may be as a result of storms or of the fish being subsequently disgorged from the stomachs of larger predatory fish (Wheeler 1969). Of all the species of hatchetfish *Argyropelecus olfersi* is apparently the one most likely to be found inshore (Wheeler 1969).

Argyropelecus olfersi

As mentioned above, the Portbury specimen represents the only record of this species on the NBN Gateway. Records from the NBN Gateway also form part of the data held by the Global Biodiversity Information Facility (GBIF). The Portbury record can now be seen on both the national (NBN) and global (GBIF) distribution maps for *Argyropelecus olfersi*. The global distribution map (see Fig. 2 below) has some anomalies (*e.g.* records showing from inland Europe) but mainly shows a distribution in deeper waters well away from coastal areas, with the exception of the Portbury record and a couple of records from around the Norwegian and Swedish coastlines.

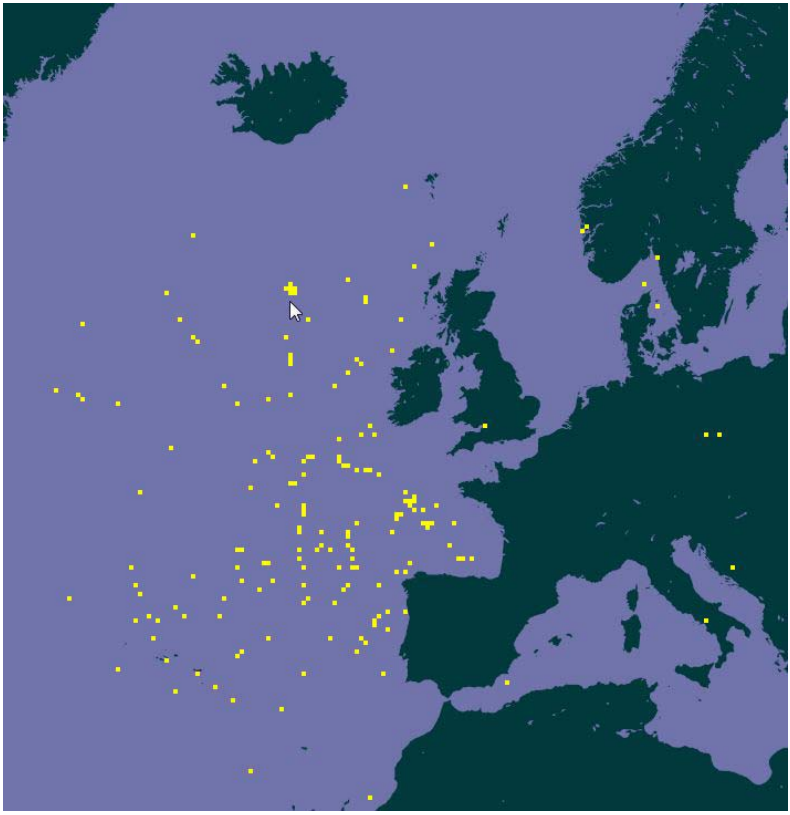

Fig. 2: The distribution of records of *Argyropelecus olfersi* in the North Atlantic held by the Global Biodiversity Information Facility (GBIF)

In addition to the records on GBIF there are some specimens in the Natural History Museum (NHM) in London, but with none from anywhere near the Bristol Channel. The NHM Data Portal gives the location (see Fig. 3 below) and other details of some of these specimens.

There are around 30 specimens of *Argyropelecus olfersi* from Irish waters (mainly from the Porcupine Seabight: a deep-water oceanic basin southwest of Ireland) and 3 specimens from either within or close to UK waters (two off the north-west coast of Scotland and one from the English Channel near Brittany). Most of these specimens seem to have originated from trawls and other deep-sea sampling from boats operating well away from the coast.

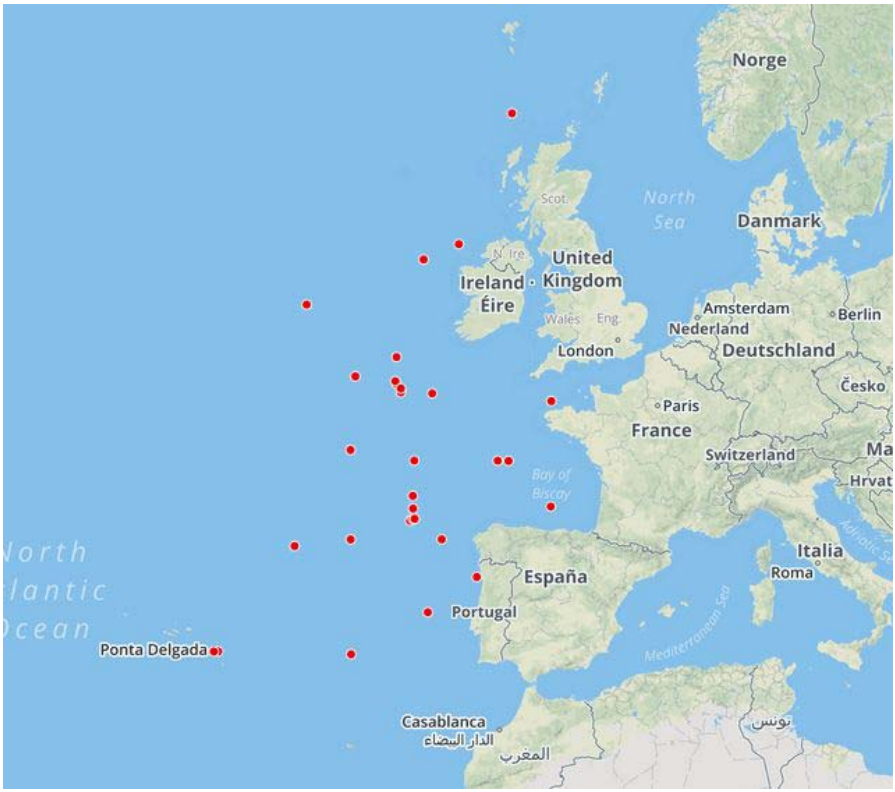

Fig. 3: Distribution map showing original location of specimens of *Argyropelecus olfersi* from the North Atlantic held by the Natural History Museum (NHM Data Portal)

Other species of Marine Hatchetfish

The NHM Data Portal also gives details of 35 specimens of the Half-naked Hatchetfish (*Argyropelecus hemigymnus*) from Irish Waters (mainly the Porcupine Seabight) plus one specimen from Rockall and one specimen found to the north of Shetland. There are also specimens of the Lovely Hatchetfish (*Argyropelecus aculeatus*) and the Giant Hatchetfish (*Argyropelecus gigas*) from the Porcupine Seabight.

Conclusion

It seems quite remarkable that the first (NBN) record of *Argyropelecus olfersi* (and the genus *Argyropelecus*) should be from our region in the light of all the intensive scientific collecting of marine fauna around the UK for so many decades. Equally remarkable is its discovery in such unusual circumstances in a shallow inshore location well away from its typical deep-water habitat.

Acknowledgments

Many thanks to Martin Sharp for providing additional information about the discovery of the Silver Hatchetfish and also to Rhian Rowson for arranging access to the specimen.

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The wildlife of Sheep Wood, Westbury-on-Trym, Bristol, 1988-2016

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Introduction

Sheep Wood is a Site of Nature Conservation Interest (SNCI). It is a strip of ancient, semi-natural woodland, a narrow arm of the Blaise Estate woodlands. More or less surrounded nowadays by housing, as late as the mid-1950s it formed the southern boundary of the Westmoreland and Elms Dairy Farms, since then built over. Situated at an elevation of over 70 metres along the top of a limestone ridge, it commands a view over low-lying land around Henbury, to the north of the Severn Estuary. On its eastern edge it is bounded by the ancient, but long modernized, Passage Road, which leads from Bristol via Cribbs Causeway to the Severn shore at New Passage. Passage Road is bordered on its west side by the remnants of a many years old hedgerow, possibly even as much as 900 years.

Much of the wood consists of long-established native trees, such as Ash *Fraxinus excelsior*, Pedunculate Oak *Quercus robur*, Beech *Fagus sylvatica*, Field Maple *Acer campestre*, Hazel *Corylus avellana*, Hawthorn *Crataegus monogyna,* Elder *Sambucus nigra* and Spindle *Euonymus europaeus,* intermingled with obviously planted Scots Pine *Pinus sylvestris*. There is also Horse Chestnut *Aesculus hippocastanum*, Sycamore *Acer pseudoplatanus*, Norway Maple *Acer platanoides,* Silver Birch *Betula pendula*, cypresses *Chamaecyparis* spp. and such shrubs as Jasmine *Jasminum officinale*, Rose of Sharon *Hypericum calycinum*, *Senecio laxifolius,* Hebe *Hebe* sp.*,* and Fuchsia *Fuchsia* sp.

The ground flora contains such indicator species of ancient woodland as Bluebell *Hyacinthoides non-scripta*, Wood Anemone *Anemone nemorosa*, Common Dog-violet *Viola riviniana,* Herb Robert *Geranium robertianum*, Bugle *Ajuga reptans*, Common Ivy *Hedera helix*, Dog's Mercury *Mercurialis perennis*, Lesser Celandine *Ranunculus ficaria*, Primrose *Primula vulgaris*, Wild Arum *Arum maculatum*, Hart's-tongue Fern *Phyllitis scolopendrium*, Male Fern *Dryopteris filix-mas* and Wood Melick Grass *Melica uniflora*.

At the wood edges Meadow Buttercup *Ranunculus acris,* Cowslips *Primula veris*, Bush Vetch *Vicia sepium*, Wood Avens *Geum urbanum*, Cow Parsley *Anthriscus sylvestris*, Ground-elder *Aegopodium podagraria,* Wood Dock *Rumex sanguineus,* Curled Dock *Rumex crispus,* Germander Speedwell *Veronica chamaedrys,* Common Field Speedwell *Veronica persica,* Wood Forget-me-not *Myosotis sylvatica* and Green Alkanet *Pentaglottis sempervirens* are among other species to be found.

At the western end of Sheep Wood I noted on 20 May 2008 a large patch of Field Madder *Sherardia arvensis* in flower as well as carpets of Dove's-foot Crane's-bill *Geranium molle* and Germander Speedwell on the grassy banks at the wood edge.

My interest in Sheep Wood was aroused by my purchase on my retirement in 1988 of a top floor flat in Westacre Close overlooking the north-eastern edge of the wood.

Fig.1: A view from my flat in Westacre Close

Although since then I have spent most of my time overseas, I have nevertheless lived in the property for lengthy periods two or three times a year. As a result, my observations of the wood's wildlife over the period 1988 to 2016 cover all months of the year, except January. I have not been able to access all parts of the wood as some of it is private property, so most of my observations have been largely confined to the eastern section, particularly the north-eastern fringe bordering the blocks of purpose-built flats in Westacre Close where I resided until late August 2016. This narrow part, to which I had access, bounded by a metal fence, is currently under the management of the Hillcrest Estate Management Company.

Westacre Close is itself bordered along its northern edge by an old hedgerow that once formed the boundary of the North (Lookout) Field of the former Westmoreland Farm (McEwen Smith & Tonkin, 1996) and consists mainly of Pedunculate Oak, Wild Privet *Ligustrum vulgare,* Hawthorn, and Elder interspersed with an obviously planted row of now mature Horse Chestnut trees, which have grown considerably taller since I arrived on the scene in 1988. In summer they now block most of the otherwise magnificent view of Henbury village and the Bristol Channel beyond. The

hedgerow verge is brightened in spring by the blossoms of Lesser Celandine, Primroses, Early Dog-violet *Viola reichenbachiana,* Bluebells, Wood Forget-me-not and Garlic Mustard *Alliaria petiolata.*

The one or two pairs of Foxes, which raise cubs in the wood in most years, are a source of great interest and pleasure for the residents of Westacre Close and possibly residents elsewhere in the vicinity. Badgers are very occasionally seen and I believe that there is at least one sett somewhere in the middle of the wood. Roe Deer have reared young in the wood and are often to be seen feeding in the northern fringe of Sheep Wood and on the lawns at the rear of Westacre Drive. As for other mammals, Grey Squirrels are almost always present and I have seen up to nine together.

Of the 60 species of birds I have so far seen in the wood, at its edges or flying over, 31 have bred or are believed to have done so at least once. Among the latter, Goldcrest, Jay, Nuthatch, Tawny Owl, Mistle Thrush, Song Thrush, Coal Tit, Long-tailed Tit, Treecreeper, Great Spotted Woodpecker and Green Woodpecker are particularly noteworthy. The west-south-west to east-north-east orientation of this woodland strip provides a corridor for migrant birds, such as Blackcaps, Chiffchaffs, Willow Warblers, Wood Warblers, Pied Flycatchers, Redwings and Fieldfares. House Martins, Swallows and Swifts often feed over the treetops. Sparrowhawks are frequently seen hunting in and around the wood and a pair may occasionally nest. Other raptors which I have seen flying over are Common Buzzard (they breed in nearby Haw Wood), Kestrel, Peregrine Falcon and, on one occasion, a Hen Harrier. Other unusual birds I have seen flying over are Cormorant, Canada Goose, Mallard, Grey Heron and Raven (in the cases of the last two species, birds alighted on the tree-tops).

Of the 12 species of butterflies I have recorded, four (Speckled Wood, Holly Blue, Orange-tip and Small White) breed in or at the edges of the wood, while another five (Red Admiral, Peacock, Small Tortoiseshell, Meadow Brown and Green-veined White) probably do so. Although I have not operated a mercury vapour or any other moth trap at Sheep Wood, I have, nevertheless, recorded so far 74 species of moths, 31 of which can be considered to be especially characteristic of old woodland. The great majority of these were attracted to the lighted windows of my flat. Among other kinds of insects inhabiting Sheep Wood, the Oak Bush-cricket *Meconema thalassinum,* the Fungus Weevil *Platystomos albinis* (a nationally scarce species) and the Hornet-mimic Hoverfly *Volucella zonaria* are worth special mention.

MAMMALS

Eurasian Hedgehog *Erinaceus europaeus*: My only records are as follows: two on a lawn between Westacre Close and the wood around 23.30 hours on 9 July 1991. The larger one was thought to be a male; one present at the same location between

14 June and 5 July 1994; one, a road casualty, was found on 12 April 1999 in Passage Road by Sheep Wood.

Grey Squirrel *Sciurus carolinensis*: Up to nine present in and around the wood in 2003 and 2007, seven in 1990, 2004 and 2006, and six in 1989, 1991, 2000 and 2001, but more usually up to four in most years. However, in 2015 and 2016 I never saw more than two. On 31 May 1990 I watched one climb the brick wall of our block of flats to the roof, 15-16 metres above ground, and on 6 November 2003 the 'mad' antics of one that ran up and down the trunk of a Scots Pine, then wildly round and round at high speed on the adjacent grass lawn for about five minutes, a couple of times rolling on its back, before stopping and then foraging normally with the other six Grey Squirrels present.

They often came for peanuts, cobnuts and raisins that I and others in Westacre Close threw out for them. In October 2003, I watched four burying peanuts. Natural foods I saw them eating were Hazel nuts; the buds, flowers and fruits of Horse Chestnut; the seeds of Norway Maple; the cones of Scots pines in April and May, and, in July, fresh green ones.

Interactions with other species: At 09.00 hours on 3 July 1989 a Fox rushed out of the wood and seized a squirrel, but it manage to wriggle free and escaped by climbing the nearest tree, apparently none the worse for the experience; on 3 April 1991 one was repeatedly attacked by a Carrion Crow but managed to escape; on 17 September 1991 one was attacked by a Magpie but escaped; on 31 May 2002 one was attacked by a black and white domestic cat but escaped by leaping from one Scots pine to the next; towards noon on 11 June 2007 four squirrels feeding at the edge of the wood were suddenly attacked and scattered by a Fox, which then retreated into the wood, while for several minutes afterwards the squirrels scolded from the safety of the trees.

Fox *Vulpes vulpes*: At least one or two pairs are resident in the wood and breed most years: I have seen cubs in 1989, 1993, 1994, 1995, 2004, 2006, 2007, 2008, 2009, 2014 and 2016. In the north-eastern section of the wood, as night falls, they regularly bring the cubs out on to the lawns bordering Westacre Close, where food is regularly put out for them by some of the human residents of the blocks of flats. The adults themselves often emerge from the wood during the daytime, usually in the morning but occasionally in bright sunshine in the afternoon. In 1993 a neighbour told me that he had identified six different individuals in the vicinity of Westacre Close. In 2014 three adults regularly emerged together from the wood and interacted amicably towards each other.

Instances of the Sheep Wood Foxes attacking Grey Squirrels are detailed above under that species. At 09.45 hours on 6 June 2006, a neighbour, Christine Butcher, saw an adult emerge from the wood, alarming the Carrion Crows and Magpies foraging in the area, and seize a Jay, which it carried into the wood. On

16 May 2009 I watched an adult that had emerged from the wood at 10.05 hours briefly interact with a foraging pair of Carrion Crows.

Fig.3: Fox on the lawn (centre)

Badger *Meles meles*: There appears to be at least one well established sett in Sheep Wood. The first adult I saw was one lying dead in Passage Road close to the edge of the wood, 8 May 2002. At 23.15 hours on 15 June 2008 a neighbour in Westacre Close watched one walk along the wood edge. On 10 May 2009 one was reported lying dead in Passage Road in front of Brentry Post Office. In 2012 and 2013 Christine Butcher told me that she had seen up to two Badgers after nightfall at the edge of the wood during the summer, and one again in late April 2014. On 25 October 2015 an adult I was watching around 23.00 hours foraging below my flat windows in Westacre Close suddenly charged at full speed with a galloping gait a female Roe Deer that was feeding at the edge of Sheep Wood and put it to flight. Both then disappeared into the darkness of the wood. In 2016, Christine Butcher saw one at the wood edge on 4 April and again around the middle of that month and I watched an adult there at 23.00 hours on 8 June.

Common Pipistrelle Bat *Pipistrellus pipistrellus*: Roosts of this species are present on the main building of Wesley College and at Frances Greeves House at the western end of Sheep Wood, and are legally protected. My only record of bats here is of two small ones that I watched flying up and down the north-eastern edge of the wood well before dusk on 13 July 1989 that were probably this species.

Roe Deer *Capreolus capreolus*: Since 2001, when one was seen by local residents grazing at the edge of the wood, this species has become more and more frequently observed, often in the daytime. I saw and photographed my first one there, an adult female, on 26 and 27 May 2006. On 13 June I photographed either this female or another one with a very young kid. Then later that month, 21-30, I watched a female browsing there with two kids. On 1 November that year I again saw and photographed a female, this time with two well grown young ones, and again on a few other occasions up to 9 December. Christine Butcher occasionally saw an adult female during the summer of 2012. In 2013, between 29 March and 23 April, I saw a female on several occasions and during that summer Christine Butcher several times saw it with two kids. On 31 October the same year she saw an adult female and on 7 November I watched two females emerge from the wood at 07.00 hours and walk along its edge. Then at 16.00 hours on 22 November I saw a male and a female at the wood edge. In 2014 an adult female was seen by Christine Butcher from 1 May and I photographed it or another female on 14 May. At 08.35 hours on 23 November 2014 I watched three females emerge from the wood and trot along its edge from east to west. In 2015 both an adult male and an adult female were frequently seen in June and July, and again in October (when a female was chased away by a Badger on the 24th – see under that species). In 2016, from 13 March, both adult males and females were seen at the wood edge, and between 19.00 and 19.30 hours on 17 June I photographed a female suckling a young one. On 31 March 2016 an adult male emerged from the wood at 13.00 hours and, after browsing for a while, it spent the rest of the afternoon up to 18.00 hours resting on a fairly open slope just inside the wood.

Plants I observed the Roe Deer browsing upon at Sheep Wood included Bramble *Rubus fruticosus*, Common Ivy *Hedera helix* and Jasmine *Jasminum officinale*,

REPTILES

Slow-worm *Anguis fragilis* Although I have not seen this species at Sheep Wood myself, it is reported to occur there.

AMPHIBIANS

Common Toad *Bufo bufo*: My only record is of a dried-up corpse that I found close to the wood in Westacre Close in September 1993.

BIRDS

Greater Canada Goose *Branta canadensis*: My only record is of a flock of 13 which flew eastwards over the wood on 28 May 2004.

