“How’s Our Wildlife Doing? Part 3”

The Nature of our Village Report on the surveys of 2018

Penparcau, Aberystwyth

Covering Wildlife Surveys from 1st November 2017 to 31st October 2018

Surveys and report undertaken by Chloe Griffiths for the Nature of our Village Project at Penparcau Community Forum.

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The River Rheidol at Parc y Llyn

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1. How's our wildlife doing?

In 2018 this is still a hard question to answer. There has been a lot of concern at a national level because, "Our ability to monitor the state of nature, and respond with appropriate conservation action, is hampered by a lack of knowledge on the trends of most of the UK's plant and animal species." The State of Nature Report (2013).

More recently we have seen in the Well-being of Wales 2016 -17 Report that "overall, biological diversity is declining, and no ecosystems in Wales can be said to have all the features needed for resilience. A long-term study has revealed an alarming loss of flying insects. The study revealed more than a 75 per cent decline over 27 years in total flying insect biomass in protected areas. There is an urgent need to uncover the causes of this decline, its geographical extent, and to understand the ramifications of the decline for ecosystems and ecosystem services."

In response, The Nature of our Village project set out to massively increase how much we know about wildlife in Penparcau, a village of over 3,000 people and covering 190 hectares in West Wales. It began in November 2015 as a partnership between the Penparcau Community Forum, the West Wales Biodiversity Information Centre and the Wildlife Trust for South and West Wales. The project is run by Chloe Griffiths, an Ecologist living in Penparcau. We are working to keep the knowledge of species distribution updated with our evidence and to help to inform climate change science.

We were delighted to be praised in the House of Commons by our MP Ben Lake, who tabled an Early Day Motion that stated:

"That this House applauds the invaluable work undertaken by the Nature of our Village Project, organised and run by volunteers in conjunction with the Penparcau Community Forum in Aberystwyth; celebrates the meticulous work of the project that has resulted in a greater understanding of the wealth of both flora and fauna species that can be found locally; commends the tireless work of the project's dedicated team of volunteers, whose efforts have enhanced the community's awareness and engagement with their natural surroundings, as evidenced by the increasing regularity of nature walks and community litter picks; and further celebrates this project as a shining example of community action at its very best."

We are grateful to WCVA for making us "Project of the month" for April 2018.

Summary

The project has now completed its third year, and this report aims to reflect on what we have found out. Since the project began in November 2015 we have:

Made 2,024 engagements with people

Run 346 sessions – surveys, walks and talks

Noted 4,398 records of species, including many records made independently of this project and kindly shared with us.

For more on our approach to sourcing data from the community, we had an article published in Inside Ecology magazine in March 2018, which is available online here: https://insideecology.com/2018/03/09/were-all-eyes-and-ears-how-our-community-records-wildlife-in-ways-we-didnt-expect/

This report will examine the results from the surveys we carried out between the 1 Nov 2017 and 31 Oct 2018 as results prior to this were reported on in the 2016 and 2017 reports.

A breakdown of the number of records made of species groups recorded in 2018 shows that birds were by far the most frequently recorded group:

Species with >10 records	No. of Records in 2017	No. Of Records in 2018	% of Total with >10 Records
Birds	495	1423	32
Flowering plants	263	657	15
Mosses & Liverworts		17	Fewer than 1
Butterflies & Dragonflies	258	340	8
Moths	159	250	6
True Flies	139	120	3
Bees and Wasps	116	147	3
Reptiles	72	80	2
Beetles	58	116	3
Sharks and Skates	847	1021	23
True Bugs	38	92	2
Molluscs (Land and Sea)	36	36	Fewer than 1
Mammals	36	52	1
Amphibians	18	21	Fewer than 1
Grasshoppers & Crickets	11	21	Fewer than 1
Total of sp. with >10 records	1759	4393	99%

Table 1. Species groups represented by 99% of species recorded in 2017 and 2018 with 10 or more records.