Mallard *Anas platyrhvnchos*: I occasionally saw pairs flying over in spring in the 1990s, but not since 9 April 1998.

Cormorant *Phalocrocorax carbo*: One flew south low over the wood in the direction of the Severn Estuary at 07.57 hours on 9 November 2003.

Grey Heron *Ardea cinerea*: One or two frequently flew over the wood every year, especially in spring and autumn. On 19 May 1997 four flew over to the south-east at 07.30 hours. Occasionally one would alight in the trees in the wood or in the Westacre Close hedgerow, usually in the early morning, from whence it would drop down into an adjacent garden where there was a small pond.

Hen Harrier *Circus cyaneus*: On 10 May 1997 I watched from my flat an adult male soaring in circles over Haw Wood that gradually drifted towards Sheep Wood and out of sight over it.

Sparrowhawk *Accipiter nisus*: Frequently seen visiting the wood or flying over it. On 21 July 1991, I saw a passing male make a half-hearted attack on a Magpie and on 18 August 1995 positions were reversed when a female was pursued into the wood by six Magpies. On 17 April 1996 a low-flying female was chased by a Carrion Crow. On another occasion, a Carrion Crow mobbed a female circling over the wood. I also saw Jackdaws mobbing a Sparrowhawk here: several on 4 April 1998 and two on 10 April 1998. The resident Woodpigeons were sometimes killed by Sparrowhawks; their remains being found at the wood edge. On 7 April 2003, Christine Butcher saw one standing astride a Woodpigeon at the wood edge and plucking it. On 20 October 1996 I watched a female closely pursuing a Woodpigeon into the wood.

It is probable that a pair have nested or attempted to do so in Sheep Wood. Around 09.00 hours on 14 May 2012 I watched a pair indulging in courtship chases in the wood. The male still appeared to be in immature plumage. In April 2016 it looked as if a pair were interested in nesting in a tall ivy-covered tree, where on one occasion on 18 April, the male was attacked by a local nesting pair of Magpies. I have frequently noticed Sparrowhawks flying between Sheep Wood and Haw Wood.

Buzzard *Buteo buteo*: Recorded as follows: one calling close to the wood on 4 April 1998; one, mobbed by *c.*10 Herring Gulls and two Carrion Crows, circling over the wood on 10 April 1999; one circled quite low over the wood at 15.30 hours on 10 May 2001; one put up from Haw Wood by the arrival of the last Concorde aircraft on its way to Filton Airfield on 26 November 2003 circled as far south as Sheep Wood; two circled low over the wood on 12 May 2009, mobbed by the local Carrion Crows; one mobbed by a Herring Gull over the wood on 21 April 2016.

Black-headed Gull *Chroicocephalus ridibundus*: Many are usually seen patrolling daily over the wood and its vicinity, especially outside the breeding season. On 26 November 2003 the arrival of the last Concorde aircraft at Filton Airfield caused much disturbance amongst this species, Herring Gulls, Carrion Crows, Jackdaws and Woodpigeons in the area, causing them to rise and fly around aimlessly. Parties

and flocks are regularly to be seen flying over the wood to and from their roosts in the Severn Estuary.

Lesser Black-backed Gull *Larus fuscus*: As with the last species, regularly to be seen flying to and from their roosts in the Severn Estuary area. Except in the winter months, several fly daily over and around the wood. I noted a wintering individual on 15 November 1998. On occasions, attracted by food scraps put out for the Foxes, they are attracted down to the lawns between the wood and Westacre Close, when they are then sometimes attacked and driven off by the resident Carrion Crows.

Herring Gull *Larus argentatus*: Several or more are daily to be seen patrolling over or around Sheep Wood throughout the year, sometimes descending to the ground to take food scraps put out for Foxes. In the springs of 2015 and 2016 adults frequently landed on the flat roofs of the blocks of flats in adjacent Westacre Close and long-called from them. As with the previous two species, parties and flocks are often to be seen flying to and from their roosts in the Severn Estuary.

Feral Pigeon (Rock Dove) *Columbia livia* var.: Occasional visitor, usually only one feeding with Woodpigeons on the lawns between Westacre Close and the wood.

Stock Dove *Columba oenas*: A pair present and probably breeding most years since 2003 in the north-eastern section of the wood as a male could be heard 'singing' there from late March to August. On 25 April 2006 I watched a pair feeding on ivy berries and on 9 April 2016 a pair perching together in a tall ash tree.

Woodpigeon *Columba palumbus*: At least 10 pairs breed in the wood. Known nesting sites include a horse chestnut and a lime tree, ornamental cypresses and various ivy-covered trees. They are often to be seen feeding on the lawns between it and Westacre Close. Natural foods seen eaten include buds and leaf tips of ash trees, hawthorn and other broad-leaved trees, elderberries, dandelion leaves and ivy berries. The usual abundance of the latter attracts up to 30 birds at a time in spring. At this time in particular, apparently gorged birds quite often flew from the ivy direct into windows at flight level in Westacre Close, leaving a powdery outline of their body, especially the wings. Usually they fell stunned to the ground, but soon recovered and flew off, although, to my knowledge, one juvenile managed to kill itself in 1996. Up to 30 birds at least normally roost in the wood. I have occasionally seen flocks flying over the wood early in the morning in the autumn (e.g., *c.*100 south on 9 November 2003; *c.*60 south on 20 October 2004; *c.*150 south-west on 1 November 2014). On 27 April 1998 I photographed an almost white individual.

Collared Dove *Streptopelia decaocto*: At least one pair usually breeds or attempts to do so in the vicinity of the wood. Nesting sites included ornamental cypresses at the edge of the wood. On occasions, I saw nesting pairs drive of marauding Magpies.

Tawny Owl *Strix aluco*: At least one pair breeds or attempts to breed in the wood most years. Between 23.00 hours and 00.15 hours from 12 to 28 May 2002, for instance, I heard at least two owlets calling in the north-east corner of the wood and on 18 June 2007, when two adults were hooting in the wood, I saw a fledged owlet. On 5 June 2009 I watched an adult mobbed by a party of eight Magpies; on 19 November 2011 one was chased by two Carrion Crows, and on 23 August 2016 one perched in a Scots pine at the edge of the wood in the daytime was mobbed by Magpies and a Jay.

Swift *Apus apus*: One or more frequently seen flying over the wood; on occasion quite large feeding parties appear, flying just below cloud cover. On 16 May 2004 I watched a pair copulating in flight.

Green Woodpecker *Picus viridis*: At least one pair bred each year in the wood. I often watched adults and juveniles feeding on the lawns between the wood and Westacre Close. On 17 September 1991 I watched a juvenile on the trunk of a Scots pine repeatedly repel perfunctory attacks made on it from below by a Magpie. The woodpecker responded by lunging at its assailant with its long, sharp bill. Eventually it flew off pursued by the Magpie. At 08.00 hours on 8 May 1997 I watched a female vigorously digging at the nests of Black Ants *Lasius niger* in the roadside grass verge in Westacre Close. I also saw Green Woodpeckers, most often an adult female, digging for these ants in the lawns between the Close and Sheep Wood.

Great Spotted Woodpecker *Dendrocopos major*: Adults frequently seen and males heard drumming in spring, so it is probable that a pair bred in at least some years. Between 08.00 and 08.15 hours on 26 May 1990 I watched a female feeding a juvenile with woolly aphids pulled from the trunk of a young, heavily infested sycamore tree.

Kestrel *Falco tinnunculus*: Single birds occasionally seen flying over.

Peregrine *Falco peregrinus*: At 17.00 hours on 13 September 1996 a male flew over the wood and on 11 April 2005, I was watching one flying close to the wood, being mobbed by a Carrion Crow, when it was joined by a second Peregrine. The two birds flew to each other as if making a food pass, but they did not appear to transfer prey and quickly parted. They caused a commotion among the Herring and Lesser Black-backed Gulls flying in the vicinity.

Magpie *Pica pica*: Several pairs nest annually in or close to Sheep Wood. Nesting sites here included a deodar tree, horse chestnuts, Scots pine and ornamental cypresses. I often saw them carrying nesting material, including sticks up to 50 centimetres in length. On 1 June 2016 I watched a male courtship-feeding a female. As well as territorial conflicts between neighbouring pairs of Magpies, I saw this species on occasions attacking or mobbing Grey Squirrels, a Green

Woodpecker, a Sparrowhawk, Jays, Collared Doves and a Tawny Owl, as well as being themselves attacked by Carrion Crows.

Jay *Garrulus glandarius*: At least one pair bred annually in the north-eastern section and probably others elsewhere in the wood. They frequently interacted aggressively and noisily with the resident Magpies, Carrion Crows and domestic cats. As is usual, I observed them in the autumn collecting acorns from nearby oaks and carrying them into the wood or burying them in the lawns between it and Westacre Close.

Jackdaw *Corvus monedula*: Up to 25 seen on occasions in and around Sheep Wood, but usually fewer present, especially since 2003. A pair or two usually breed or attempt to do so in or close to the wood. On 10 April 1998 I watched a pair pursuing a male Sparrowhawk.

Rook *Corvus* **frugilegus**: Very occasionally seen flying over the wood.

Carrion Crow *Corvus corone*: Several pairs breed annually in or close to Sheep Wood; nesting trees included a Scots pine, a deodar and an ivy-covered oak. From 24 October to 3 December 2011 a party of four birds included an individual, which I photographed, that had much white in its plumage so that it appeared to have a white band across its wings. As well as interacting territorially with each other in the breeding season, I saw Carrion Crows on occasions attack Grey Squirrels, a Lesser Black-backed Gull, a Tawny Owl and a party of *c.*10 Magpies (see under those species). On 7 June 2006 an adult flew against one of my flat windows facing Sheep Wood and fell to the ground, but quickly recovered and flew off. Sometimes unusually large numbers of Carrion Crows congregated in the wood, such as 18 between 09.00 and 10.00 hours on 22 November 2005, 12 at 18.00 hours on 14 April 2006 and a flock of 17 that settled in the treetops of the wood on 21 March 2010, but were very restless and eventually flew off.

Raven Corvus *corax*: I have the following sightings:-

5 September 1993: A first year immature perched on the top of a tall cypress at the edge of the wood and stayed for nearly 10 minutes.

8 June 2007: An adult alighted at the top of a cypress and stayed for four minutes.

2 July 2015: At 09.24 hours one approached, croaking, from the north, pursued by a pair of Carrion Crows and flew low over the wood.

14 August 2016: A pair flew, calling, over the wood to the north-west.

Goldcrest *Regulus regulus*: A pair or two bred or probably did so in most years, at least up to 2005, since when the species became less frequently seen and fewer in numbers. Outside the breeding season up to five frequently accompanied mixed feeding parties of tits, but since 2005, I have not seen more than two in such parties.

Blue Tit *Cyanistes caeruleus*: Several pairs breed annually in the wood or its close vicinity. A pair bred successfully in a nestbox I erected at the edge of the wood, in view of my flat in Westacre Close, in 1989, 1990, 1991, 1998, 1999, 2000, 2004, 2005, 2010 and 2011. Outside the breeding season Blue Tits formed a prominent part of often large mixed feeding flocks of tits, such as the one of *c.*100 birds on 26 September 1996, but since 1998 the size of these flocks has declined, so that one of *c.*20 on 6 November 2010 was exceptional.

Great Tit *Parus major*: At least two pairs bred annually in the north-east section of the wood and, almost certainly, several other pairs elsewhere within its boundaries. In 2008 and 2016 a pair nested in the nestbox I erected at the north-eastern edge of the wood in 1989. Outside the breeding season, Great Tits formed a prominent part of the mixed feeding flocks of tits that worked their way through the wood.

Coal Tit *Periparus ater*: From 1989 to 2011 a pair bred successfully or probably did so in the north-eastern part of the wood, with other pairs probably doing so elsewhere (*e.g.* the south edge bordering Northover Road where two males were singing on 10 April 2001). In 1994 a pair nested with partial success in the nestbox I erected at the edge of the wood in 1989. The males at the north-east edge usually sang from, and the family parties fed in, the Scots pines in full view of my flat.

Marsh Tit *Poecile palustris*: My only sighting is of one in a mixed party of tits moving eastwards along the wood edge between 09.30 and 10.15 hours on 27 October 2014.

Sand Martin *Riparia riparia*: My only sighting is of a single bird that flew west along the edge of the wood on 18 April 1996.

Swallow *Hirundo rustica*: Occasionally seen flying over; usually singletons.

House Martin *Delichon urbicaum*: Occasionally seen flying over in very small numbers and hunting flying insects above the trees, but not noted doing so after 2004.

Long-tailed Tit *Aegithalos caudatus*: At least one or two pairs breed or attempt to do so annually. Outside the breeding season foraging parties of up to 10 or so birds were frequently seen moving through the edge of Sheep Wood or along the hedgerow in Westacre Close, sometimes in company with Blue Tits and Great Tits.

Wood Warbler *Phylloscopus sibilatrix*: On 8 April 1998 a passage bird sang incipient song from the trees in Westacre Close not far from the edge of Sheep Wood.

Chiffchaff *Phylloscopus collybita*: Until 2005, a regular passage migrant, especially in spring. Sometimes, as in 1990, 1994 and 2004, a male stayed singing as late as June in the north-eastern section of the wood and it is possible that a pair nested in those years.

Willow Warbler *Phylloscopus trochilus*: Until 2002, a regular passage migrant, especially in spring (April), but not noticed since then. On 17 and 18 April 1996 a west-south-west movement of this species occurred along the northern edge of Sheep Wood: I watched at least six birds on the 17th and eight between 07.30 and 08.00 hours on the 18th extracting invertebrates from the opening buds of Sycamore and Horse Chestnut trees.

Blackcap *Sylvia atricapilla*: A regular summer visitor and passage migrant with at least one pair breeding in the north-east section of the wood and others elsewhere within its boundaries. Occasionally, as in 1988-1989 and 1990-1991, individuals over-winter.

Nuthatch *Sitta europaea*: A pair or two probably breed in the wood but I have no specific breeding records. However this possibility is suggested by a pair I watched feeding from a suspended nut-container at the wood edge in the north-eastern section of the wood in March 1989, one present in July 1990 and one calling there in July 2015.

Treecreeper *Certhia familiaris*: One seen and/or singing occasionally in most years and it seems likely that a pair or two breed in the wood, at least in some years, such as 1990, 1991, 1994, 20011 and 2015. On 16 June 2015 I photographed a freshly dead individual that I found below a window in Westacre Close, against which it had probably flown.

Fig.2: Treecreeper

Wren *Troglodytes troglodytes*: One or two pairs breed annually in the north-eastern section of the wood and presumably other pairs elsewhere within its boundaries.

Starling *Sturnus vulgaris*: Several pairs breed in and around the wood, but numbers have declined since about 2008. However, parties and flocks fly over daily to and from their roosts but in smaller numbers in recent years.

Blackbird *Turdus merula*: Several pairs breed annually, including at least two or three in the north-eastern section. Territorial conflicts between neighbouring pairs were frequently observed. A nest that I found on 15 May 2009 and kept under observation had four eggs, the first of which was presumably laid on 11 or 12 May; it later contained a full clutch of five. All the nestlings successfully fledged on 7 June, 11 days after hatching on 28 May.

At 09.45 hours on 18 October four Blackbirds, apparently migrants, arrived in horse chestnut trees in Westacre Close with 12 Redwings. After a few minutes all 16 birds flew off together to the east.

The remains of a male Blackbird I found at the edge of the wood on 28 May 2016 beside a half empty egg of this species may have been killed by a Sparrowhawk in the act of disposing of an egg that had just hatched.

Fieldfare *Turdus pilaris*: An occasional winter visitor to Sheep Wood. I have the following records:

14 October 1997: A flock of *c.*20 flew south over the wood.

25 November 2005: *c.*10 in a mixed flock of *c.*30 thrushes that alighted in the wood before eventually flying off westwards.

1 November 2014: Soon after 08.00 hours a flock of *c.*200 flew south-west over the wood.

Song Thrush *Turdus philomelos*: At least one pair apparently bred in the north-eastern section of the wood almost every year, including 2016, and probably others elsewhere within its boundaries. Often seen feeding on the lawns bordering the wood edge.

Redwing *Turdus iliacus*: My records of this occasional winter visitor to the wood are as follows:

1988: Six on 1 December and one feeding on red berries with three Blackbirds on 5 December.

1992: 13 at 18.00 hours on 4 March.

2003: Flock of *c.*40 on 20 November; party of eight on 26 November.

2005: Flock of 12 with four Blackbirds alighted in horse chestnut trees in Westacre Close at 09.45 hours on 18 October, eventually flying off together to the east; on 24 October a flock of 15 flew west low over the wood at 08.30 hours; on

25 November a mixed flock of *c.*30 thrushes which alighted in the wood, contained *c.*20 Redwings. They eventually flew off to the west.

Mistle Thrush *Turdus viscivorus*: A pair definitely bred successfully in the north-eastern section of the wood in 1990 and 1998, and probably in other years up to 2005, but not since. During that period one or two males were to be heard singing in the springs of most years. Other pairs were probably present and breeding in other parts of Sheep Wood. On 25 November 2005, two were present in a mixed flock of Redwings and Fieldfares that alighted in the wood and eventually flew off westwards.

Spotted Flycatcher *Muscicarpa striata*: On 26 May 1990 I watched one fly-catching from the branch of a beech tree at the edge of Sheep Wood.

Robin *Erithacus rubecula*: At least one pair bred every year in the north-eastern section of the wood and other pairs almost certainly elsewhere within its boundaries. In June 2006 a pair reared nestlings in a nest situated in honeysuckle growing on a wall close to my own flat in Westacre Close facing Sheep Wood. On 19 April 2016 I watched a male courtship-feeding a female. On occasions I heard one singing at night, such as the one that sang between 02.00 and 03.00 hours on 11 December 1988 near a bright outside lamp below my window.

Pied Flycatcher *Ficedula hypoleuca*: On 17 April 1996 I watched two adult males feeding from the branches of birch and horse chestnut trees at the wood edge; then on 22 April 1998 I watched an adult male moving westwards through the wood.

Dunnock *Prunella modularis*: A pair almost certainly bred in the north-eastern part of the wood every year up tp 2001, but more sporadically subsequently, although a pair was present in June 2016. It is probable that breeding occurs elsewhere in Sheep Wood.

House Sparrow *Passer domesticus*: Several breeding pairs were present at suitable nesting sites in buildings around the wood until 1995, following which numbers declined so that by 2001 only a few were to be seen and none on the north-eastern outskirts of the wood by 2012.

Grey Wagtail *Motacilla cinerea*: My only sighting is of one foraging on the lawn between the wood edge and Westacre Close on 7 October 1996.

Pied Wagtail *Motacilla alba yarrelli*: Occasional birds seen foraging around the edge of the wood and in Westacre Close in June 1990, September 1991, July-August 1992, August 1994 and during May to early July 2004.

Chaffinch *Fringilla coelebs*: At least one pair bred or attempted to do so in the north-eastern section of the wood and probably other pairs elsewhere within its boundaries up to 2011. Since then I have not noticed any singing males, in the

north-eastern part at least. On 31 October 2009 I saw a flock of *c.*30 in the wood's treetops, an unusual event here.

Bullfinch *Pyrrhula pyrrhula*: A pair present at the north-eastern edge of the wood on 30 June 1994 is my only record.

Greenfinch *Chloris chloris*: Several pairs bred or probably bred around the wood's edges up to 2004, but nor since as far as my observations go.

Goldfinch *Carduelis carduelis*: One pair at least bred in 1990 in the north-eastern section and probably in other years up to 1994, plus possibly other pairs elsewhere in the wood or near its edges. My only records subsequent to 1994 are of a party of 10 in the wood's treetops on 17 April 1996 and birds occasionally seen flying over in April-May 1997 and 1998.

Siskin *Carduelis spinus*: My only record is of a male and a female together on 5 March 1989, the male in splendid spring plumage with a jet black 'cap' and much bright yellow.

INVERTEBRATES

Insects

Lepidoptera – Butterflies

Brimstone Butterfly *Gonepteryx rhamni*: A regular visitor. On 18 September 1989 I watched a female being pursued by two male Speckled Woods *Pararge aegeria.*

Large White *Pieris brassicae*: A regular visitor, usually in small numbers, but in July 1990 I saw many towards the end of the month. On 4 and 5 May 2002 I watched up to three males nectaring at the blossoms of horse chestnut, plus others doing so on 11 May 2002.

Small White *Pieris rapae*: Numerous in most years. Like the Large White, I often observed them nectaring at the blossoms of horse chestnut.

Green-veined White *Pieris napi*: A regular visitor in small numbers that probably breeds.

Orange-tip *Anthocharis cardamines*: Occurs each spring in small numbers and breeds. For instance, on 4 May 2002 I found four eggs on Garlic Mustard *Alliaria petiolata* on the south side of Sheep Wood. On 27 April 1998 I watched a male being pursued by a Speckled Wood.

Red Admiral *Vanessa atalanta*: Seen every year, usually in small numbers and probably breeds in nettles at the wood's edges.

Painted Lady *Vanessa cardui*: Occasional visitor, especially in years when large immigrations occur, such as in 2009. On 28 May that year I watched between 16.45 hours and 18.00 hours a northerly movement taking place over Sheep Wood at a rate of about 40 butterflies per minute on a viewing front of *c.*30 metres. They flew very rapidly, rising over trees with an average height of 30 metres in the wood, then dropping down before rising again to clear the roofs of the block of flats in Westacre Close.

Small Tortoisehell *Aglais urticae*: Regularly seen in small numbers and probably bred up to 1995, after which I did not see any in the vicinity of the wood until 14 May 2000, when I saw one. My only records since then are of one on 23 April 2013 and another on 20 October 2014.

Peacock Butterfly *Aglais io*: Occasional visitor in small numbers that may breed on the outskirts of the wood. At 12.25 hours on 28 October 2015 one persistently tried to enter one of my flat windows in Westacre Close, presumably in search of hibernation quarters.

Comma Polygonia c-*album*: My only records are one on 24 October 2009 and another on 11 April 2013.

Speckled Wood *Pararge aegeria*: A small, presumably, breeding population is present, including in the north-eastern section of the wood where most of my observations were made. On 18 September 1989 I watched several males and a female occupying sun patches up to 12 metres above ground on the foliage of a Scots pine and three adjacent cypresses. On one occasion that day I counted seven males spiralling upwards together to about 20 metres in a multiple territorial encounter. Similarly, in late July and early August 1992, I watched three males, that were present most days, spending much time basking in sun patches high up (*c.*13 metres) on the foliage of Scots pines and adjacent trees, sometimes indulging in prolonged spiralling pursuits. On 18 September 1989 I watched two males pursue a female Brimstone Butterfly and on 27 April 1998 one chasing a male Orange-tip.

Speckled Woods are not often noticed nectaring at flowers, so it is worth mentioning that on 27 June 1994 I watched a female nectaring at those of *Senecio laxifolius*. and that on 11 May 2006 I saw two males visiting the blossoms of hawthorns **and** horse chestnuts and, on 22 July 2007, one apparently feeding from Wild Privet blossoms.

Meadow Brown *Maniola jurtina*: Regularly seen in June and July flying along the edges of the wood and presumably breeds there. Seen visiting the flowers of Self-heal *Prunella vulgaris.*

Holly Blue *Celastrina argiolus*: Seen in small numbers in most years and almost certainly breeds in the wood as its larval foodplants are present in quantity. The

imagines were especially plentiful in the spring of 1997: During one watch of about an hour I counted 10 flying along the north-eastern edge of the wood.

Lepidoptera – Moths

All my records for each species are given. I never operated a mercury vapour or other type of moth trap and those that came to light were attracted to the lighted windows of my flat in Westacre Close.

Twenty-plume (Many-plumed) Moth *Alucita hexadactyla*: One at light on 10 and 26 September 1996; one male just out of hibernation on one of my apartment windows on 1 May and another at light on 5 October 1997.

Beautiful Plume *Amblyptilia acanthadactyla*: Two at light on both 2 and 3 October 1996.

Common Plume *Emmelina monodactyla*: Two at light on 5 October 1997; one at light on 26 October 2001; one photographed on entrance door of Block 2 of the apartments in Westacre Close on 31 October 2015.

Bee Moth *Apohomia sociella*: One male at light on 11 July 1991; one female at light on 30 May 2003; one fresh male at light on 3 June 2007.

Endotricha flammealis: One male at light on 29 July 1990.

Grass Moth *Chrysoteuchia culmella*: One at light on 3 July 1995; one male at light on 4 July 2003.

Grass Moth *Agriphila geniculea*: One at light on 26 August 1995.

Pyrausta despicata: One male at light on 7 July 1991 and two males on 17 August 1995.

Small Magpie *Anania hortulata*: One at light on 7 July 1991; one disturbed from nettles at wood edge on 11 June 2007; one at light on 14 July 2015.

Rush Veneer *Nomophila noctuella*: Two male of this immigrant species on 22 September 1996 and another at light on 9 October 1996.

Common Swift *Hepialus lupulinus*: One male found dead on 1 June 1990 and another on 17 May 1997.

Lackey Moth *Malacosoma neustria*: One male at light on 22 July 1991.

The Mocha *Cyclophora annularia*: One at light on 24 July 1990.

Clay Triple-lines *Cyclophora linearia*: A male at light on 2 June 2006.

Small Blood-vein *Scopula imitaria*: One male photographed at rest on a door on 10 July 2015.

Small Fan-footed Wave *Idaea biselata*: One male photographed at rest on a door frame on 27 June 2015.

Small Dusty Wave *Idaea seriata*: One male photographed at rest on a door frame on 10 July 2015.

Treble Brown Spot *Idaea trigeminata*: Three at light on 7 July 1991.

Riband Wave *Idaea aversata*: One or two at light on 23, 24 and 30 July, and on 2 August 1990; up to three every night from 6 to 26 July 1991; one at light on 29 July 1992; one at light on 10 May 2001; one at light on 30 June 2003; two (male and female) at light on 12 June 2004; one male at rest on entrance door on 10 July 2015.

Silver-ground Carpet *Xanthorhoe m. montanata*: One on 23 May 1997.

Garden Carpet *Xanthorhoe fluctuata*: One at light on 19 September 1993; one male at light on 9 and two on 23 September 1996; one male at light on 30 May 2003.

Yellow Shell *Camptogramma b. bilineata*: One male at light on 24 June 2003.

Common Marbled Carpet *Chloroclysta truncata*: One female at light on 6 September 1993; one female of the melanic form at rest on a wall on 27 September, one male at light on 4 and 5 October and a fresh female at light on 10 October 1997 that laid 26 white eggs the next day; one freshly emerged male at rest on 7 May 2000; a male at light on 30 May and 2 July 2003; a female at light on 19 May 2004; a male at light on 7 June 2006.

Spruce Carpet *Thera britannica*: One male at light on 6 June 2004.

November Moth *Epirrita dilutata*: Three at light on 15 October 2001 and one on 23 October 2001.

Winter Moth *Operophtera brumata*: One male at light on 23 October 2001.

Foxglove Pug *Eupithecia pulchellata*: One photographed on an outside door on 15 April 2016 – an early date.

Mottled Pug *Eupithecia e. exiguata*: One fresh male at light on 26 May 1990 and another male on 18 May 1997.

Common Pug *Eupithecia v. vulgata*: One fresh male at rest on outside door on 13 May 1999.

Ash Pug *Eupithecia innotata* form *fraxinata*: One male at light on 11 June 2006.

Green Pug *Pasiphila rectangulata*: One male at light on 23 June and a female on 5 July 2003; another female on 8 June 2007.

Brimstone Moth *Opisthograptis luteolata*: One at light on 7 July 1991; a male at light on 5 September 1993; another male on 4 September 1996; a male at light on 14 May 1999; a male at light on 3 July 2003 and another on 30 April 2011.

Dusky Thorn *Ennomos fuscantaria*: One male at light on 14 September 1991 and a female on 17 September 1991.

Scalloped Hazel *Odontopera bidentata*: A female at light on 10 May 2004.

Scalloped Oak *Crocallis elinguaria*: One fresh imago on car port wall on 22 July 1992.

Swallow-tailed Moth *Ourapteryx sambucaria*: One at light on 22 July 1991; a male at light on 3 July 2003; one flying along the wood edge on 11 June 2006; one male at light on 19 July 2016 and another male in flight on 24 August 2016.

Feathered Thorn *Colotois pennaria*: One male at light on 18 October 1997; one male on 11 November 2003; a fresh male at rest on an outside door on 26 October 2005; one male found dead on 28 November 2006; a fresh male photographed above a doorway on 18 November 2011; one fresh male at light on 25 October and another on 12 November 2013; one male at light on 12 October 2015.

Pale Brindled Beauty *Phigalia pilosaria*: One fresh male at rest on wall on 7 March 1991; another fresh male found dead in a spider's web on 27 February 1992.

Dotted Border *Agriopis marginaria*: One at rest on a parked car on 8 March 1989; one at rest on a wall on 14 March 1991.

Mottled Umber *Erannis defoliaria*: One at light on 23 October 2009.

Waved Umber *Menophra abruptaria*: One at light on 16 May 2002.

Willow Beauty *Peribatodes rhomboidaria*: One of the melanic form *rebeli* at light on 1 September 1993; two of the typical form at light on 17 August 1995; one male of the form *rebeli* at light on 30 June 2003; one male of the typical form at rest on wall on 19 August 2016.

Mottled Beauty *Alcis r. repandata*: One at light on 3 July and another, semi-melanic, on 10 July 1989; a female at light on 4 July 2003.

Engrailed Moth *Ectropis bistortata*: One dark-brown second generation female at light on 30 July 1992.

Clouded Silver *Lomographa temerata*: One male at light on 30 May 2003.

Vapourer Moth *Orgyia antiqua*: A male at the edge of the wood on 28 July 1992; a male on 8 September 1993; three males on 8 August 1994; a male on 24 July 2007; a male on 22 August 2016. A young larva found at the wood edge on 9 June 2016.

Pale Tussock *Calliteara pudibunda*: A fresh female at rest, 30 May 2004; a fresh male at light on 30 May 2016.

Heart and Dart *Agrotis exclamationis*: A female at light on 26 May 1990; a male at light on 9 July 1991; a male at light on 14 June 2006; a dead female found on 13 June 2009.

Shuttle-shaped Dart *Agrotis p. puta*: Two females at light on 30 July 1990; one fresh male at light on 5 August 1992.

Large Yellow Underwing *Noctua pronuba*: One at light on 5 July and another on 11 September 1989; one at light 24 June 2003.

Pearly Underwing *Peridroma saucia*: A female of this immigrant species at light on 21 October 1996.

Ingrailed Clay *Diarsia m. mendica*: One at light on 8 September 1993.

Setaceous Hebrew Character *Xestia* c-*nigrum*: One male at light on 21 May 2004.

Square-spot Rustic *Xestia xanthographa*: One at light on 11 September 1989, 2 August 1990, 19 September 1993, 8 August 1994 and 9 September 1996.

Bright-line Brown-eye *Lanacobia oleracea*: A female at light on 5 July 2003 and a male on 7 May 2011.

Broad-barred White *Hecatera bicolorata*: One male at light on 18 June 2003.

Smoky Wainscot *Mythimna impura*: A male at light on 24 July 1990 and a female on 23 June 2003.

Common Wainscot *Mythimna pallens*: A fresh male at rest on 19 September 1989.

Blair's Shoulder-knot *Lithophane leautieri hesperica*: A fresh male at light on 10 October 1997. Photographed.

Early Grey Xylocampa areola: A fresh male at rest on 5 April 1991.

Brick Moth Agrochola circellaris: A male at light on 24 October 2015.

Grey Dagger *Acronicta pisi*: One at light on 11 July 1991.

Knot Grass Moth *Acronicta rumicis*: A newly emerged male flew into my flat from Sheep Wood during bright sunshine on 3 June 2009.

Marbled Beauty *Cryphia domestica*: A male at light on 20 July and another on 2 August 1990; one to six at light most nights from 20 July to 7 August 1992.

Copper Underwing *Amphipyra pyramidea*: A fresh male at light on 20 July 1990; a dead male found on 21 September 1990; a freshly emerged male at light on 5 August 1992; a male at light on 10 September 1994 and another on 13 September

1996; a female at light on 19 July 2007; a freshly emerged male found dead on 21 October 2009.

Angle Shades *Phlogophora meticulosa*: One at light on 24 October 2001 and another two days later.

Dun-bar *Cosmia trapezina*: A male at light on 2 July 2003.

Dark Arches *Apamea monoglypha*: One at light on 13 July 1989 and another on 2 August 1990.

Tawny Marbled Minor *Oligia latruncula*: A melanic male, form *unicolor,* that I found inside a large lamp in my flat on 8 November 2015 had probably been there since the previous June or July.

The Uncertain *Hoplodrina alsines*: A female at light on 2 July 2003.

Pale Mottled Willow *Caradrina clavipalpis*: One at light on 23 September 1996.

Silver Y *Autographa gamma*: A male of this immigrant species at light on 30 July 1990; two at light on 2 July 2003; one fresh male on 7 June and another on 11 June 2006, both at light.

Red Underwing *Catocala nupta*: One at rest on a wall on 10 September 1996; one found dead by a neighbour in early September 2005 and another photographed by me resting on an outside window frame on 14 September 2016.

Common Snout *Hypena proboscidalis*: Singletons at light on 31 July 1992, 19 September 1992 and 23 June 2006.

Miscellaneous records of other insect orders

Odonata – damselflies and dragonflies

Southern Hawker Dragonfly *Aeshna cyanea*: Occasionally seen flying at the wood edge.

Orthoptera – grasshoppers, bush-crickets and allied insects

Oak Bush-cricket *Meconema thalassinum*: One adult male on roof of my parked car on 5 August 1990; single adult males at light in my flat on 2 and 6 August 1992; a male found in the daytime on 2 September 1993; a female at light on 23 August 1995; two males at light on 19 August 2016.

Hemiptera – bugs

Hawthorn Shieldbug *Acanthosoma haemorrhoidale*: One on 21 October 2009 and another on 27 October 2010.

Parent Shieldbug *Elasmucha grisea*: One on 15 April 2010.

Common Froghopper *Philaenus spumarius*: Plentiful on Curled Dock *Rumex crispus* and other plants at the wood edge.

Coleoptera – beetles

Cockchafer *Melolontha melolontha*: One at light on 30 May 1999; two at light on 28 May and one on 30 May 2003.

Red-tipped Flower Beetle (Common Malachite) *Malachius bipustulatus*: A male on 5 June 2008.

False Blister Beetle *Oedemera (Oncomera) femoralis*: Several at light on 24 October 2015.

Seven-spot Ladybird *Coccinella septempunctata*: Usually numerous.

Two-spot Ladybird *Ad*alia *bipunctata*: Usually numerous.

Harlequin Ladybird *Harmonia oxyridis*: One noted on 14 April 2010.

Cramp-ball Fungus Weevil *Platyrhinus resinosus*: 12 June 2007: one adult of this species, which breeds in Cramp-ball Fungus (King Alfred's Cakes) *Daldinia concentrica* on ash trees and in other fungi, such as *Hypoxylon fragiforme* on beech trees. **A nationally scarce species**.

Diptera – flies

Mosquito *Theobaldia annulata*: One or two at light on several nights in November and December 1988.

Common (Dark-edged) Bee-fly *Bombylius major*: Up to three nectaring at Dandelion, Lesser Celandine, Primrose and Slender (Round-leaved) Speedwell *Veronica filiformis* flowers on 6 and 7 April 1998.

Hornet-mimic Hoverfly *Volucella zonaria*: One on 20 July 2016.

Hymenoptera – ants, bees and wasps

Black Garden Ant *Lasius niger.* many nests in the vicinity of the wood.

Tree Wasp *Dolichovespula sylvestris*: One worker flew into my flat on 25 July 1990; a nest 10 metres up on outer branch of a horse chestnut tree in the hedgerow of Westacre Close, September 1998.

German Wasp *Vespula germanica*: Regularly recorded.

Common Wasp *Vespula vulgaris*: Regularly recorded.

Tree Bumble Bee *Bombus hypnorum*: One on 15 July 2015.

Large Red-tailed Bumble Bee *Bombus lapidarius*: Frequent throughout the period covered.

White-tailed Bumble Bee *Bombus lucorum*: Frequent throughout the period covered.

Buff-tailed Bumble Bee *Bombus terrestris*: Numerous throughout the period covered. In June 2007 a queen made a nest in an old tit's nest in a nestbox at the edge of the wood.

Mollusca

White-tipped Banded Snail *Cepaea hortensis*: Abundant in the wood edge vegetation.

REMARKS

Sheep Wood has been somewhat neglected since at least 1988 and is in need of judicious management in view of its status as a Site of Nature Conservation Interest. Although the fallen timber that exists should be left undisturbed for the sake of the many invertebrates associated with it, the undergrowth has become very thick in places and some careful thinning would, I believe, benefit the wildlife.

As already stated, of the 60 species of birds I have recorded in the wood or flying over it, 31 have bred, probably done or attempted to do so. There has been a decline in recent years of the numbers of such breeding passerine species as Willow Warbler (since 2002), Chiffchaff, Greenfinch and House Sparrow (since 2005), Mistle Thrush (since 2006), Starling (since 2008), Chaffinch (since 2010) and Coal Tit (since 2011). Some of these have, of course, been declining nationally, but it is difficult to escape the suspicion that the prevalence in and around the wood of such potential predators as Carrion Crows, Magpies, Jays, Sparrowhawks, Foxes, Grey Squirrels and domestic cats may also be a factor. However, some managerial improvements to the structure of the wood as suggested above might well benefit these species and other small passerines like the Dunnock and Robin.

There is little doubt that Sheep Wood is a wildlife corridor connecting the coastal countryside of the Severn Estuary with the Blaise Estate in an increasingly urbanised area and for that reason alone should be treasured and conserved.

References

McEwen Smith, R., & Tonkin, M.T. (1996) *Lost Farms of Henbury*. Redcliffe Press, Bristol.

The Helgoland Trap at Chew Valley Lake 2007 to 2016

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As far as we know this is one of the few, possibly the only, operational inland Helgoland trap in the country; all others being at the coastal observatories. It is very useful on days that are unsuitable for using mist nets (too wet and windy) and provides the opportunity for the participants on our ringing courses to experience one in action (Fig. 1). Bird food, mainly sunflower seed, is provided throughout the autumn and winter months by a small team of members who live locally. In some years ducks can be attracted when the lake level is high by baiting with corn.

A large structure such as the Helgoland trap needs a certain amount of maintenance for it to be kept in a fully functioning condition. Regular cutting of the vegetation inside the trap, for example, has to be carried out each year in early summer to stop it projecting through the roof. The partial collapse of the roof, due to the weight of snow, happened on a couple of occasions and in the 2012/2013 winter, apart from many of the horizontal roof spars breaking, half of the netting was also torn and had to be replaced (Fig.2). Somewhat to my surprise it only took two morning's work to repair.

Fig. 1: The Helgoland trap, Summer 2013

Fig. 2: Snow damage to the roof of the trap 2012

The Helgoland trap, although now looking rather weather beaten, has undergone several modifications and is now more efficient than our original design. The compartment at the tapered end of the trap has been made smaller (Fig. 3) and this seems to encourage the birds to head more readily towards the 'window' of the catching box. The catching box has been modified as follows: The front Perspex sheet is now hinged and by removing the two pins at the top can be lowered for either cleaning and, quite importantly, for releasing unwanted guests such as the occasional squirrel! As the birds enter the box they pass over a flexible plastic sheet

that acts as a 'one-way' entrance flap. At first the catching box was separated into two sections by a platform of horizontal dowel rods placed circa 30mm apart. The idea was that an upper chamber would hold any larger birds (Blackbird size and above) and that smaller birds could drop through into the lower compartment. In practice this did not work very well as the birds could quite easily evade capture by hopping between compartments. To overcome this problem the compartments were separated by a plywood sheet with just a 4cm gap at the front. Smaller birds can still access the lower section but can be held in either section by sliding a second sheet of plywood to touch the front Perspex sheet (Fig. 4).

Fig. 3: Rear of Helgoland trap with ramp to 'window' of the catching box

Fig. 4 *Left*: Catching box with 4cm gap between platform and front.
Right: Catching box with plywood sheet slid forward to separate upper and lower sections.