The table above shows the taxonomic groups with most records from 2017 and 2018. More than two thirds (70%) of the records were made up of plants, birds,

sharks and skates (eggcases). There were 54 records which we did not include above, which were made up of spiders, sea anemones, fish and other taxonomic groups for which we had very few records. Many of the records we analyse in this report were made independently of the project, and kindly shared with us. The above table does not include the enormous number of bird records noted from Ceredigion Bird Blog, or any other sources of bird records not directly sourced from WWBIC, although these key records will form part of our analysis in the section on birds later on.

The project expanded in 2018, with increases in the number of species recorded, recorders involved, number of people reached and organisations engaged with. We had training in Slug and Snail identification at Teifi Marshes, had further training in Grasshopper and Bush-cricket identification from local naturalist Roger Bray, went to Parc Slip for training in Leaf-, Frog- and Plant-hoppers and had a day of invertebrate identification training in our village from entomologist Liam Olds. We also carried out surveys with the Wildlife Trust of South and West Wales.

It is important to note the extreme weather of 2018 as having an impact on the distribution and abundance of our species recorded, following one of the hottest, driest summers on record. This has meant a decrease in nectar and pollen resource as plants have been scorched off, as well as a loss of micro habitats, as the plants fail to grow back after strimming in some areas.

Where our data goes

We shared our records with our Local Environmental Record Centre, WWBIC, the West Wales Biodiversity Information Centre, with agencies such as Shark Trust and BTO and sent them to County Recorders. After various processes of validation and verification our data will be published on the National Biodiversity Network.

We are pleased to report that our knowledge of Penparcau and Parc y Llyn has been much improved by many members of the public who are not directly involved in our project, but who have kindly made records available. This sharing of data allows us all to benefit from the expertise of local people, and the amount of time they have put in to their recording efforts.

This report is written for a wide audience, for people who enjoy nature as a leisure activity, as well as people for whom it is their main interest or job. We aim to show how wildlife is faring in one small village, compared where possible with the national picture. We break down our records in to groups of insects, birds, mammals, etc. and look at how each set is doing. We have also taken care to focus on those species that seem to get least attention, from Grasshoppers to Plant Galls. Local people's hard work and enthusiasm has been the driving force of this project, and we have been kindly supported by many experts in the community, including our County Recorders who are responsible for the records of particular groups, e.g. Mammals, Plants and Moths.