This article is an update of my report covering the first eight months of the trap's use by members of the Chew Valley Ringing Station (CVRS). (Bailey, 2006). It has continued to work well since then and in terms of ringed and retrap events (excluding nestlings) has provided *circa* 10% of the birds handled during the ten years 2007 - 2016. The table (Table 1) provides a list of the 42 species caught and the totals given are for all handlings i.e. birds ringed plus retraps. For the commoner species this often represents multiple captures within a calendar year.

To some extent the annual totals reflect how well, or badly, the bird populations around the lake are faring. However, there has also been variation in the use of the trap so the catching effort has not been consistent. It is noticeable that the total fell in 2011 and was much higher in 2012 (Fig. 5). This was mainly due to changes in the water level at the lake. In 2011 less use was made of the trap during the winter months because low water levels allowed access to all of our mist-netting sites.

Species	**2007**	**'08**	**'09**	**'10**	**'11**	**'12**	**'13**	**'14**	**'15**	**2016**	**Total**
1 Mallard	7	8	0	2	0	8	1	0	1	2	29
2 Sparrowhawk	0	2	0	2	2	1	2	1	1	0	11
3 Water Rail	4	5	3	1	0	6	3	2	1	3	28
4 Moorhen	3	5	9	4	0	22	21	1	0	0	65
5 Wryneck	0	0	0	0	0	1	0	0	0	0	1
6 Gt.Sp.W'pecker	0	2	0	3	1	2	0	1	0	0	9
7 Meadow Pipit	0	0	0	0	0	0	0	0	1	0	1
8 Wren	12	11	8	6	3	13	4	5	9	11	82
9 Dunnock	18	26	29	13	7	14	7	28	5	17	164
10 Robin	15	30	30	16	2	11	6	18	15	5	148
11 Blackbird	5	9	13	13	4	11	3	4	2	4	68
12 Song Thrush	0	2	0	5	0	4	0	3	4	0	18
13 Redwing	6	2	0	0	3	0	0	0	3	0	14
14 Cetti's Warbler	3	7	0	0	1	1	0	1	1	0	14
15 Sedge Warbler	2	0	0	1	0	0	1	0	0	0	4
16 Reed Warbler	7	1	5	6	0	2	7	9	3	2	42
17 Lesser Whitethroat	0	1	0	0	0	0	1	1	0	2	5
18 Whitethroat	1	1	2	1	1	0	2	9	0	0	17
19 Garden Warbler	2	0	0	1	1	3	0	1	1	0	9
20 Blackcap	9	5	6	9	3	27	7	17	2	4	89
21 Chiffchaff	25	14	7	14	13	23	10	23	4	9	142
22 Willow Warbler	3	1	1	1	0	1	0	0	0	1	8
23 Goldcrest	2	0	0	2	4	5	0	4	3	0	20
24 Long-tailed Tit	8	27	20	11	16	16	0	15	12	11	136
25 Marsh Tit	0	1	0	0	0	0	0	0	0	0	1
26 Coal Tit	2	4	6	6	2	3	2	2	3	0	30
27 Blue Tit	100	115	163	141	142	221	124	168	197	120	1491
28 Great Tit	50	65	83	95	95	112	50	71	79	45	745
29 Nuthatch	0	0	0	0	0	0	0	0	0	1	1
30 Treecreeper	0	1	0	0	0	0	0	0	1	0	2
31 Jay	0	0	0	0	0	0	1	0	1		
32 Magpie	0	1	0	0	0	0	2	0	0	0	3
33 Carrion Crow	2	0	0	0	0	0	0	0	0	0	2
34 Starling	14	40	2	0	0	0	0	0	0	0	56
35 Chaffinch	162	99	77	46	15	99	51	23	82	43	697
36 Greenfinch	289	204	134	11	6	84	79	208	8	0	1023
37 Goldfinch	0	1	0	1	0	1	0	0	0	2	5
38 Lesser Redpoll	0	0	0	0	1	3	0	0	1	0	5
39 Linnet	0	1	0	0	0	0	0	0	0	0	1
40 Siskin	0	0	0	0	1	0	0	0	0	0	1
41 Bullfinch	0	0	1	0	3	4	0	3	7	3	21
42 Reed Bunting	0	11	6	1	0	3	5	9	9	15	59
Total:	**751**	**702**	**605**	**412**	**326**	**701**	**388**	**627**	**456**	**300**	**5268**

Table 1: Helgoland trap annual capture totals at Chew Valley Lake 2007-2016

In 2012 however the opposite situation occurred, when a long period in which the lake remained full greatly restricted our access to most of the reed bed and we were far more reliant on the trap. The raised water level during the autumn and winter 2012 also covered the floor of the trap to a depth of around 20 - 30cm (Fig. 6). This meant that it was possible to bait the trap with corn and attract a greater number of water birds. As a winter feeding station it is not surprising that Blue and Great Tits are high on the species totals list (Fig. 7). In comparison we also monitored the rapid decline in Greenfinch numbers due to the fatal protozoan disease *Trichomonosis*. (Fig. 8).

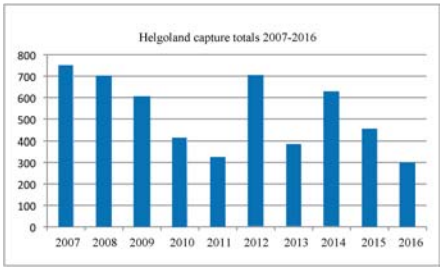

Fig. 5: Helgoland annual totals 2007-2016.

Fig. 6: High water November 2012

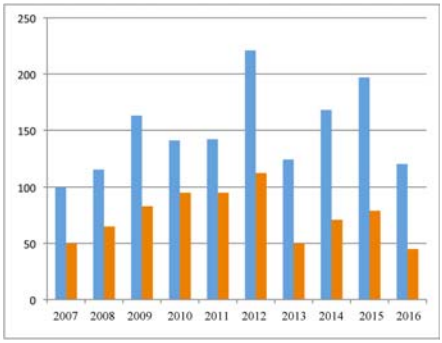

Fig. 7: Blue Tit (blue bars) and Great Tit (orange bars) annual totals 2007-2016.

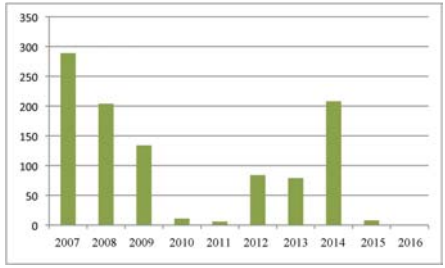

Fig. 8: Greenfinch annual totals 2007-2016.

The trap has also provided an interesting range of species such as Redpoll (Fig. 9), Sparrowhawk (Fig. 10) and on 29th November 2014, although it was a 'normal' looking Lesser Whitethroat (Fig. 11), the very late date raised the possibility of a central Asian (Siberian) race *Sylvia curruca blythi* although subsequent MtDNA analysis disproved this. It was perhaps inevitable that something regarded as a rarity would turn up, and on September 29th 2012 there was the surprise find of CVRS's second Wryneck (Fig. 12).

Fig. 9: 1st year Redpoll
16th October 2010

Fig. 10: 1st year male Sparrowhawk
8th November 2010

Fig. 11: Lesser Whitethroat
29th November 2014

Fig. 12: Wryneck
29th September 2012

Chew Valley Ringing Station members would like to express their thanks to the Bristol Naturalists' Society for financially supporting the construction of the Helgoland trap in 2006, and recently in the publishing of CVRS's 18th Ringing Report in 2016.

Footnote

Helgoland, whose name has been adopted for this type of trap, is a small, two island archipelago located 46 kilometres from the German coastline in the North Sea. Historically a Danish possession but, because of its strategic position, it was forcibly annexed by Britain in 1807 to avoid Napoleon's trade blockade. It seems that with the imperialistic might of the British navy at the time the Danes had little say in the matter! In 1890 it was swapped with Germany for a slice of the African coast facing Zanzibar.

In 1910, Hugo Weigold a German zoologist and a pioneer bird ringer who worked for the Scientific Commission for Marine Research set up a bird observatory on the island to trap and ring migrating birds. This however, had to stop at the onset of the First World War (1914-18) at the end of which the Helgolanders were evacuated so that submarine bunkers used by U-boats could be dismantled.

Between the wars it was a holiday resort and during the Second World War it was again used to deadly effect as a submarine base. After the war it became renowned as the site of probably the largest non-nuclear explosion in history! On April 18th 1947 a huge stock of Nazi bombs and ammunition (6,700 tons) were detonated to destroy the fortifications, underground bunkers and submarine bases. The blast had a third of the strength of the Hiroshima atomic bomb, and was also used as a scientific experiment to record the explosion with seismic sensors. The blast was noted as far away as Sicily. Fortunately, there had been protests from British bird watchers and a smaller explosion prior to 'Operation Big Bang' was detonated to temporarily scare the Helgoland birds away.

The Royal Air Force continued to use the island as a bombing range until it was returned to West Germany on 1st March 1952. The town and harbour were rebuilt, and Helgoland once again became a holiday resort. The island is used in navigation, as a site for wind-energy production, and in scientific research, especially the study of birds.

There has been a gradual acceptance that the 'i' should be omitted from the name 'Heligoland' in preference for the spelling 'Helgoland' as used by the residents of the island.

References

Bailey, M. (2006) A Heligoland Trap at Chew Valley Lake. *Nature in Avon*, **66**, 19-23.

Fungi Day
A report from the Justin Smith Foundation

Lucy Wallis Smith
www.justinsmithfoundation.org

The Justin Smith Foundation was set up in memory of Justin Smith, a local expert mycologist who had led numerous highly-regarded fungi workshops and forays, championing mycology and inspiring many people. The Foundation is in partnership with Avon Wildlife Trust (AWT).

Description of the project

The Foundation received funding from Bristol Naturalists' Society to promote and run our first Fungi Day, which was designed for young naturalists in and around Bristol. It was held on 24 October 2016 at Folly Farm Centre, Chew Valley. The aim was to educate 20 young people about fungi and inspire the next generation of mycological recorders and conservers.

A report 'Saving the Forgotten Kingdom: A Strategy for the Conservation of the UK's Fungi' produced by Plantlife *et al.* in 2008 stated that "The importance of fungi to the health and welfare of the planet is no longer in any doubt… There are so many fungi, and there are not enough people studying them… Raising awareness of fungi and their importance is fundamental to their conservation…".

Bryn Dentinger, Senior Research Leader, Comparative Fungal Biology, Kew Gardens, commented in November 2014 "We need more people studying [fungi]. We need more resources to do it…. We know probably less than 5% of the total fungal diversity in the world… We have a huge task in front of us… We have yet to really explore their full potential."

There are currently very few mycologists in the UK as a whole, let alone the Bristol area. Many respected organisations, including the RSPB and the British Mycological Society acknowledge that there is a knowledge gap regarding fungi, and there are not enough people studying what is often referred to as the 'Forgotten Kingdom'. The aim of Justin Smith Foundation is to harness Justin's passion for nature and continue his work to inspire, inform and educate about fungi, lichens and lower plants, thus helping to narrow that knowledge gap.

Promotion

To attract young enthusiasts who were already a little curious about the fungi kingdom, we offered 20 places on the Fungi Day to winners of a competition which involved showing/telling us what the entrants found fascinating about fungi.

We sent the competition information along with a letter to Heads of Science at all Bristol secondary schools (and to some in surrounding areas). We also developed the website, flyers, posters and our social media presence to promote the competition and the Fungi Day, and were interviewed on local radio. Promotional material was distributed to all relevant locations in and around Bristol – *e.g.* libraries, museums, community centres, Zoo, Botanic Gardens, City Farms, AWT venues, Scouts and Guides groups. AWT were very supportive and promoted the project via their magazine, their social media outlets, and useful contacts such as volunteer groups.

With more time and resources, we could have engaged closer with the schools, teachers and students, inspiring more competition entries. We have learnt that a longer lead time is required in order to fit in with the existing busy curricular and extra-curricular school schedules.

At the start of the Autumn term we made the decision to expand the age criteria for the competition to include university students and other young adults with an interest in learning about fungi, and promoted it directly to the two Bristol universities. We very soon received emails from a good number of interested applicants, and the 20 places were filled.

Fungi Day

To make sure all attendees arrived at Folly Farm by 10am we arranged a minibus to transport most of them from Bristol. We greeted the attendees with a welcome pack which included a hand lens, a fungi swatch book, notebook and pencil, and relevant leaflets and resources from the British Mycological Society. We had two AWT fungi experts leading the day, and a volunteer helper from the North Somerset & Bristol Fungus Group. The morning session was classroom based, learning about what is a fungus, the life-cycle, and identification skills. A delicious hearty lunch was provided by the venue, before we headed out in two groups on forays around the surrounding nature reserve. Although the rain had set in, the wet weather didn't dampen any spirits, and the students were very enthusiastic about each new fungal find.

After a couple of hours we returned to consolidate and admire our collections - an impressive array of around 60 different species of fungi between us (see Appendix).

Outcomes

Through widescale promotion of the project, we selected 20 enthusiastic students who learnt about the basics of fungi ecology, identification and recording skills. They benefitted from the knowledge of fungi experts on a foray, exploring fungi habitats and different species. They were inspired and enthused to learn more, saying that they wished the day had been longer.


JSF Fungi Day 2016

While planning and delivering this project we learnt what works, regarding communication, promotion and agenda for the day, and what could be improved (see Evaluation).

We developed our website and social media while promoting this project, to make fungi education and information more widely available, and to facilitate communication between fungi enthusiasts.

We established good relationships with expert tutors for further educational events.

We received positive feedback from the students.

A straw poll on the day indicated that further workshops and forays would be popular and beneficial. Subject to funding, we are in the process of planning our next fungi workshop which may be in Spring 2017, in Bristol, to include microscopy. We will invite all the attendees from the 2016 Fungi Day, and then other interested people if there are still places available.

We are also very keen to offer schools a visit from a fungi expert for a tailor-made 'introduction to fungi' session for pupils (and teachers). AWT have advised that this may be a more successful way of engaging young people with a new subject, and could lead to inspiring more future mycologists.

Evaluation

Before returning to Bristol on the minibus, the students filled out our feedback forms, & their responses were predominantly positive. Here are some of the answers to "What did you like most about the day?":

- "Everything! Had an amazing and informative day – Thank you!"
- "The lectures at the beginning."
- "The foray!"
- "The walk, speakers, and general nice vibes."
- "The info was clear, & it kept people entertained. Fantastic day... Good for beginners and the more experienced."
- "The detailed but simple learning process and field work… Looking forward to further events."
- "It was a great day and has sparked an interest in both of us to learn more about fungi."

100% of the students who completed an evaluation form (17) said they would recommend the project to others.

To help us plan for future events we asked "what could we do differently?" – their answers included more social media coverage, something after the foray *e.g.* microscope analysis, a longer day, more days, and more time on common species identification.

Appendix - Species found and identified (summary list)

Abortiporus biennis
Armillaria mellea
Auricularia auricula-judae
Bisporella citrina
Bolbitius titubans
Clavulina coralloides
Clitocybe nebularis
Collybia butyracea
Collybia peronata
Coprinus comatatus
Daedaleopsis confragosa
Daldinia concentrica
Ganoderma sp.
Hymenochaete corrugata
Hymenochaete rubiginosa
Hypoxylon fuscum
Laccaria laccata
Lacrymaria lacrymabunda
Lycoperdon pyriforme
Melanoleuca sp.
Mycena arcangeliana
Mycena galericulata
Mycena haematopus
Mycena inclinata
Mycena vitilis
Pholiota sqarrosa
Pluteus cervinus
Psathyrella candolleana
Russula sp. (possibly *sardonia*)
Rutstroemia firma
Scleroderma areolatum
Scleroderma citrinum
Stereum hirsutum
Trametes gibbosa
Trametes versicolor
Xylaria hypoxylon
Xylaria polymorpha / longipes

Badgers at the Bommie and Glyn Vale, Northern Slopes, South Bristol

Rupert Higgins

Introduction

During the winter of 2015/2016 two areas of public open space in south Bristol were surveyed with the aim of establishing the pattern of badger use in the area. The work was commissioned by The Northern Slopes Initiative, with financial support from the Bristol Naturalists' Society and the permission of the landowners, Bristol City Council. The purpose of this article is to summarise the findings of the survey and to compare them with historical information.

Field surveys were carried out in December 2015 and January 2016.

Results

Site Description

The eastern area of open space, The Bommie, has a large central area of amenity grassland. It is surrounded by scrub and secondary woodland, which become particularly extensive in the western and north-eastern parts of the area. The two areas of allotment gardens adjoin this area: Wedmore Vale to the north-west and Springfield Road to the South. A small-holding known as Bramble Farm lies in the eastern part.

Glyn Vale is to the west of Wedmore Vale. It consists largely of scrub and secondary woodland. Much of this is relatively open taller woodland, but there are areas of dense scrub in the southern part of the site. There are several patches of grassland scattered amongst the wooded vegetation with a more extensive area, which is grazed by horses, in the western part of the site.

Both areas have small pockets of habitats that could have avoided being turned into allotments in World War 2 and provide examples of undisturbed traditional agricultural habitat.

The Bommie effectively forms the eastern end of the strip of open spaces provided by the Northern Slopes and there are few open spaces to the east of here. To the west of Glyn Vale, but separated from it by a road and housing, there are open spaces at Kingswear Road and Novers Common. Parts of this area are currently being developed, with further development agreed uphill of Kingswear Road and west of Haldon Close. To the west and south there are then links through a strip of open space along Novers Hill (known as the Western Slopes) to further open land in the Malago Valley and beyond.

The two areas in this study are Local Nature Reserves, Sites of Nature Conservation Importance and Public Open Spaces. They form part of the Strategic Green Infrastructure Network in the Bristol City Council Local Plan (2011).

Badgers in the Surrounding Area

Badger corpses have been found on Wedmore Vale (L. Wyatt pers. comm.), suggesting that some movement occurs between the two sites.

A 2009 survey did not find badger setts on either Novers Common or Kingswear but paths and feeding signs were found. These were most frequent in the part of the area most distant from the present survey site. There are badger setts within two kilometers of the survey area to the south-west, to the south, to the west, to the east and to the north-east.

Survey Results

Setts

An active sett was found in secondary woodland at The Bommie. At least four holes in active use are present: paths lead into nearby areas of dense scrub and further holes could be present here.

Another active sett, consisting of a single entrance, was found in Springfield Allotments. Activity levels around this sett are moderate only and the evidence suggests that it is in current but intermittent use.

A single disused entrance was found within the Wedmore Vale allotments.

There are two locations (one on each site) at which several paths converge on an area of dense scrub, suggesting that a sett might be present. At both sites confirmation of a sett was impossible without unacceptable disturbance to the habitat.

Other Signs

Badger paths are widespread across The Bommie but at Glyn Vale are largely restricted to the western parts of the site.

Assessment

The two sites are both of importance for badgers. The number of holes and level of activity around the active sett on The Bommie strongly suggest that this is a main (breeding) sett. Badgers from this sett make a high level of use of both the Public Open Space and surrounding gardens and other areas. Activity on Glyn Vale is at a much lower level but feeding signs and paths were found and there is a probable sett in dense scrub here. The absence of evidence found in the eastern part of Glyn Vale suggests that these signs are attributable to another social group of badgers.

However, the fact that a dead badger has been seen on the road at Wedmore Vale in 2010 (L. Wyatt pers. comm.) suggests that there is at least some interchange between the two areas.

Both sites are highly suitable for badgers: the soil is suitable for burrowing; there are areas of dense scrub that provide cover; the primary feeding habitat, permanent grassland, is present in good quantity; and there are good secondary food supplies including brambles and apples. The carrying capacity of urban areas is difficult to assess. In pastoral areas across lowland England a social group, on average, requires just over 1km^2 (Judge *et al.* 2014). This is approximately the area of the two sites combined. However, any badgers here are certain to also use surrounding habitats. Whilst many of these will provide sub-optimal foraging habitat and in some cases badger access will be actively discouraged, in others it is likely that badgers are fed and this may enable the area to support a population density well in excess of the average. It does seem likely that Glyn Vale, in particular, is capable of supporting a higher level of badger activity.

The obvious connection to the wider countryside is to the south-west, through Novers Common and the Malago Valley to the southern fringes of Bristol. There are also potential links to a population of badgers at Arnos Vale approximately 500 metres to the north-east; although this would involve crossing many residential roads and the A37 Wells Road some exchange may be important to the Arnos Vale badgers in the long term.

Trends In Bristol's Badger Populations

The main body of historical evidence of badger populations in Bristol is provided in Bristol's Badgers (Harris and Cresswell, 1988), published in the Proceedings of this Society. They provide evidence that Bristol had at the time the largest urban badger populations in the world and one of only four in Britain (one of the others being in Bath). In their paper the authors include a map showing the distribution of setts across the city, based on a survey carried out over the 1981/1982 winter. This showed three badger populations to be present. Two of these are in north Bristol, once centred on Stoke Bishop and the other on the Frome valley. In the south of the city there was only one population, in the Brislington area, approximately 2.5km to the east of the Northern Slopes sites. Away from these populations the only setts were scattered single holes, many of them disused. In south Bristol these were concentrated along the southern and western edges of the city. A study of the diet of urban badgers showed that they are far less dependent on earthworms than their rural counterparts, with scavenging and garden raiding making up around 80% of their diet.

The area surveyed here was therefore unoccupied by badgers 35 years ago, as were the sites in the Malago Valley, Hengrove Park, Bedminster Down, Arnos Vale and the Wells Road referred to above. There is ample evidence that similar range

expansion has occurred in north Bristol, with at least scattered populations across most areas away from the city centre. These include a main sett established close to my own house in Bishopston within the last five years, as well as a gradual spread along the Temple Meads to Severn Beach railway line, obvious to observant users of this train service. This increase in population is not unique to Bristol. A nation-wide study of urban mammals showed that the number of sites from which badgers were recorded rose at an average of 2.49% a year between 2003 and 2015, an increase of around a quarter over the period (Wembridge and Langton 2016).

This increase is in stark contrast to the predictions made by Harris and Cresswell in 1988. They concluded that urban badger populations are relicts of rural populations enclosed by development and that, unlike with foxes, badgers do not colonise urban areas. An intensive study of the Stoke Bishop population revealed that the number of individuals here fell from 80 in 1981 to 47 in 1986 leading them, not unsurprisingly, to conclude that badgers were in real danger of disappearing from Bristol.

Something has clearly changed significantly in the last thirty years. Harris and Cresswell identified two main pressures on urban badgers. The first of these was increased development. They noted ongoing loss of so-called brownfield sites and also a trend to build in large domestic gardens and also that several main setts had been lost to development, or were directly threatened by proposed development. The second threat that the authors identified was persecution. They report that baiting, trapping in snares left for foxes and hunting at night using lurchers were all major causes of mortality. It seemed unlikely that urban badgers could survive these two challenges, particularly since evidence showed that they were unadaptable to change and in particular unable to establish new main setts.

There have clearly been major changes since 1988 although development in Bristol has proceeded at a pace unlikely to have been envisaged by Harris and Cresswell thirty years ago. Almost all “wastelands” and other brownfield sites have disappeared and back garden development has been intensive, although its pace has been slowed by recent changes to planning policies. The efforts of nature conservationists and local authority ecologists since the 1980s have ensured protection of main setts during this process, but there has been large scale loss of badger feeding habitat as well as increased loss of connectivity due to road construction.

The other threat cited in 1988 has partly receded, however. Although the threat remains, with arrests made in South Bristol in 2011 for badger baiting, badger persecution has become much less frequent due to a combination of legal protection and a massive shift in public attitudes. As well as reducing direct mortality, declining persecution has probably also changed badger behaviour: if fear of humans has reduced, this will have enabled them to live in much closer proximity to

people, opening up areas that would previously have been too disturbed for occupation. A similar trend has been obvious in several bird species: for example on the Clifton Downs in the 1930s wood pigeon was uncommon (Morley 1931) due to extreme timidity at a time when persecution was widespread.

It is significant that Harris and Cresswell do not mention feeding in their intensive review of badger food sources: in the 1980s few people would have considered feeding badgers, and most badgers would have been too shy to exploit this resource. Now, however, although many gardeners and allotment holders continue to resent the presence of badgers, feeding has become popular and presumably allows badgers to exist at densities that would otherwise not be possible. There is also evidence that badgers have become more adaptable. I am aware of several urban sites where new main setts have been established, sometimes in apparent response to feeding in a nearby garden. The rural badger population has also increased over the same period: this is frequently attributed to increased winter survival due to climate change and the improved winter forage provided by crops such as maize.

It is tempting to conclude that the future for urban badgers is assured, but this is not necessarily the case. The obvious threat to badgers is posed by the controversial and increasing cull to prevent the spread of bovine tuberculosis. This is not the place to rehearse the controversies over this policy but although the cull itself is unlikely to be extended into Bristol, it could affect the urban badger population. It is possible that, if adjacent rural areas become under-populated following culling, urban badgers may move into vacant territories and in their turn be killed, causing an ongoing drain on the city's population. The publicity surrounding the cull may also cause a shift in people's perceptions of badgers. If badgers are perceived erroneously as presenting a threat to human health, even by a small minority, persecution may increase again. If this occurs it might make badgers more wary of people again. Future expansion of built up areas into urban green spaces presents a further threat, both by removing habitat and by leaving surviving populations isolated from each other.

It is threats such as these that make ongoing survey of badger populations all the more important. The Northern Slopes Initiative has begun to use Trail Cameras to record the presence and activities of the badgers; as this technology has become more available perhaps individuals and community groups throughout Bristol could add significantly to our knowledge of these charismatic animals.

Acknowledgements

Thanks are due to Bristol Naturalists' Society for part-funding this work; to The Northern Slopes Initiative for commissioning and part-funding it, and in particular to Len Wyatt for sharing his local knowledge with me; and to Bristol City Council for provision of maps and facilitating access.

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Bristol & District Invertebrate Report, 2016

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Introduction

By all accounts 2016 was a very poor year for invertebrates. For example, the national 'Big Butterfly Count' had the lowest number of common species recorded in its 16 year history. Locally, that reduction in the number of usually common species seemed to be reflected in anecdotal reporting across all the different insect groups. Reasons for this may be related to the unseasonably warm end to 2015 which was then followed by a long drawn out and cool spring, perhaps due to a combination of the global impact of El Nino and climate change. The only butterfly that seemed to have had a reasonable year locally was the Holly Blue.

Despite this, one highlight of 2016 was a massive influx of the Diamond-back Moth *Plutella xylostella* in early June. This small moth is a known migrant and its larvae can be a pest on crucifers, but the number of individuals arriving in the country must have been huge with some light traps in southern England recording over a 1,000 in one night. In our region reported numbers were not quite as large as that but were still way above the norm, with many people seeing moths in the tens and Robert Kelsh counting 571 in his trap in Bath on 4 June followed by Martin Evans recording 500+ in his garden trap in Bristol on 5 June.

Other notable moth migrants included a clutch of Convolvulus Hawks in September and October, for example Bob Fleetwood reporting seven in his Clevedon garden over this time. The Vestal was also present in some numbers as witnessed by Jean Oliver and John Martin for example. New to the region was a single Orache Moth in the trap of Ray Cottrell, the nearest breeding colony being on the Channel Islands, and Mike Challenger at Severn Beach had not only his first ever Gem but more impressively a Clifden Nonpareil. This large species may now be breeding in southern England, although not yet in our region as far as we know.

The national recording database iRecord has been set up by the national Biological Records Centre. The aim is to make recording easier although it has to be said it has added to the confusion in some recorder's minds as to where to send records – local environmental record centres, national species recording schemes and so on and whether one has to submit the same data to one database or to several. Locally, BRERC's view is simple: send data to them and they will send it on to the national recording schemes. What iRecord has done though is to capture some data that otherwise may not have made it into BRERC. Jon Mortin has been searching this data for interesting invertebrate records from our region and hence has pulled out data on earthworms and marine invertebrates, some of which are reproduced here (along with his own records including these taxa). Bob Fleetwood has also been an

important source of data as he has been carrying out extensive beetle recording at sites such as Tyntesfield and discovering many new species either never recorded locally before or very rarely.

In summary, our endemic species of insect during 2016 were in low numbers although invertebrate recorders continued to find species presumably previously overlooked. This was coupled with the continued colonisation of our region by species as our climate warms, such as the Southern Green Shieldbug and Roesel's Bush-cricket.

Scientific nomenclature follows that used by the National Biodiversity Network website (www.nbn.org.uk).

My thanks to all who have submitted records directly to the Society, particularly to Jon Mortin and Bob Fleetwood, the former for his own records and for sourcing new records from iRecord, and the latter for his extensive records of beetles. In addition I thank Andy Pym, John Martin, John Aldridge, Jean Oliver, Dave Nevitt, Helen Williams, Alan Bone, Chris Iles, Tony Smith, John Burton, Paul Bowyer, Richard Pooley, Martin Evans, Des Bowring, Mike Bailey, Grant Burleigh, the Bristol Regional Environmental Records Centre (BRERC), Bristol & District Moth Group and the Bristol Wildlife E-group. The importance of receiving, not just the records picked out here, but those of perhaps less noteworthy species cannot be understated in terms of monitoring the ever changing status of the invertebrate fauna.

Species of note in 2016

INSECTA (Insects)

Odonata (damselflies and dragonflies)

Libellula fulva (Muller) **Scarce Chaser** Walton Common, North Somerset (vice county 6) ST4 7, 08 June 2016 Dave Horlick. Presumably a wanderer from the rhynes of the North Somerset Levels and evidence of the continued colonisation of this species, unknown in the region before the mid-1980s.

Orthoptera (grasshoppers and crickets)

Metrioptera roeselii (Hagenbach) **Roesel's Bush-cricket** Elm Farm, Burnet, Bath & NE Somerset (vice county 6) ST66 65, 25 July 2016 John Aldridge. Further evidence of the continued colonisation of our region by this impressive cricket.

Hemiptera (true bugs)

Nezara viridula (Linnaeus) **Southern Green Shieldbug** Grenville Road, Bristol (vice county 34) ST590 750, 22 September 2016 Jon Mortin. 1 nymph. Likely to become more commonplace.

Sehirus luctuosus (Mulsant & Rey) Lamplighter's Marsh, Bristol (vice county 34) ST526 763, 15 April 2016 Des Bowring. Bristol Zoo's Wild Place, Blackhorse Hill, South Gloucestershire (vice county 34) ST572 813, 14 May 2016 Ray Barnett. We seem to be on the western edge of the national distribution of this black shieldbug.

Sciocoris cursitans (Fabricius) Lamplighters Marsh LNR, Bristol (vice county 34) ST521 768, 29 May 2016 Jon Mortin. 20 adults. A local species.

Eupelix cuspidata (Fabricius) Sand Point, North Somerset (vice county 6) ST32 65, 27 May 2016 Paul Bowyer. A distinctive leafhopper not often recorded locally.

Coccus hesperidum (Linnaeus) **Brown Soft-scale** Sommerville Road, Bristol (vice county 34) ST594 751, 25 October 2016 Jon Mortin. 10 adults on *Aloe vera.* Few people record scale insects.

Lepidoptera (butterflies)

Satyrium w-album (Knoch) **White-letter Hairstreak** Bath city centre, Bath & NE Somerset, adjacent to the railway line in the city centre (vice county 6) ST7 6, 12 May 2016 Chris Iles. 1 larva on scrubby wych elm which had been nibbling the leaves but had retired to hide amongst the elm seeds for the night. The second time in three years larvae found on this tree – 'presumably there is a colony on Beechen Cliff where there are a number of mature elms, and occasional females wander down to lay eggs'. An interesting record in terms of an example of urban wildlife which may often go unobserved.

Melitaea cinxia (Linnaeus) **Glanville Fritillary** Sand Point, North Somerset (vice county 6) ST32 65, 28 May 2016 Paul Bowyer. Two seen on this occasion. Is this unauthorised introduction still managing to survive at the site or is someone continuing to release stock to ensure its survival?

Boloria selene (Denis & Schiffermüller) **Small Pearl-bordered Fritillary** Priddy Mineries, Somerset (vice county 6) ST54 51, 05 June 2016 Paul Francis. Over 20 individuals seen.

Lepidoptera (micro-moths)

Stigmella suberivora (Stainton) University of Bath campus, Bath & NE Somerset (vice county 6) ST7 6, 2016 Chris Iles. A leaf miner found on Holm Oak but much less commonly than the new arrival – *Ectoedemia heringella.*

Ectoedemia heringella (Mariani) Bath, Bath & NE Somerset (vice county 6) ST6 6, and ST7 6, 2016 Darrel Watts, Chris Iles. First noted in London in 1996 but not recognised as this species until 2001, it has spread across southern England as a common leaf miner on Holm Oak. Present in the region since at least 2012 and very common in and around sites in Bath and probably elsewhere during 2016.

Argyresthia cupressella (Walsingham) Keynsham, Bath & NE Somerset (vice county 6) ST653 678, 01 June 2016 Alan Bone. 1 at light. This North American species was first noted in the UK in the south east of England in 1997 and has been expanding its distribution ever since. First record for our region was from the north Bristol garden of Martin Evans in 2004.

Coleophora binderella (Kollar) Bath city centre, Bath NE Somerset (vice county 6) ST7 6, 12 May 2016 Chris Iles. Larval case on common alder along the riverside. A species for which there are few records from the region.

Pyrausta cingulata (Linnaeus) Sand Point, North Somerset (vice county 6) ST32 65, 27 May 2016 Paul Bowyer. A less common species than the related and familiar *Pyrausta aurata* which is regularly seen in gardens.

Lepidoptera (macro-moths)

Synanthedon myopaeformis (Borkhausen) **Red-belted Clearwing** Salisbury Avenue allotments, Bristol (vice county 34) ST63 73, 27 July 2016 Helen Williams. 1 photographed. A local species in the region.

Idaea seriata (Schrank) **Small Dusty Wave** Kingsdown Parade, High Kingsdown, Bristol (vice county 34) ST585 757, 12 April 2016 Ray Barnett. A common species but out of season, usually flying from June/July.

Cleorodes lichenaria (Hufnagel) **Brussels Lace** Clevedon, North Somerset (vice county 6) ST398 708, 06 July 2016 Bob Fleetwood. 1 at light. Chew Valley Ringing Station, Bath & NE Somerset (vice county 6) ST56 58, 09 July 2016 Lucy Delve & Mike Bailey. 1 at light. A species common in the south west peninsular which may be increasing in our region, previous records from the region are: one near Bath in 1980, one at Chew Valley Lake in 2006, one at Dundry in 2009, two in Carlingcott and one at Chew Valley Lake in 2011 and one at Brown's Folly in 2015.

Catocala fraxini (Linnaeus) **Clifden Nonpareil** Frampton Cotterell, South Gloucestershire (vice county 34) ST665 812, 13 October 2016 Mike Challenger. 1 at light trap. A species apparently colonising southern England and this presumably represents another individual passing through.

Panemeria tenebrata (Scopoli) **Small Yellow Underwing** Sand Point, North Somerset (vice county 6) ST32 65, 27 May 2016 Paul Bowyer. Overlooked by those moth recorders who only focus on light trapping, but widespread.

Trachea atriplicis (Linnaeus) **Orache Moth** Church Road, Severn Beach, South Gloucestershire (vice county 34) ST54 84, 08 July 2016 Ray Cottrell. 1 at light and the first record in our region for this striking species.

Coleoptera (beetles)

Bembidion maritimum (Stephens) Stup Pill saltmarsh, North Somerset (vice county 6) ST52 82, 16 July 2016 Bob Fleetwood. Vacuum sampling revealed this coastal specialist. Clevedon, North Somerset (vice county 6) ST39 70, 08 September 2016 Bob Fleetwood. Adult found by vacuum sampling on bank of outfall stream through saltmarsh.

Bembidion iricolor (Bedel) Stup Pill saltmarsh, North Somerset (vice county 6) ST52 82, 16 July 2016 Bob Fleetwood. Vacuum sampling revealed this coastal specialist.

Bembidion minimum (Fabricius) Stup Pill saltmarsh, North Somerset (vice county 6) ST52 82, 16 July 2016 Bob Fleetwood. Vacuum sampling revealed this coastal specialist.

Cercyon depressus (Stephens) Clevedon, North Somerset (vice county 6) ST39 70, 08 September 2016 Bob Fleetwood. 1 adult from sifting high tideline seaweed, 2 previous Somerset records. Nationally Scarce.

Plegaderus dissectus (Erichson) Tyntesfield, North Somerset (vice county 6) ST50 71, 19 July 2016 Bob Fleetwood. 1 adult in flight interception trap (4 bottle vane trap), 3 previous Somerset records. Nationally Scarce.

Dropephylla devillei (Bernhauer) Tyntesfield, North Somerset (vice county 6) ST50 71, 24 June 2016 Bob Fleetwood. Adult in flight interception trap (vane trap by log pile). Bullock's Lakes, Somerset (vice county 6) ST403 678, 17 September 2016 Bob Fleetwood. 1 in a flight interception trap (vane trap), male genitalia determination. Very few records in the south of England and no previous records in Somerset.

Omalium rugatum (Mulsant & Rey) Leigh Woods, North Somerset (vice county 6) ST56 73, 16 November 2016 Bob Fleetwood. 1 adult in leaf litter. Nationally Scarce.

Aleochara grisea (Kraatz) Channel View, Clevedon, North Somerset (vice county 6) ST37 68, 21 April 2016 Bob Fleetwood. 1 adult found under decaying seaweed by vacuum sampling, 3 previous Somerset records.

Deleaster dichrous (Gravenhorst) Walton Moor, North Somerset (vice county 6) ST438 729, 30 May 2016, Paul Bowyer.

Augyles maritimus (Guérin-Méneville) Stup Pill saltmarsh, North Somerset (vice county 6) ST52 82, 16 July 2016 Bob Fleetwood. Vacuum sampling revealed this coastal specialist.

Athous campyloides (Newman) Garden, Clevedon, North Somerset (vice county 6) ST398 708, 22 June 2016 Bob Fleetwood. 1 adult at actinic light, 1 previous Somerset record in 2010. Nationally Scarce.

Lampyris noctiluca (Linnaeus) **Glow-worm** Monarch's Way bridleway under the Long Ashton bypass, Long Ashton, North Somerset (vice county 6) ST542 693, 25 June 2016 Jane Cole. A male attracted to the glow of a bat detector. There is some concern nationally about glow worm populations and more current records from our region would be appreciated.

Phloiophilus edwardsii (Stephens) Canada Farm, Somerset (vice county 6) ST41 40, 18 September 2016 Bob Fleetwood. 1 adult beaten from sallow, 5 previous Somerset records. Nationally Scarce.

Adistemia watsoni (Wollaston) Tyndall's Park, Bristol (vice county 34) ST58 73, 22 November 2016 Bob Fleetwood. 1 adult found indoors, only 12 records on the National Biodiversity Network (NBN), probably as only regularly encountered by pest control officers, a very small synanthropic species.

Cis festivus (Panzer) Prior's Wood, Portbury, North Somerset (vice county 6) ST49 74, 20 April 2016 Bob Fleetwood. Beaten out of dead hazel branch, 2 previous Somerset records. Nationally Scarce.

Alphitobius diaperinus (Panzer) **Lesser Mealworm Beetle** Garden, Clevedon, North Somerset (vice county 6) ST398 708, 19 July 2016 Bob Fleetwood. 1 adult at actinic light, 1 previous Somerset record in 1906.

Chrysolina americana (Linnaeus) **Rosemary Beetle** Sommerville Road, Bristol (vice county 34) ST594 751, 15 May 2016 Jon Mortin. Slowly increasing.

Chrysolina oricalcia (Müller, O.F.) Wills Hall, University of Bristol, Stoke Bishop, Bristol (vice county 34) ST56 75, 05 June 2016 Ray Barnett. Several swept off umbels. Nationally Scarce.

Chrysolina staphylaea (Linnaeus) Severn Beach, South Gloucestershire (vice county 34) ST538 841, 11 September 2016 Jon Mortin. Two adults.

Longitarsus nigrofasciatus (Goeze) Channel View, Clevedon, North Somerset (vice county 6) ST37 68, 21 April 2016 Bob Fleetwood, confirmed by David Hubble. 1 adult found by vacuum sampling, 1 previous Somerset record, from Minehead, in 1946. Nationally Rare.