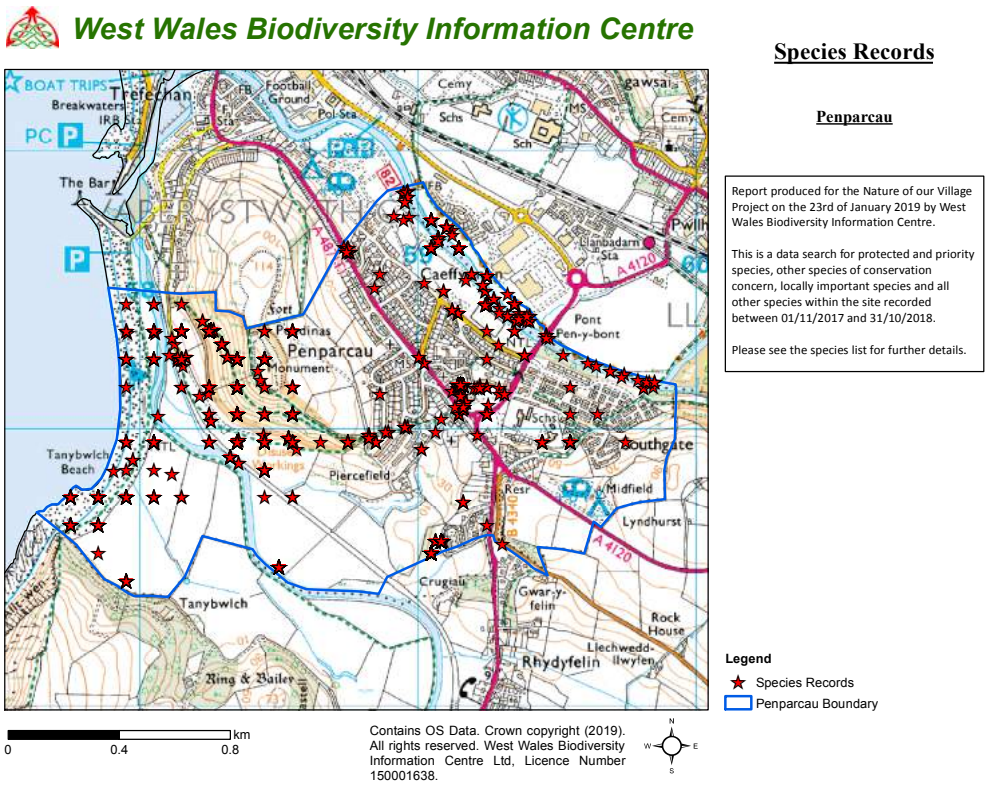

Image 1. Penparcau Species Map prepared by WWBIC

The above map shows the geographical area we cover: Penparcau village and Parc y Llyn. The symbols refer to the level of conservation concern for each species recorded.

Our aim was to create a new generation of people with the skills to recognise and record the wildlife on their doorstep. Increased public understanding about wildlife and the threats it faces is often the first step to taking action to protect what we have. Wildlife recording helps councils, governments and other bodies like Natural Resources Wales and the Wildlife Trusts to make decisions on policies, conservation measures and how they spend their budgets. This project provides evidence of the wealth of species we have in Penparcau, based on scientific methods, and our data has been through rigorous checks for accuracy. Please note that where I have not provided a complete species list for a taxonomic group (e.g. birds and moths) it is possible to find this by accessing the Aderyn website http://aderyn.lercwales.org.uk/home and investigating “What’s in my area” for a site specific search, or “Distribution Maps” for a specific species.

Yellow Horned-poppy (*Glaucium flavum*)

2. Flowering plants and Bryophytes

There are excellent plant records for Penparcau, thanks to Arthur Chater's Flora of Ceredigion, and the hard work of many talented local botanists. In 2016 we carried out flowering plant surveys with the Wildlife Trust of South and West Wales on a Roadside Verge Nature Reserve next to a busy road, and were pleased to be able to observe an increase of 20 new plant species from the 56 previously recorded there. We repeated this survey with volunteers and the Reserves Manager Em Foot in 2017, and were able to add 7 new plant species, with a further 6 new species occurring in 2018. These included Meadowsweet and Square-stalked Willowherb, as well as Garlic Mustard, which is the foodplant of the Orange Tip butterflies, and has managed to spread from nearby Parc y Llyn. An exciting find at this location was the Lesser Sea-spurrey, (*Spergularia marina*) which is normally found very close to the sea shore. Steve Chambers, the Vice County Recorder for Plants noted that it was "particularly interesting growing a short distance inland...Yours looks c. 1.5 km (inland), so a Vice County record breaker!" We hope that this increased biodiversity demonstrates the value of this change in management approach.

Whilst surveying Pen Dinas we paid particular attention to the ruins of an old farmhouse, Pant-yr-Allt. We have begun to manage this area for the benefit of wild flowers, as they were being lost to scrub, working as volunteers in partnership with the Wildlife Trust, Greener Aberystwyth Group and the Penparcau Community Forum. We were hoping to see the return of a rare plant, Knotted Hedge-parsley, as it had last been recorded on the site in 2008. In 1977 approx. 300 plants were seen there, but sadly it has not reappeared in 2016, 2017 or 2018 despite our annual efforts to remove encroaching scrub from this area. We will check again in 2019.

However, we did notice that our habitat conservation work had increased the number and variety of species at Pant yr Allt, and it is now host to 36 flowering plants and ferns. Species newly recorded at these ruins in 2017 included Oval Sedge (*Carex leporina*) and Cut-leaved Crane's-bill (*Geranium dissectum*). In 2018 our botanical survey showed 4 new species, including Hemp-agrimony, Rough Chervil and Tormentil (*Potentilla erecta).* We did not re-find a number of species, including Foxglove, Lesser Burdock and Black Medick, and will be checking to see if they return in 2019.

Further surveys were carried out to refresh records in Llwyn yr Eos (15 new species), and along Nanny Goat's Walk (the western half is within our area of interest). At the latter site we noted 14 species newly recorded from last year, but did not re-find Meadow Vetchling.

The Aberystwyth Botanical Society ran a walk around Coed Geufron, part of which is in the village, in May 2018, which was attended by 12 people. This woodland is next to a housing estate and is accessible to many local people. There was a good assembly of woodland plants to admire, with Broad Buckler Fern, Enchanter's Nightshade and even a Wych Elm which was thought to be over 60 years old. We thank Adam Thorogood from the Woodland Trust for his leadership and expertise.

At the end of the very hot summer of 2018 we found that the well-known "Penparcau Yucca" was actually in flower. This plant grows on the south-facing flank of Pen Dinas and was thought to be a remnant of the days when the rubbish tip was sited there. Arthur Chater notes it in 2005 as "one strong stem", but has never before seen it in flower. Mr. Chater provided the project with a comprehensive list, updated in 2018, of all plant species ever recorded in our area, comprising of 434 species, for which we are extremely grateful.

Another plant of interest was the Yellow Horned-poppy, shown at the top of this section, which had begun to spread from the shingle of Tanybwlch beach in to the field directly behind it, with 114 rosettes being visible in September 2018. Steve Chambers responded to our find: "Spectacular. It's heartening to know species can respond given a chance. I often imagine the Tanybwlch valley full of reed beds, coastal carr, brackish swamps, gravel bars…. It must have been like that thousands of years ago."

We began looking for Plant Galls this year, and were pleased to make a good number of County Firsts. This is almost certainly because there are so few people recording them, as Janet Boyd from the British Plant Gall Society says: "I'm ashamed to say that Wales is seriously under recorded. I have only 20 gall records for VC46, (Ceredigion), I would be delighted to add your records to our database. This is brilliant, having a recorder in Wales!" Plant galls are an interesting example of interaction between insects and plants, where eggs are laid into plant material, causing it to either increase the size of its cells or the number of them. This causes odd-looking plant growth, like the familiar Oak Galls and Robin's Pincushion. There are an enormous number

of these galls, and we are enjoying this area of study. Thanks go to Arthur Chater for his support in this topic on which he has done so much work.

The project benefited from training in Winter Twig identification from John Poland for BSBI, (The Botanical Society for Britain and Ireland) and also in Arable Weeds identification at the BSBI conference, which was held at Aberystwyth University in 2018.

In a related group, (non-vascular plants) we thank Tom Ottley for his spreadsheet of a fantastic 151 Bryophytes (Mosses and Liverworts) that he and others recorded in our village. Most of them predate this recording year, but 17 are within it. It is of great value to have these older records. He notes that two species of particular interest were "*Pterogonium gracile* as it is very scarce in Ceredigion and *Tortula viridifolia* which is strongly coastal in distribution and usually found on rock outcrops on the cliffs but it is on the river bank on gravelly soil in a number of places." We are very lucky to have this level of scholarship to rely on for these often over-looked plants.

3. Dragonflies

Both damselflies and dragonflies made the most of the heat wave in Penparcau, and we were delighted to have 26 records of sightings in 2018. It was particularly pleasing to have 2 records of the Large Red Damselfly in May, one from a garden with a very small pond, and one on Pen Dinas, as this insect hadn't been recorded in Penparcau since 2015. Another dragonfly we were pleased to see again after a gap was the Golden-ringed, the UK's longest dragonfly, which we once found laying eggs in a gravelly shallow area of the river Rheidol in Parc y Llyn. It was back in 2018, with 4 sightings, 3 in Parc y Llyn and 1 in a garden in the village. One of the records noted that the insect was "roosting on a branch", and the insect was happy enough to climb on to the recorder's finger to soak up some warmth.