Psylliodes chalcomera (Illiger) Dowlais, Somerset (vice county 6) ST38 69, 07 April 2016 Bob Fleetwood. 1 adult found by vacuum sampling. Nationally Scarce.

Mecinus collaris (Germar) Dowlais, Somerset (vice county 6) ST38 69, 09 May 2016 Bob Fleetwood. 1 adult found by vacuum sampling on saltmarsh. Nationally Scarce.

Rhamphus oxyacanthae (Marsham) Tyntesfield, North Somerset (vice country 6) ST50 71, 10 August 2016 Bob Fleetwood. 1 adult female beaten from Sycamore. 2 previous Somerset records.

Pelenomus zumpti (Wagner) Channel View, Clevedon, North Somerset (vice county 6) ST37 68, 21 April 2016 Bob Fleetwood. 1 adult found by vacuum sampling the grasses below the high tide line, 1 previous Somerset record. Nationally Scarce.

Polydrusus pulchellus (Stephens) Stup Pill saltmarsh, North Somerset (vice county 6) ST52 82, 16 July 2016 Bob Fleetwood. Vacuum sampling revealed this coastal specialist.

Hypera meles (Fabricius) Tyntesfield, North Somerset (vice county 6) ST50 71, 19 May 2016 and 18 June 2016 Bob Fleetwood, Adults swept from meadow next to orchard, 3 previous Somerset records. Nationally Scarce.

Scolytus mali (Bechstein) **Large Fruit Bark Beetle** Bullock's Lakes, Somerset (vice county 6) ST403 678, 21 August 2016 Bob Fleetwood. 1 adult in a flight interception trap (4-bottle vane trap in hawthorn tree in hedge next to lake), 3 previous Somerset records. Nationally Scarce.

Hymenoptera (bees, wasps and ants)

Cimbex connatus (Schrank) Southmead Road, Bristol (vice county 34) ST584 776, 26 May 2016, Quintin Hyndman. This alder feeding sawfly was very rare but has been increasing across the country over the last 10 years.

Calameuta filiformis (Eversmann) **Reed Stem Borer** Lamplighters Marsh LNR, Bristol (vice county 34) ST523 766, 29 May 2016 Jon Mortin, 20 adults.

Ichneumon sarcitorius (Linnaeus) Dyrham Park (meadow), Bath (vice county 34) ST742 754, 02 July 2016 Ray Barnett. Several on umbels. Few members of this family are regularly identified given the difficulties of keying them out, so species are very under-represented on databases.

Apechthis compunctor (Linnaeus) Sommerville Road, Bristol (vice county 34) ST594 751, 01 October 2016 Jon Mortin, confirmed by Sasha Varga. 1 adult female.

Cleptes semiauratus (Linnaeus) Warmley Brook, Bristol (vice county 6) ST668 730, 11 July 2016 Jon Mortin & Alexander Berg. 1 adult male.

Dasineura glechomae (Kieffer) **Ground Ivy Gall Wasp** Lamplighters Marsh LNR, Bristol (vice county 34) ST521 769, 29 May 2016 Jon Mortin, gall.

Diptera (true flies)

Nemotelus uliginosus (Linnaeus) Stup Pill saltmarsh, North Somerset (vice county 6) ST52 82, 16 July 2016 Bob Fleetwood. Vacuum sampling revealed this coastal specialist.

Stratiomys potamida (Meigen) **Banded General** Chew Valley School Memorial Garden, Bath & NE Somerset (vice county 6) ST569 624, 17 June 2016 Jon Mortin. 1 adult.

Bombylius discolor (Mikan) **Dotted Bee-fly** Chew Valley School, Bath & NE Somerset (vice county 6) ST567 623, 13 April 2016 Jon Mortin. 1 dead adult.

Polyporivora picta (Meigen) Shirehampton Railway Station, Bristol (vice county 34) ST528 764, 13 November 2016 Jon Mortin, confirmed by Peter Chandler. 1 adult female.

Chetostoma curvinerve (Rondani) Garden in Sommerville Road, St Andrews, Bristol (vice county 34) ST594 751, 21 March 2016 Jon Mortin. At one time considered a Red Data Book category 1 Endangered species, this fly has been increasing across southern England with strongholds in the Hampshire area and with a scattering of records elsewhere. This is the second sighting in our region David Gibbs having reported it in 2000.

Hydrophoria lancifer (Harris) **Deer Warble Fly** Webbs Brake, South Gloucestershire (vice county 34) ST575 815, 14 May 2016, Jon Mortin. First record on the BRERC database.

Siphonaptera (fleas)

Nycteridopsylla longiceps (Rothschild) Chew Valley School, Bath & NE Somerset (vice county 6) ST567 623, 02 September 2016 Jon Mortin. 1 on dead adult Pipistrelle Bat.

Arachnida

Ixodes trianguliceps (Birula**) Vole or Shrew Tick** Combe Down, Bath & NE Somerset (vice county 6) ST755 625, 05 June 2016, Susannah Mayhew. Rarely recorded due to lack of recorders.

Annelida

Allolobophoridella eiseni (Levinsen) Towerhouse Wood, Nailsea, North Somerset (vice county 6) ST475 719, 23 January 2016 Ben Crabb, verified by Kieron Brown/Victoria Burton.

Dendrobaena attemsi (Michaelsen) Nailsea, North Somerset (vice county 6) ST460 697, 01 January 2016 Ben Crabb, verified by Kieron Brown/Victoria Burton.

Dendrobaena octaedra (Savigny) Nailsea, North Somerset (vice county 6) ST460 697, 01 January 2016 Ben Crabb, verified by Kieron Brown/Victoria Burton.

Dendrobaena pygmaea (Savigny) Nailsea, North Somerset (vice county 6) ST466 715, 2016 Ben Crabb, verified by Kieron Brown/Victoria Burton.

Dendrodrilus rubidus (Savigny) **Bank Worm** Moorend Spout Nature Reserve, North Somerset (vice county 6) ST466 715, 28 January 2016 Ben Crabb, verified by Kieron Brown/Victoria Burton.

Lumbricus festivus (Savigny) Towerhouse Wood, Nailsea, North Somerset (vice county 6) ST475 719, 23 January 2016 Ben Crabb, verified by Kieron Brown /Victoria Burton.

Satchellius mammalis (Savigny) **Little Tree Worm** Nailsea, North Somerset (vice county 6) ST460 697, 1 January 2016 Ben Crabb, verified by Kieron Brown /Victoria Burton.

Haemopis sanguisuga (Linnaeus) **Horse Leech** St Andrews Park, Bristol (vice county 34) ST592 751, 16 June 2016 Jon Mortin. 1 adult.

Sabellaria alveolata (Linnaeus) **Honeycomb Worm** Birnbeck, Weston-super-Mare, North Somerset (vice county 6) ST307 623, 16 October 2016 Jon Mortin.

Anthozoa

Actinia equina (Linnaeus) **Beadlet Anemone** Birnbeck, Weston-super-Mare, North Somerset (vice county 6) ST307 623, and ST310 620, 16 October 2016 Jon Mortin. 10 examples.

Diadumene lineata (Verrill) **Orange-striped Green Sea Anemone** Sand Bay, North Somerset (vice county 6) ST326 632, 06 August 2016 Jack Sewell 'found during Crabwatch trial with Bristol Nature Network and MBA.'

Nationally Scarce – Occurring in 16-100 hectads in Great Britain.
Nationally Rare – Occurring in 15 or less hectads in Great Britain.

Weather Report for 2016

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The Bristol Naturalists' Society (BNS) began publishing weather data in 1872 with G. F. Burder's paper [Burder PBNS 1872] on rainfall in Clifton since 1853, and this led me to search for temperature data back to that date. From 1920 until its closure in 2002 the Long Ashton Research Station published weather data. During this period the BNS, and later this Report, made use of this information. From 2003 I have made use of the temperature data from the website *www.afour.demon.co.uk* which is based in Totterdown (Bristol). It has also traced records from some other sources back to 1853, and I have used these to fill in historical gaps. I discovered this year that the official Met Office Bristol temperature data is taken at Lulsgate, and overall this is two degrees colder than that recorded at the Totterdown site. This suggests that the figures after 2002 cannot be directly compared with the earlier ones. Since 2002 I have used my own rain gauge situated in the Clifton/Stoke Bishop area, as Burder measured rainfall in Clifton. Rainfall figures vary notoriously with location and time, and so a long series is crucial to any understanding of the continuous processes of climate change. I use the term 'long-term average' to mean the average back to 1853. Most meteorologists use the mean daily temperature as the basic unit, but many sources only quote daily maxima and so I have used these figures throughout.

Summary for 2016

The year had an average maximum temperature of 15.0ºC, lower than the previous two years, but well above the average since 1853 of 13.7ºC. The only other years with an average of over 15ºC were 1921, 1949, 1959, 2002 and 2011. There were no monthly or seasonal extreme records for either temperature or rainfall.

Year	**2007**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**2016**
Av. Max. *ºC*	14.5	13.7	14.6	13.7	15.5	14.7	14.8	16.1	15.4	15.0
Ten year av. *ºC*	14.4	14.3	14.3	14.3	14.4	14.5	14.5	14.6	14.8	14.8
Rainfall *mm*	1107	1150	986	747	847	1420	799	1143	870	855
Ten year av. *mm*	997	1005	993	943	945	981	983	975	992	984

Table 1: Average mean maximum temperature and rainfall. The second and fourth rows give the average for the ten years up to and including the year referred to.

Seasons

Winter (December 2015 to February 2016)

Average maximum temperature was 10.0ºC, the third highest, just below 1920 and 1989, and 2.5ºC above the long term average. The main cause of this was that December 2015 had the highest temperature yet recorded at 13.3ºC. Rainfall averaged at 108mm per month, a third above the average, as both December and January were wet months. There were 20 frost nights (October to April), compared with an average 36 in the past decade. No snow fell, but there were six days when ponds were frozen.

Spring (March to May)

Average maximum temperature was 14.1ºC, one degree above the long-term average. The 30-year average is now 13.6ºC, just higher than the previous peak in 1960. April was four degrees cooler than last year, but to make up May was 2.5ºC warmer, and was the warmest May since 1922. Rainfall was average.

Summer (June to August)

Average maximum temperature at 21.4ºC was a degree above the long-term figure. The thirty-year average, 20.5ºC, was exactly the same as in 1880. Rainfall was a third below average because of a very dry July. June had half the normal sunshine hours.

Autumn (September to November)

Average maximum temperature at 15.2°C was 1.2 degrees above the long-term average, helped by a warm September. October was notably dry, November notably wet, but rainfall overall was average at 85mm per month.

Seasonal Comparisons

To put the 2016 seasonal average temperatures into perspective, Table 2 shows the seasonal temperature extremes with their year, the average since 1853, and the differences between 2016 and the long-term average. Table 3 shows the same figures for rainfall.

	2016	Minimum	Maximum	Av. since 1853	Diff.
Winter	10.0°C	1917 - 2.5°C	1920 - 10.6°C	7.5°C	2.5°C
Spring	14.1°C	1887 - 10.4°C	1893 - 16.6°C	13.0°C	1.1°C
Summer	21.4°C	1883 - 18.0°C	1976 - 23.9°C	20.3°C	1.1°C
Autumn	15.2°C	1915 - 10.6°C	1959 - 16.8°C	14.0°C	1.2°C
Annual	15.0°C	1892 - 12.1°C	2014 - 16.1°C	13.7°C	1.3°C

Table 2: 2016 seasonal average max. temperature compared with minimum, maximum, and the difference between 2016 and the average since 1853.

	2016	Min.	Max.	Av. since 1853	Diff.
Winter	108mm	1964 – 21mm	1995 – 154mm	79mm	29mm
Spring	67mm	1893 – 17mm	1981 – 107mm	60mm	7mm
Summer	54mm	1995 – 11mm	2012 – 149mm	74mm	-20mm
Autumn	85mm	1978 – 26mm	1935 – 173mm	87mm	-2mm
Annual	71mm	1864 – 49mm	2012 – 118mm	75mm	-4mm

Table 3: 2016 seasonal average rainfall per month compared with the maximum, minimum and average figures.

Summary

January, February, May and December were significantly warmer than average. July, October and December were significantly drier than normal, and March and November significantly wetter.

	Temp. (%).	Rain (%)
January	31	26
February	21	39
March	5	52
April	5	-40
May	15	21
June	4	8

	Temp. (%)	Rain (%)
July	4	-74
August	8	-25
September	13	6
October	9	63
November	1	53
December	34	-61
Annual	10	-7

Table 4: Monthly percentage deviation in 2016 from the average since 1853

Monthly summaries for 2016

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Av.
Temp. *°C*	9.3	9.1	10.3	13.4	18.7	20.2	21.8	22.2	20.3	15.3	10.0	9.8	15.0
Rain *mm*	106	86	93	34	75	67	19	65	84	35	135	35	70

Table 5: 2016 monthly average temperatures and total rainfall.
The average for the year in the last column.

For each month I have stated the monthly average maximum temperature, and the range of this figure over the past decade. This helps to put the 2016 figures into perspective, and emphasizes the very large range of temperatures that wildlife has to cope with annually, a range that is many times the size of any climate change. This issue is dealt with at the end of the report.

January (Average 9.3ºC Decadal range 4.1ºC to 9.8ºC)

Following the warmest December since 1853 the first week remained warm, at around 10ºC, and wet, with low pressure systems moving though. On the 10th temperatures fell fast under the influence of northerly winds around a high-pressure system over Greenland, with a frost, the second of the winter, on 13th, clear skies, and ice on ponds from 16th to 21st. Temperatures then rose to 14ºC by 24th as southerly and then westerly winds took over.

February (Average 9.1ºC. Decadal range 6.7ºC to 10.1ºC)

The westerly wind pattern continued for the first ten days, including a storm between 5th and 8th that bought 68mm of rain. It was cooler from 8th to 18th, with three frost nights and some very bright days. Temperatures rose briefly to 13ºC on 21st. From 22nd a high pressure over Greenland and low pressure over the Baltic brought northerly winds, cooler temperatures, three very bright days and three frosts.

March (Average 10.3ºC. Decadal range 7.6ºC to 14.9ºC)

The first ten days were dominated by northerly winds, temperatures fell to 6ºC on 6th, and there were four frost nights. On 8th 29mm of rain fell, the second wettest day of the year. High pressure over the UK controlled the weather from 11th to 22nd, with very light winds, a maximum of 13ºC on 12th and over nine hours of sunshine on 17th. South west winds took over on 22nd, and storm Katie produced 43mm of rain after an almost dry month. On 25th the temperature reached 15ºC for the first time in the year.

April (Average 13.4ºC. Decadal range 12.3ºC to18.7ºC)

High pressure brought dry variable winds for the first ten days, a mini heat wave from 12th to 14th with a high of 18ºC on 15th and a second warm spell from 19th to 21st and over ten hours of sunshine on 20th and 23rd. It then became much cooler for the rest of the month under northerly winds. It was an unusually dry month.

May (Average 18.7ºC. Decadal range 16.2ºC to18.7ºC)

The warmest May since 1922. For the first week high pressure over the Baltic fed warm easterly winds over the country, with a temperature that rose to 27ºC on 8th. From 14th to 21st southerly winds, brought rain and cooler conditions. On 23rd NE winds resumed control and the month finished with a temperature of 21ºC.

June (Average 20.2ºC. Decadal range 18.6ºC to 22.6ºC)

At the start a high-pressure system over Iceland dominated the weather, with light northerly winds and bright sunshine, and the temperature reached 27ºC on 6th. South westerly winds from 11th lowered temperatures, and the rest of the month saw little sunshine, but the cloudy skies produced little rain. Sunshine hours were half normal.

July (Average 21.8ºC. Decadal range 18.7ºC to 26.2ºC)

Light westerly winds dominated the month, but brought virtually no rain, and kept temperatures down to 20ºC. There was a brief hot snap when high pressure brought SE winds up from the Mediterranean and the temperature reached 34ºC on 19th, the hottest day since 2006. The temperature fell back to around 20ºC from 24th.

August (Average 22.2ºC. Decadal range 19.2ºC to 22.5ºC)

An exceptional rainfall of 30mm on the night of August 1st ensured that the month's rainfall was close to average, but 21 days were entirely dry, and there was more sunshine than in July. Light SW winds dominated much of the month, with pressure high to the south. For the first two weeks temperatures only once reached 24ºC, but reached 28ºC on 16th and 17th, and 30ºC on 23rd. As a result it was one of the three warmest Augusts since 2000.

September (Average 20.3ºC. Decadal range 17.2ºC to 22.1ºC)

South winds kept temperatures up for the first two weeks, but north winds pushed it down to 16ºC on 19th, though it recovered to around 20ºC for the last ten days. There were no gales, and, though it was the wettest month since March, there was no rain at all on half the days.

October (Average15.3ºC. Decadal range 13.7º to 17.3ºC)

An unusually dry month, dominated for the first two weeks by high pressure over the Baltic, and light easterly winds. These produced a spectacular bird migration on the east coast, but Bristol saw nothing of it. There were some spectacularly bright days and sunshine totals were greater than any year back to 2008. There was no rain until 15th, and autumn colour was spectacular, despite the lack of frost. Temperatures remained high for the first two weeks before falling to around 14ºC by the end of the month.

November (Average 10.0ºC. Decadal range 8.7ºC to 15.5ºC)

North winds on 5th brought the first frost of the winter, earlier than the previous three years, and the temperature fell to 8ºC on 8th before recovering to 14ºC on 15th. Low pressure brought a week of rain between 16th and 22nd, producing 110mm, and the temperature fell to 7ºC for three days. Two very windy days on 21st and 22nd swept most of the remaining leaves off trees. East winds and sunless days dominated the last ten days and there were three frost nights at the end.

December (Average 9.8ºC. Decadal range 3.4ºC to 13.2ºC)

The month began with ice on ponds and a temperature of 5ºC, but warmed up to 15ºC (for the last time) by the 7th under the influence of south winds. It was another dry month, almost all its rain falling on 10th. Two storms over Christmas, Barbara and Conor, had little impact in Bristol. The month ended with three frost nights and ice again on ponds.

Weather Extremes

	2007	8	9	10	11	12	13	14	15	2016	Max	Av
Hottest day (°C)	27	28	28	26	29	30	32	31	32	34	34	30
Coldest day (°C)	2	2	-1	-5	1	1	0	4	5	5	5	1
Wettest day (*mm*)	40	35	36	36	40	72	33	42	28	30	72	39
Sunniest day (*hrs*)	14.1	14.9	14.7	15.6	14.7	15.0	15.0	13.3	13.7	12.8	15.6	14
Longest dry (*days*)	24	16	20	24	23	17	20	17	14	15	24	19
Longest wet (*days*)	8	8	8	7	5	15	9	7	6	7	15	8
Frost, nights (*days*)	25	44	42	76	22	41	67	15	12	34	76	37
Snow (*days*)	2	1	19	33	0	1	8	0	0	0	33	6
Storms (35mph+) (*days*)	22	16	17	9	24	22	25	28	30	13	30	21
Hotter than 25°C (*days*)	1	7	5	3	14	19	32	27	5	13	32	13
Colder than 5°C (*days*)	18	14	37	60	13	16	29	2	5	5	60	20
More than 10hrs sun (*days*)	45	29	49	46	44	38	44	39	25	16	49	38
No sun (*days*)	99	95	95	106	104	93	95	82	84	74	106	93
No rain (*days*)	238	228	265	269	253	205	238	203	227	236	269	236

Table 6: Summary of weather extremes for the past decade

Table 6 above gives figures for the extreme annual events over the past decade, enabling the events of 2016 to be put into perspective. It is often claimed that extreme weather events are becoming more common, but without a clear definition of an 'extreme' event this is very hard to demonstrate. Flooding is often caused by human factors, such as house building on former flood meadows, or draining of upland moors for sheep rearing, and storm fatalities are often more an indication of population density and poverty rather than the scale of the storm. None of the

figures above show any significant trend over the past 15 years. I have added a column for the maximum 'extreme', and another for the average 'extreme' since 2000, to put 2016 into perspective. 'Storms' are particularly hard to define, even though they are now being named, as a named storm may well have almost no impact on Bristol. I have simply added up the number of days when a wind speed of more than 35mph is predicted for the SW. This also roughly coincides with the rare occasions when a low-pressure system is centred over the UK.

The table gives little evidence of trends. 2016 was had fewer cold days, and fewer sunny days and fewer storms than average. It is notable that 60% of days had no rain at all.