Garden ponds can play a very important role in providing habitat for dragonflies, especially in a village like Penparcau, which does not have many large pools suitable for them. The Scarce Blue-tailed Damselfly was seen in a garden with a pond no larger than a bath tub, in a first for the village. The British Dragonfly Society website notes that:

"I. pumilio is classed as nationally scarce in the British Red Data Book of Insects. At the turn of the century it was thought to be extinct, but in recent times has shown some range expansion."

Breeding records are a good way of telling if a habitat is really suitable for wildlife, and there were breeding pairs of both Common Darter and Beautiful Demoiselles in 2018. The Darter was laying eggs in a garden pond, and the Demoiselles were seen at Parc y Llyn as they need flowing water.


Golden-ringed Dragonfly beside the River Rheidol

We didn't have any records of the Emerald Damselfly this year, nor the Keeled Skimmer, but did have the Southern Hawker and Banded Demoiselles, as well as the Azure, Common Blue and Blue-tailed Damselflies. The first day of the year that dragonflies were recorded in the village was the 7th of May, and the last was the 29th October. We can now say that the total number of dragonfly species ever seen in Penparcau is 12. We are pleased to note that we have 3 of the "nationally or locally important" damselfly and dragonfly species in our village, which are Banded Demoiselle, Scarce Blue-tailed Damselfly and Keeled Skimmer.

The British Dragonfly Society published our article on dragonfly recording in Penparcau in their March 2018 e-newsletter and we are pleased that our data will contribute to their UK-wide publication: The State of Dragonflies Report 2020. We look forward to comparing how the species we find locally compare with the national picture for Wales and the UK once this is published.

4. Hoverflies

27 species of hoverfly were recorded in Penparcau in 2018, a small decrease from 31 noted the previous year, but still up from the 22 recorded in 2016. We can now say that a total of 43 species of hoverfly have been recorded here since records began as we managed to find 5 species new to the village in 2018.

Thanks go to George Ryley for his hard work in this area, and for making a Penparcau first with *Ferdinandea cuprea*. The project made 4 other firsts for

hoverfly species in the village in 2018, which demonstrates how little invertebrate work of this kind is being officially recorded.

It has proved challenging to find records of how hoverfly species are doing nationally, but thanks to the UK Hoverflies group on Facebook, and the "Syrphing Time" blog by Roger Morris, who runs the Hoverfly Recording Scheme in the UK, we have been able to take note of some of their species accounts. In terms of Hoverfly trends, Morris writes:

"In broad terms, we have a very good understanding of what is happening to our hoverfly fauna - somewhere in the order of 40 to 50% is declining and perhaps 15-20% is increasing." He also notes that "a clear drop in the number of records during the drought (of summer 2018) is apparent...with 2018 clearly fitting the 3-year average until the third week of June, when the numbers of species recorded crash." (Syprhing Time)

Our own records are too few to be able to say with certainty whether the drop in species that we experienced in 2018 was directly related to the drought, but the Penparcau results do seem to be echoing the national picture.

At the end of the recording season in 2017 we reviewed the data that we had collected and planned how we could increase the usefulness of our hoverfly recording in particular. We considered various options, such as designating polygons and confining recording to these specific areas, restricting ourselves to specified time slots (e.g. 30 minutes or 1 hour) and noting weather conditions. In the end we decided to adopt the following new standards:

Note whether male or female
Note behaviour, especially if breeding, feeding or interactions with predators
Note specific plant if hoverfly is visibly feeding from it.