A note on climate

Climate is defined as the normal weather measurements over time, usually taken to be thirty years. Because it is an average it changes slightly every year. The general pattern of climate in Bristol since 1853 is that the average maximum annual temperature fell until about 1900 when it was 13.2ºC. It rose to 1960, when it was 14.0ºC, fell to 1992 to 13.6ºC, and it has risen since to 14.3ºC today.

	1916	**1966**	**2007**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**2016**	**Diff**
Temperature (*ºC*)													
Winter	7.3	7.5	7.8	7.9	7.9	7.9	7.8	7.9	7.9	8.0	8.0	8.2	0.9
Spring	12.6	13.4	13.0	13.1	13.1	13.2	13.3	13.4	13.3	13.4	13.5	13.6	1.0
Summer	19.9	20.2	20.2	20.2	20.3	20.4	20.4	20.4	20.5	20.5	20.4	20.5	0.6
Autumn	13.5	14.5	14.4	14.4	14.4	14.4	14.5	14.5	14.5	14.6	14.6	14.7	1.2
Annual	13.3	13.9	13.9	13.9	13.9	13.9	14.0	14.0	14.1	14.1	14.2	14.3	1.0
Rainfall (*mm*)													
Winter	78	75	89	88	88	86	87	87	87	89	89	89	11
Spring	61	58	68	69	68	67	64	65	63	64	63	63	2
Summer	75	75	68	69	70	70	72	74	74	76	75	74	-1
Autumn	79	85	91	93	95	95	93	94	94	93	94	93	14
Annual	74	73	79	79	80	80	80	80	80	81	81	81	7

Table 7: Annual average temperature and rainfall
calculated over the preceding thirty years

Weather varies much more widely from year to year than climate does in centuries, and birds, like all other wildlife, respond to the changing conditions they experience daily. Data gathered over the last decade on the Downs in Bristol suggest that, normally, a change of one degree in average temperature will lead to a week's change in the average timing of events for both plants and birds, although individual

species may respond more than this. The climate changes that have occurred since the peak of the last ice age 18,000 years ago, have led to continual change in the wildlife that can thrive here, and this process continues. Seasonal change, especially cold winters and cold or wet breeding seasons, can have a dramatic effect on bird populations. Table 7 above shows the climate figures for each season a century ago, 50 years ago, and over the past decade. The most striking feature is that the roughly one degree of warming took place between 1916 and 1966, and the past 50 years has seen little change. However, looking at the overall pattern, temperatures fell after 1960 and have recovered in the past decade. The rainfall figures show an increase in autumn and winter in the past fifty years.

Table 7 shows seasonal thirty-year average temperature and rainfall for the years 1916, 1966, and for the decade 2007 to 2016 The final column shows the change between the 2016 figure and 100 years earlier. All the figures, except for the summer rainfall, show an increase; but these increases, except for the winter temperature and rainfall, and the autumn rainfall, are all less than 10%.

References

Burder G.F. *20 years' rainfall at Clifton* Proceedings of the Bristol Naturalists' Society (1872).

Obituary
Hugh Boyd
1925-2016

(Photo by Malcolm Ogilvie)

Hugh was born and educated in Bristol, and was a lifelong member of the Bristol Naturalists' Society. He was modest, meticulous, an enthusiast both for counting birds as a key tool for their conservation, and for observing their behaviour in detail. He produced a continuous stream of publications beginning with a study of Coots at Blagdon in 1947 published in British Birds, and an extraordinary account of the 1952 'wreck' of Leach's Petrels in our Proceedings. His last article came in 2010 looking at the record of migrant dates created by HH Davies at his farm in Little Stoke in the 1930s.

He was appointed warden of Lundy in 1948, and then moved in 1949 to Peter Scott's newly established Severn Wildfowl Trust at Slimbridge, now the Wildfowl & Wetlands Trust (WWT). He instituted the first systematic Duck counts, which became the Wetland Bird Survey, now run by the British Trust for Ornithology (BTO), a scheme which now monitors the coastline, and major inland waters on a monthly basis. He encouraged wildfowlers to record bag returns, and recognised that ornithologists and the shooting fraternity shared an interest in wildfowl population dynamics and conservation. In 1963 this led to the International Wildfowl Research Bureau, a conference at Aberdeen, and in 1971 to the Ramsar Convention on the protection of estuaries worldwide. This led on to the 1995 African Eurasian Waterbird agreement.

In 1967 he joined the Canadian Wildlife Service (CWS) to head their Migratory Birds Office. He rapidly transformed the methods of using science-based evidence to formulate conservation policy. He moved CWS from ducks and geese to the conservation of all bird species, and established yardsticks in advance of oil exploration and the James Bay hydroelectric development.

His studies in the Canadian Arctic involved an understanding of the impact of the changing arctic climate, and its impact on the population of Snow Geese, and he was studying this in detail long before the issue became a matter of mainstream academic interest. He formally retired in 1991 but his enthusiasm was undimmed, and he was an active participant in a variety of studies into the Greenland White-fronted Goose in Iceland. He produced over 180 papers.

In 1996 he was awarded the first Peter Scott medal, and in 1997 he was made a Member of the Order of Canada, the highest honour the state awards.

He was a modest man whose support and encouragement of others, both in Bristol and on the wider world stage, played a vital part of the whole international conservation movement in which the WWT, and the BTO play a crucial part. He was a giant, who laid many of the foundations upon which the whole ornithological world now builds.

R L Bland

Obituary
Sylvia Kelly
1933-2016

Sylvia was born in the Isle of Man. She moved to Bristol in *c.*1970, and took up a post teaching Biology at St Ursula's for twenty years. She joined the Bristol Naturalists' Society in 1972, and became an active member of the Botany section and she was also a friend of the Botanic Garden and a member of the Avon Wildlife Trust. She was a good photographer and an active member the NW Bristol Camera Club. She was very involved in the Henleaze Society, of which she became chair, both in developing an understanding of its history and in environmental projects. In retirement her energies went into the campaign to save and improve the Phoenix Hedge. This was an ancient field boundary, and Sylvia worked hard to get it officially recognised, and properly re-laid. She did a good deal of guerrilla gardening to remove nettles and brambles, and replanting with native species to thicken the hedge. In 2013 with the help of a grant from the BNS she installed an interpretation board.

She became Secretary of the Bristol Naturalists Society in 1992, and was tireless and meticulous in that role for the rest of the decade. Her links with the NW Bristol Camera Club were the key to the success of the Society's photographic display in Henleaze in 2012, which was part of our 150th year celebration. She also participated in the Society's contribution in March 2015 to the Green Capital Year, with a fine display on behalf of the Phoenix Hedge project. She will be much missed.

R L Bland

Society Annual Report 2016

1. Organisation

The AGM was held on Thursday 17th March 2016 at the new venue in Westbury-on-Trym, where the greater availability of facilities such as car parking and public transport was appreciated by all, making the move a popular one. Roger Steer oversaw the meeting as his last action before retiring from office with a hearty vote of thanks from the members present.

The President (David Hill) was entering the final year of his three-year term of office with the following re-elected as his fellow officers. Secretary: Lesley Cox, Treasurer: Stephen Fay, Membership Secretary: Margaret Fay, Bulletin Editor: David Davies, Librarian: Jim Webster, Archivist: Clive Lovatt, Circulation Secretary: Brian Frost, Webmaster: Mark Pajak and Receiving Editor for the *Proceedings*: Dee Holladay. The Publicity Secretary's position remained vacant. Richard Ashley, Mark Pajak, Gill Brown and Giles Morris were chosen to represent the Sections whilst Roger Steer, Ray Barnett, Tim Corner, Robert Muston, Mandy Leivers, Tony Smith and Richard Bland were chosen as ordinary members of Council.

Although very different from the bustle of Bristol's Green Capital Year tenure and the ambitious *Celebration of Nature* organised by the BNS in 2015, 2016 became another year of industrious activity. The regular commitments of the Society, *i.e.* our diverse field meetings held across the BNS area (once designated as *Avon*) and its neighbouring shires, plus our winter lecture programme and a variety of focused surveys, continued unabated, whilst previous commitments, such as the BNS Bursary Scheme, were consolidated and further augmented by other imaginatively formulated innovations and co-operative ventures.

2. Co-operative Ventures

As in other years, the Society responded to the Bristol Natural History Consortium's request to provide expertise for the main BioBlitz of the year, which was held at the Zoo's *Wild Place* site in May, where 372 species, fewer than in previous years, were recorded. Subsequently, in June, at the associated Festival of Nature Weekend held in Millennium Square, the BNS took the unprecedented step of obtaining a more substantial display area than in previous years, which allowed firstly, a more prominent position and secondly, a much higher level of interactive display material including, for example, identification photographs, microscope material and video footage with which to engage the public. It was clear that the superior modes of interaction enabled a relaxed atmosphere in which to educate and enthuse visitors

and there was no doubt that the greater investment proved to be extremely successful with public and members alike.

The Bristol Swift Conservation Group (comprising the BNS, the RSPB, Bristol Swifts, The Avon Wildlife Trust, Bristol Zoo, and Bristol City Council), created during 2015 with funding from the Green Capital Year, consolidated its activities in 2016 by studying parties of screaming Swifts, identifying nesting sites, persuading householders to erect swift boxes and by holding a second Swift Conference at the Zoo, designed to influence invited developers, local authorities and builders to incorporate swift bricks into their renovation plans or new building designs. The project is continuing and the idea it embodies is gaining ground.

2016 also saw the inception of a completely new joint venture in which the BNS and the University of Bristol joined forces to create a programme of Biodiversity Events utilising BNS expertise within University grounds and estates, most of which are not normally open to the public. The idea behind this programme is multi-faceted and seeks, amongst other things, to engage a largely new audience in which individuals with considerable knowledge and with none are given the opportunity to explore the value of well-managed urban or suburban sites within which a wide variety of species thrive, and to kick start or expand, as appropriate, individual knowledge and expertise in relation to the species found and the ecosystems in which they exist. To date it has attracted University staff and students, ecologists, gardeners and a broad range of individuals from the general public as well as members of the Society, for whom a number of places are reserved at each event. The new venture has proved to be a very successful union between the two organisations (the new BNS members deriving from it, including the Treasurer elect, speak to its validity) with further projects emanating from the venture to be unveiled in 2017.

It is clear that in a time of changing agricultural practices, chemical use and declining species numbers, the urban or suburban sites of the University and elsewhere are becoming increasingly important, not only as havens for many species such as the Nationally Notable *Chrysolina oricalcia* netted by Ray Barnett during one ‘Biodiversity’ event, but also for the development of necessary identification skills, the lack of which amongst the younger generation is causing considerable concern to current naturalists. In an attempt to address this latter issue, the Society instigated the BNS Harper Bursary Fund.

4. BNS Harper Bursary Fund

Due to the generous bequest of Barry Harper previously reported on, this BNS scheme was devised in 2014, began operating in 2015 and has fully blossomed in 2016. In the arrangement forged with the University, a lump sum was donated and legally constituted to enable small grants to be given to undergraduates to attend recognised courses, such as those run by the Field Studies Council and similar

organisations, to develop general identification skills and to become more familiar with the taxonomy of particular groups of organisms through specialist fieldwork experience. The reports submitted by attendees were of a higher standard this year than last, which indicates that an important learning process is perhaps in progress, and clearly demonstrated the value of the experience to the undergraduates in both personal and academic terms. Collated by the University and submitted to the BNS, the reports demonstrated that:

- 22 undergraduates attended a Field Studies Council Course or equivalent in 2016.
- 15 different courses were selected. Examples include: *Aquatic Plants, Broadleaved Trees, Cetacean Survey Training, Finding and Identifying Beetles, Identifying Dragonflies and Damselflies, Mammal Identification, Marine Mammal and Bird Survey Techniques, Rocky Shore Invertebrates, Spider Identification, Using a Flora* and *The Wild Orchids of Scotland.*
- 8 centres across Britain, in England, Scotland and Wales, were utilised.
- £8,344.25 was awarded in total.

The limit set for any individual grant within the scheme is £500. The average grant awarded this year was £379. Free membership of the BNS was also offered to attendees. 20 students gratefully accepted the offer. One student was an existing member of the BNS and one student did not respond. The demonstrable success of the Bursary scheme will enable the University to obtain an alternative funding source when the BNS Bursary scheme eventually closes in few years time. The precedent is one of which the Society and Barry Harper can be immensely proud.

5. Grants and Legacy Awards

Grants

The Society gave out £3,950 in grants during 2016 comprising:

- £500 to Alex Morse for DNA analysis of Dormouse droppings with an associated behavioural study.
- £1,500 to the Justin Smith Foundation (in association with Avon Wildlife Trust) for an Education Day in Mycology at Folly Farm for 20 Secondary School Pupils.
- £1,250 to *Butterfly Conservation* for their *Munching Caterpillars Campaign* encouraging school children to be able to identify Butterflies, their larvae and required food plants and to stimulate the use of school grounds for appropriate planting.
- £200 to the *Chew Valley Ringing Station* as contribution towards the costs of improvements in the production of the CVRS Bird Ringing Report, incorporating articles on a number of tangential studies, *e.g.* the types of Mosses used in Nest Building and A Survey of Water Rail Territories.

- £500 to Simon Carpenter for Public Insurance and/or display materials related to his remarkable excavation at Welton Hill to expose Lower Jurassic clays (Charmouth Mudstone Formation) noted for its well-preserved fossils and remarkable biodiversity.

Legacy Award

Once again, the generosity embodied in the bequest from Barry Harper enabled the Society to award £15,000 to BRERC to produce a much-needed update on the *Flora of The Bristol Region*, the original edition of which is now significantly out of date. The Society recognised the importance of producing this volume, firstly as a working, up to date guide to our local flora for local people, whether professionally or personally motivated, secondly as an historical record at a time of unprecedented local destruction arising from house building, retail construction, car parks and transport schemes such as the *MetroBus,* and thirdly as a physical demonstration of the inherent importance of our flora upon which so much of our other wild life depends.

6. Library

The Society is extremely fortunate to have this remarkable asset. Its value is inherent and intrinsic rather than pecuniary and it is worth pointing out that many similar Societies are without the benefits that we enjoy through it. Significant improvements during the course of the year have included, for example, the completion of several years' painstaking work by a dedicated volunteer to carefully clean and reorganise the book stock. Also, the addition of a dehumidifier (purchased by the Society and maintained by the Museum to whom the Society offers its sincere thanks) has optimised the conditions for storage and conservation.

In another initiative, technological advances had made the Library Catalogue less accessible than ideal. Considerable effort has therefore gone into retrieving and modernising the resource with the resultant availability of the post-1960 Catalogue on the website. In addition, there is also a searchable index of articles published within the BNS *Proceedings* (*Nature in Avon),* since 1863 on the website, (the Society was inaugurated in 1862). It is available to use or download in Excel or PDF formats with direct links to the *Biodiversity Heritage Library*.

7. Archives

Digitisation of the *Proceedings* of the Society (*Nature in Avon)* and the *Avon Bird Report* begun in 2014 continues with the consequent benefits detailed above.

8. Annual Section Reports for 2016

i. Botany Section

Five indoor meetings (2015, six) and 16 field meetings (2015, 14) were held in the year under the auspices of the Botanical Section. Notices and accounts of all of the meetings can be found in the BNS monthly Bulletin, *Bristol Naturalist News* together with photographs and various notes on plant finds and anecdotes from the History of Bristol Botany. A photograph of Copse Bindweed near Nailsea, a rare plant Red-listed as Vulnerable and unrecorded in Somerset since 1836, appeared on the cover of the October 2016 Bulletin. The Somerset Rare Plants Group (SRPG) and the Gloucestershire Naturalists' Society (GNS) continue to publish the most important plant records from their respective sides of the Bristol Avon.

For indoor meetings we mostly drew on our own resources, with talks on fungi, new and exciting plant finds in North Somerset in 2015, the late Professor Willis's archive of Bristol Botany 1968-2002, and wild plants that flower around the New Year. In February, we had an excellent external presentation by Bob Buck on 25 years of management of the St George's Flower Bank, which lies close to the M5 at Portbury. In June we had a field meeting there, donning Hi-Vis jackets and adding several species to the site list. We had another plant identification workshop in October, this one concentrating on seasonal fruits, berries and seeds, and including a demonstration by Libby Houston of berries and leaves of most of the whitebeams of the Avon Gorge and a poster of their evolutionary tree of life. In November at a special meeting, the Bristol Regional Environmental Records Centre outlined plans for an update to the *Flora of the Bristol Region* (2000). Attendance at indoor meetings ranged between about ten and twenty.

Field meetings were often planned in collaboration with other groups, particularly SRPG and the GNS Botanical Group and our members were additionally invited to five of their field meetings. Our own meetings included five "Gloucestershire Pot Luck" botanical meetings specifically aimed at recording for the Botanical Society of Britain and Ireland's (BSBI) *Atlas 2020*. In addition Richard Bland led a series of walks for the Friends of the (Bristol) Downs with significant botanical content, and others for the University of Bristol. Several of our members responded to a request from the Bristol Museums and Art Gallery for assistance with their *Spring Flower Power* event, and as if by a process of cross-pollination, some useful botanical recording was possible on a meeting of the Invertebrate Section – and *vice-versa*.

Most of the field meetings were within twenty miles of Bristol. Attendance varied considerably from one to over 20. We visited several commons (Rodway Hill, Minchinhampton, Highridge and Yate) and meadows (Dyrham Park, St George's) and walked beside the estuaries at Lamplighters and Shepperdine. For urban botany we went to Long Ashton, Evercreech and the Bristol Docks, and in the Malago Vale two groups worked on either side of the vice-county boundary before meeting and

comparing notes. Traditional 'country' walks both north and south of Bristol were focussed on under-recorded squares and we also visited familiar ground at Sea Walls and the Gully in the Avon Gorge.

In an exhibit at the BSBI's Annual Exhibition meeting, the Hon Secretary of the Section displayed a reconstruction of a map marked up with the numbered square miles where our predecessors had collected various plants in 1868. This seems to have been the first attempt at grid recording British biodiversity. Council have agreed that the exhibit should go on display in the Society's Library.

The Secretary wishes to thank the Sectional Committee for their organisational support throughout the year, and the leaders of the field meetings for taking us to such interesting places. Specific thanks go to Tony Titchen, a former Botanical Secretary, now living in the Forest of Dean, who during the year had to announce his retirement from leading treegazing walks.

Clive Lovatt, Hon Sec Botany Section

ii. Geology Section

The Geology Section AGM was held on 27 January 2016 when the following Officers were elected: President – David Clegg, Secretary – Richard Ashley, Field Secretary – Richard Ashley and Committee members – Gordon Hobbs, Roger Steer and David Moore. The AGM was followed by members' talks.

The following Lecture meetings took place during the year:

24 February *Thomas Hawkins and his Sea Dragons – a mad, bad fossil collector*. Stephen Locke, OBE.

30 November: *Deserts and Dinosaur Discoveries* by Dr Cindy Howells.

Field meetings arranged by BNS Geology Section were:

14 May Nailsea and Backwell lead by Richard Kefford

25 June Watchet lead by Richard Ashley

24 September Frome Museum lead by Simon Carpenter.

Members also took part in Field Meetings run by Bath Geological Society visiting Lavernack Point, South Wales on 23 April and Portishead on 16 October. In addition on 26 March members of the Geology Section lead by Simon Carpenter were involved in a project to clear a new section of the White Lias on the Saltford Railway Path. During September a major excavation was made in the Charmouth Mudstone at Welton Hill, Paulton lead and financed by Simon Carpenter with some assistance from other members of the Geology Section.

The Section would like to record its thanks and appreciation to Bristol University's Department of Earth Sciences for allowing the use of the S H Reynolds Lecture Theatre for its winter meetings and other support.

Richard Ashley, Geology Section Secretary

iii. Invertebrate Section

At the AGM held in the School's Room in the City Museum on Sunday, 17th April, Robert Muston was elected Section President and Tony Smith was elected Hon. Sec. James Dunbar gave a talk on Insect Photography that removed a lot of the hype and put in place an easily understandable psychology of the insect mind ("Give it something to eat"), plus some home-made kit. The results were stunning; the sort of distinctive detail one gets from using a good microscope!

The year has been very busy with six main efforts, *i.e.* the Wild Place BioBlitz between 13th to 14th May with BNHC, Dyrham Park BioBlitz on 2nd July, Walton Common on 30th May, Severn Beach on 10th July and Avonmouth on 16th July. Also of note were our much admired, popular, aquatic invertebrate demonstrations at the Festival of Nature, with video-footage master-minded by Robert.

Another eleven listed field meetings had variable support from members. Included were, Windmill Hill City Farm on 16.4.16, Special needs groups on 15.5.16 (a day when the Portway was closed to traffic) organised by Mandy Lievers of Bristol Zoo, the Ardagh, Horfield demonstrating Pond sampling on 20.5.16, Lady's Wood, Mapleridge Lane butterfly-rich field on 22.5.16, Netcott's Meadow, Backwell on 5.6.16, Towerhouse Wood on 19.6.16, Clapton Moor, Gordano on 26.6.16 and Callington Road LNR on 21.8.16 among many others across the region.

It is also important to mention the moth trapping efforts at various sites and times including National Moth night and the BioBlitzen. Two groups are monitoring monthly the aquatic invertebrates at two sites on rivers in Bristol under the auspices of Bristol and Avon Rivers Trust. Mike Hutchinson invited members to a BioBlitz at his house in Lockleaze on 25.6.16 and there were other events without BNS publicity in which members took part, including a demonstration of aquatic invertebrates sampling for 'Cycling for Health' at their lunch break on the Malago stream on 26.7.16. Mention should also be made of 'cross-over', *i.e.* terrestrial invertebrate surveying co-incident with botany field meetings, on Highridge Common on 31.7.16 and Clapton Moor on 10.9.16. There is room for further mixtures including joining geology with invertebrates and with mammals. It must be admitted that cross-over meetings between ornithologists and invertebratologists (*e.g.* Hanham, 2.6.16) do not appear to have a viable future!

Tony Smith, Hon. Sec.

iv. Mammal Section

The AGM was held on 26th January 2016. Gill Brown was re-elected as President, and Michael Meecham as Secretary. A talk on Cetaceans by Tom Walmsley followed the meeting. However, unfortunately the Section, and some of its members, have experienced a number of difficulties during the year and as a result the Section has gone into temporary hibernation.

v. Ornithology Section

Every year is a busy year for the Ornithology Section and 2016 proved to be no exception although, after the rigors of the Society's *Celebration of Nature* and the Green Capital Year in 2015, it seemed, perhaps, a little more relaxed at first.

The AGM was held on the 13th January at the new venue in Westbury-on-Trym where the existing Officers and Committee were re-elected to serve as follows: Giles Morris, President; Lesley Cox, Hon. Secretary and Committee Members: Mike Johnson, Richard Bland and Mary Hill. Peter Hilton who had been expected to join the Committee following his election did not do so.

By the time of the AGM, the results of the Rook Survey, undertaken in 2015, had become available, which showed a worrying continuation in the decline of the species. The unexpected and, as yet, unexplained decline in numbers had first become manifest in the survey results of 2000; a dramatic drop of 50% has taken place over the last 15 years in a previously stable population and BTO results show that this is not a localised issue. Further research is clearly needed.

Several training events were arranged in the early part of the year in the hope of encouraging younger people in the Bristol Nature Network to develop their identification skills. The events organised by Richard Bland were successful in themselves but there is little evidence of any subsequent progression or application, which is disappointing. However, spirits were lifted when this same leading member of the Ornithology Section was awarded the Lord Mayor's Medal in recognition of his hard work in the field of natural history, particularly Ornithology, and his contribution to the Community over many years.

The Society also accepted an invitation from the University to work jointly to create a Biodiversity Events Programme with a view to informing University staff, students and members of the public of the wealth of species to be found on University estates and to enhance the understanding of them. Of these events, those led by Mike Johnson focusing on birds were by far the most popular, in fact they were heavily oversubscribed. This demonstrates the level of interest in avian matters that exists within in our area; ideally, we should look to harness and develop it.

As summer approached, the Bristol Swift Conservation Group, of which the BNS is a part, along with the RSPB, Bristol Swifts, Bristol City Council and the AWT amongst others, worked to identify existing nest sites of these site-faithful, enigmatic birds with a view to expanding the range of each nesting area. Progress has been made, if rather slowly but there has now been a shift of emphasis from the provision of swift boxes to swift bricks. These are clearly more durable but are typically not amenable to local naturalist action in the same way. It is likely, therefore, that aspects of the BSCG's project will require re-evaluation.

Ornithology Section members made a solid contribution to the Bristol Natural History Consortium's BioBlitz, which took place in May at the Zoo's *Wild Place*

site but the venue produced fewer species recorded than in both previous years. At the Festival of Nature weekend in June, held as usual at the harbourside, the Society had a much more prominent and effective presence than in previous years with a very popular bird display as a central feature of its stand that engendered a great deal of interest from visitors.

Field meetings and talks have continued as usual - details below; attendances are good and survey work has been vibrant. In this latter regard, in addition to the Rook Survey previously noted, our liaison with the BTO continues. The regular work of the Breeding Bird Survey was, as always, very successful, covering 223 squares and around 74,000 birds counted and, in a new initiative, an extension of the BBS has begun in the form of the Avon Winter Bird Survey which is operating in a very similar way to the BBS with similar survey methodology. It will be interesting to see if another Siskin invasion occurs to repeat that of February last year. This particular invasion lasted well into April, whilst at the other end of the year (in the middle of October) a huge migration surge to the east missed the Bristol area completely.

The House Martin is another species in decline. The House Martin Nest Survey has been instigated to follow up previous studies on the bird itself. Again, members contributed to this with great results but the decline of insect life and the requirement for houses to be 'tidy' is adding to the impacts on the bird elsewhere.

Members also undertook work relating to the Wetland Bird Survey and continue to do so. This programme of data collection seeks to monitor species that are dependent on the specific habitat of wetland, which, like so many other habitats, is being lost at an alarming rate around the world. Roland Digby's brilliant explanation of the *Saving the Spoon-billed Sandpiper Project* in November demonstrated the critical importance of flyways (the 'hedgerows of the sky') connecting wetlands and ways in which they are being compromised. In addition, a truly epic research flight by paramotor to investigate the specific ways in which the flyways for Bewick's Swans are compromised was undertaken by a member of WWT's staff that culminated in the delivery of a petition to the Prime Minister asking for greater protection for both the Bewick's and the Wetlands upon which all Waders and Waterfowl depend.

As usual this report is just a glimpse of things going on 'behind the scenes' as it were. There are many more facets to the Ornithology Section than can be reported on here but the value of highlighting the examples above are that they indicate very clearly that, according to our individual aptitude and ability, we all are, or could be, cogs in a very extensive engine that is chugging away trying to make progress to benefit the biota that we are committed to.

On behalf of your Committee, I would like to thank all the members of the Section for their help and support in whatever capacity, whether leading field events,

counting birds, putting out chairs or making the tea, and for their presence at all our events. May I take the opportunity to wish everyone in the Section and across the Society a Happy, Healthy New Year as we look forward to another stimulating year of events and experiences.

Activities in 2016

Field Meetings (14)

January	Saturday, 16th – Severnside. Leader: Giles Morris.
February	Saturday, 20th – Blagdon Lake. Leader: Nigel Milbourne.
March	Saturday, 19th - Blaise Woods. Leader: Richard Bland.
April	Saturday, 2nd – Lawrence Weston Marsh. Leader: Richard Bland.
	Saturday, 16th – Frome Valley. Leader: Richard Bland.
May	Sunday, 1st – Leigh Woods. Leader: Giles Morris.
	Saturday, 14th – Velvet Bottom: Leader: Giles Morris.
June	Saturday, 4th – Westhay. Leaders: Mike Johnson & Giles Morris.
	Saturday, 18th – Uphill and Axe Estuary. Leader: Mike Johnson.
July	Wednesday, 20th – (Evening Walk) Marshfield. Leader: Paul Farmer.
September	Saturday, 24th – Steart. Leader Mike Johnson.
October	Sunday, 16th – Migration Watch at Aust. Leader: Richard Bland.
November	Sunday, 20th – Portbury Wharf. Leader: Giles Morris.
December	Wednesday, 28th – Chew Valley Lake. Leader: Mike Johnson.

Winter Lecture Programme (6 Talks)

January 13th	*The Birds (& other Fauna and Flora) of Botswana* – Giles Morris.
February 10th	*The Enigmatic Swift* – Mark and Jane Glanville with Matt Collis & Richard Bland.
March 9th	*Steart Marshes* – Tim McGrath.
October 12th	*Birds Never Get Lost* – Professor Colin Pennycuick.
November 9th	*Saving The Spoon-billed Sandpiper* – Roland Digby.
December 14th	*Birds of Scandinavia* – Terry Bond* (Postponed through illness from January where Giles Morris stood in.)

Fieldwork & Surveys, etc.

Winter Garden Bird Survey (43rd Year)
BTO and BNS Breeding Bird Survey
Wetland Bird Survey
House Martin Nest Survey
Swift Survey
Migration Watch
Data analysis of the 2015 Rook Survey produced.

Other Activities and Engagements

Members of the Section participated in or contributed to:

- Biodiversity Events in association with Bristol University.

- BioBlitz Events: The main event was held at the Zoo's *Wild Place* in association with the BNHC with other smaller events taking place elsewhere.
- The Bristol Walking Festival
- Regular radio broadcasts
- The Avon Ornithological Group
- Collaborations with: the RSPB, AWT, BOC, Friends of The Downs and Avon Gorge.
- Training Events (*e.g*. BNN)
- The Bristol Swift Conservation Group
- Following on from last year, a second Swift Conference was held at Bristol Zoo.

Richard Bland was awarded the Lord's Mayor's Medal for his contribution and achievements in Natural History.

Lesley Cox, Hon. Sec. BNS Ornithology Section

vi. Walking Group

Society Mid-Week Walks

We had twelve very interesting and well supported natural history walks on the first Thursday of every month from Bleadon Hill on 7th January to Freshford on 1st December. Also included were Frenchay, Litton, Cheddar, Ham Wall, Hanham, Collard Hill (to see the Large Blue butterfly, one glimpsed! - but most wonderful was a very rich wild-flower meadow), Berkeley Deer Park and Ham, Arlingham, Iron Acton and Oldbury-upon-Severn. Luckily, only Cheddar was misty and damp, Hanham was cloudy and all others were blessed with bright sunshine, especially bright and blindingly low-angled on Bleadon Hill, Freshford and Frenchay. Accounts were published in the BNS Bulletin.

Several people volunteered to lead walks, much increasing the diversity of places to visit. Leaders, one should emphasise, do not need to be experts in natural history, only that they know of an interesting area that they would like to share with other like-minded people. The guiding principle is that we are all keeping a look-out for anything that strikes us as interesting and any specialists amongst us can enjoy sharing their interest to the benefit of all. Of course, the other guiding principle is that the walks end with a convivial meal seated around a table in a convenient hostelry enjoying a choice of refreshments.

Tony Smith

vii. Reading Group

Do we have to plead the case for going entirely for non-fiction and being 'serious readers', rather than exploring fiction titles, entertainment, and discussing such

things as styles of writing and how believable the characters are? However, some writers we have met on the printed page write as beautifully as anybody. Beautiful writing might be memorable and phrasing ideas in the most succinct, even economical, prose. Perhaps one wants to express an idea and there is suddenly in front of one the very realisation of one's thoughts.

> *It is always exciting when something like this paper/article/book is published. You read it knowing that your world view will have shifted a little by the time you're finished. That's what I love about science, every now and then something comes along which challenges an existing paradigm, turning ideas on their heads, shaking up your thinking.*
> From Alice Roberts' 'The Incredible Unlikeliness of Being', Heron Books (2014), page 255.

In science reading it is important that one has confidence in the ideas expressed. There must be honesty. Some writers bolster their ideas or opinions by attaching, say, ecology, genetics, evolution or osmosis to them and expect us to accept their words as truth, but in reading science one needs to be assured that he or she has worked in this discipline, worked in the field or the laboratory, hammered out ideas through experience, with challenges from their peers. Even this is not enough to put a writer into the first rank; the words must come alive to the reader by being interesting. The beautiful writing of Aldo Leopold in, 'A Sand County Almanac, and Sketches Here and There', OUP (1968) paperback, as he looks into the eyes of a dying wolf.

> *We reached the old wolf in time to watch a fierce green light dying in her eyes. I realized then, and have known ever since, that there was something new to me in those eyes – something known only to her and to the mountain. I was young then and full of trigger itch; I thought that because fewer wolves meant more deer, that no wolves would mean Hunters' paradise. But after seeing the green fire die, I sensed that neither the wolf nor the mountain agreed with such a view.* (Page 130.)

The whole work is full of arresting examples from his experience and having wide, even universal application.

George Monbiot's, "Feral", University of Chicago Press (2014) is also full of personal experiences; against the storm in his sea kayak; with Kenyans in their villages; in studying moorland and woodland ecology in Britain: his excitement and honesty easily communicates to the reader. Feral creatures eligible for re-wilding our countryside include beaver, lion, wolf and elephant and all used to live wild in Britain. He expresses severe opprobrium about farming sheep because they are part of the agricultural and Super-Rich land-owning system that keeps moorland empty and massively unproductive (shown by the floral and faunal richness of fenced off areas) and called by him '*sheepwrecked*'.

As a counter to George Monbiot is James Rebanks' memoir, 'The Shepherd's Life', Penguin (2015), which is all about the cultural importance of shepherding. Linda Lear (Author of 'Beatrix Potter') writes about this book, "*Irreverent, honest, achingly beautiful and totally authentic*". One can only agree. This has been a wonderful year for reading with several other titles helping us to understand how the biosphere works and who we are. Plenty of stuff for the coming year.

Tony Smith

viii. Society Talks

A full complement of six talks was enjoyed within the Society Winter Lecture Programme with a broad spread of attractions.

January 21st – *The Bear Facts*: Charles Kinsey outlined the eight extant species of Bear focusing on the reality of their existence in the world today and the global conservation situations surrounding them; all species are endangered, threatened, or face localised extinction.

February 18th – *The Good, The Bad, The Ugly and the Arborist*: Tree specialist Carl Pedley attempted to explain the importance of trees, the mismanagement they suffer, the diseases that can occur and the treatments available.

March 17th – *The Plight of The Bumblebee*: Richard Comont gave a superb talk identifying extant and extinct species, locations and geographical spread for each and the implications inherent in habitat loss, parasites and predators, climate change and chemical use.

October 19th– *The History Of Microscopy*: Alan Potter illustrated this talk with physical examples of historical and current devices demonstrating the advances to the modern day. The history of the way in which slides were produced, decorated and personalised was surprising!

November 16th – *Quo Vadis, AWT*: Ian Barrett, the newly appointed CEO of the Avon Wildlife Trust attempted to explain his vision for the future.

December 21st – *Ancient Woodland*: Rod Leslie gave a fantastic talk encompassing the concept of ancient woodland, how it has been created, its value for biodiversity, the seed bank within the land on which it exists and so much more. A capacity audience, four days before Christmas - need one say more?

Many thanks to all our speakers who educated, entertained and enlightened us in 2016.

Lesley Cox, Hon. Sec.

9. Links with Other Organisations

Many of the links with other organisations have been detailed elsewhere in this report. Joint ventures with the University, survey work with the BTO, RSPB, BSBI, etc., are standard but there are other less obvious examples. Richard Bland was awarded the Lord Mayor of Bristol's Medal in 2016 for his considerable contributions and untold achievements over many years in the field of natural history within the City. Links with other organisations through him are manifold and sometimes unexpected, for example, Richard produced a series of walks, many of which were incorporated into the Bristol Walking Festival.

The Friends of The Downs and Avon Gorge, BRERC, The Bristol Ornithological Club, Bath Naturalist History Society, The West of England Geologists' Association, Bath Geological Society, the Avon Wildlife Trust, Gloucestershire Naturalists Society, etc., are all groups with which we are increasingly holding joint meetings or interacting more frequently in some other meaningful way.

There are also special and enduring links that the Society is especially honoured to have and without which it would be very significantly lessened; The Bristol Museum is one such.

10. Membership

Membership stood at 407 (+ 20 student members) at the end of December 2016. The lower number in comparison with 2015 is almost totally down to the loss of second in house members following the increase in Membership Fees. However, we were also privileged to gain some very notable specialists and national experts.

Very sadly, we also said goodbye to four very old friends in 2016. Brian Hawkins, who died in January and whose life we commemorated in *Nature in Avon,* Sylvia Kelly (d. 14/10/16) who joined us in 1972, Sue Townson (d. 27/10/16) and Phyllis (Rose) Jennings (d. 24/5/16) who both joined in 1994. The Society will be the poorer for their loss.

11. Thanks

As always, the Society is grateful for the help and support it receives from the Earth Sciences Department, University of Bristol and our grateful thanks also go to Ms. Laura Pye, Head of Culture, Bristol Museums, Galleries and Archives, and Bristol City Council for the Museum's continued support of the Society Library, located within the City Museum and Art Gallery. Finally, our thanks go to all those members of the Society who give so willing of their time and energy in the course of the year to support the aims and aspirations of the Society.

Lesley Cox, Hon. Sec.

Treasurer's Report – Accounts for 2016

Financial Activities for the Year ended31 December 2016

PROFIT AND LOSS

	2016		2015	
INCOME	£	%	£	%
Membership Fees	9,117	71	7,200	75
Gift Aid	1,764	14	1,454	15
Donations	564	4	441	5
Trading	133	1	131	1
Interest	610	5	324	3
Misc	615	5	60	1
TOTAL	**12,802**	100	**9,609**	100
EXPENDITURE				
Administration				
Printing & stationery	83	15	19	4
Post & telephone	57	11	62	12
Council meetings	180	33	360	68
Insurance	137	25	85	16
Capital Items	48	9		0
Other	38	7		0
TOTAL	**543**	100	**526**	100
SURPLUS of Income over Running Costs	**12,259**		**9,083**	
Charitable Activities				
Meetings (Speakers' Fees & Room	1,328	13	1,146	10
Subscriptions	116	1	83	1
Bulletin Production	1,850	18	1,630	14
Avon Bird Report Printing	1,710	17	1,100	9
Proceedings (Nature in Avon) Printing	1,207	12	1,125	10
Publications Distribution	1,866	18	2,151	18
Publicity	1,296	13	292	3
Library (books & periodicals)	415	4	2,101	18
Prepayments	310	3		
Celebration Event		0	2,034	17
TOTAL	**10,098**	100	**11,662**	100
SURPLUS of Income over Running Costs & Charitable Activities	**2,161**		**-2,579**	
GRANTS from Capital				
Grants Awarded	18,950		51,289	
Quartet Community Grant (Swift Project)	1,962		428	
TOTAL	**20,912**		**51,717**	
CASH FLOW	**-18,751**		**-54,296**	

BALANCE SHEET as at 31 December 2016

	2016	2015
ASSETS		
Lloyds Bank	10,688	5,373
Skipton Building Society	74,597	16,000
CAF Gold	0	3,571
CAF Platinum	0	79,297
Prepayments	0	310
Creditors	0	-515
	85,285	**104,036**

RECONCILIATION	
2015 Final Balance	104,036
2016 Cashflow	-18,751
2016 Final Balance	**85,285**

DESIGNATED FUNDS	
The Quartet Community Fund	
2015 Final Balance	5,572
2016 Cashflow	-1,962
2016 Final Balance	3,610
Barry Harper Memorial Fund	
2015 Final Balance	75,000
2016 Cashflow	-15,000
2016 Final Balance	60,000
Funds Committed	50,000
Balance Uncommitted	10,000

GENERAL FUND	
Assets	85,285
Quartet Fund	-3,610
Harper Memorial Fund	-60,000
General Fund	21,675

Instructions for authors

The editor welcomes original papers or short notes on the natural history of the greater Bristol region for consideration for publication in *Nature in Avon*.

Text should be submitted by email in Word. The data for graphs should be sent in Excel, separately from the graph, as graphs may have to be recreated to fit the page size of the journal. Illustrations should be submitted separately in .jpg format by email. Deadline dates for submitting copy will be published in the BNS Bulletin.

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Cover: *Argyropelecus olfersi* distribution map (see 'A marine Hachetfish – Jon Mortin')

Printed by Direct Offset, Glastonbury
ISSN 0068-1040