Roger Morris' article "Full data – why does it matter?" in the National Forum for Biological Recording Newsletter states that "there is a huge amount of interest in flower visit information related to pollinator studies. Demand can only be expected to grow. So, records of flowers visited are very useful." He also notes that recording the gender of the insect allows the extrapolation of "differences in male and female phenology...how males and females respond to changing weather patterns." We hope that providing more detailed records to the Hoverfly Recording Scheme (via WWBIC) will make them of higher value for others who may wish to interrogate our data in the future.

Species recorded for the first time in 2018	Species recorded for the first time in 2017	Species recorded for the first time in 2016
Didea fasciata	*Baccha elongata*	*Cheilosia illustrata*
Epistrophe elegans	*Helophilus hybridus*	*Dasysyrphus albostriatus*
Eupeodes corollae	*Leucozona glaucia*	*Episyrphus balteatus*
Ferdinandea cuprea	*Leucozona lucorum*	*Eristalis arbustorum*
Xanthogramma pedissequum	*Merodon equestris*	*Eristalis horticola*
	Platycheirus granditarsus	*Eristalis nemorum*
	Volucella zonaria	*Myathropa florea*
		Playcheirus albimanus
		Rhingia rostrata
		Scaeva pyrasti
		Sericomyia silentis
		Sphaerophoria philanthus
		Syrphus ribesii
		Volucella pellucens
		Xylota segnis

Table 2. Hoverfly species recorded for the first time in 2016-2018 in Penparcau.

5. Butterflies

Penparcau had records of 20 butterfly species in 2018, an improvement on the 17 species we found in 2016, and 314 butterfly records were made.

We are very grateful to Arthur Chater for making his historic butterfly records available to this project. We have now digitised 1,250 of these extremely high quality records, which cover almost 50 years of butterfly recording in Ceredigion. These sightings were not previously available to the scientific or wildlife community, being paper-based, and it has been a superb gift of data, allowing us to push back the “earliest recorded in Penparcau” dates of many of our species, often where previously we had been forced to record “no data available”. Thanks to Mr Chater’s diligent and detailed butterfly recording we now have a much longer run of data on 10 species, (so far) with “first recorded in Penparcau” dates in the case of at least 2 of our Whites being taken right back to 1979!

The table below shows all 25 species of butterfly ever recorded in Penparcau, the first date they were recorded, with the number of individuals seen in that year, and then the maximum number of individuals seen pre-2015, if this is higher than the first time they were seen. The maximum number of individuals seen at one time from 2015 to 2018 inclusive follows.

Species	Pre-2015	2015	2016	2017	2018
Red Admiral	1 in 2005 3 in 2013	1	6	6	8
Peacock	1 in 2005 2 in 2013	4	4	5	3
Small Tortoiseshell	1 in 2003 9 in 2013	4	4	5	10
Ringlet	4 in 1997	0	3	10	1
Speckled Wood	1 in 2003	15	15	20	15
Comma	1 in 1992	1	1	6	5
Gatekeeper	1 in 1992 5 in 1997	12	9	4	43
Meadow Brown	5 in 1997 20 in 2014	4	5	4	4
Small Copper	1 in 1986 3 in 1990	1	1	3	8
Large White	1 in 1979 4 in 2013	1	1	2	6
Small White	1 in 2005 2 in 2013	1	2	2	29
Green-veined White	4 in 2014	1	1	2	3
Orange Tip	1 in 1979	1	1	1	2
Holly Blue	1 in 2005	1	1	1	2
Common Blue	1 in 2005	6	4	5	10
Wall	1 in 2005	1	0	1	7
Painted Lady	1 in 1983 2 in 2010	1	3	2	6
Small Skipper	No data	0	1	1	0
Large Skipper	3 in 1983 4 in 1990	1	1	1	7
Small Heath	No data	1	0	0	1
Purple Hairstreak	1 in 2009	0	0	0	0
Clouded Yellow	2 in 1983	0	0	0	0
Small Blue	1 in 1987	0	0	0	0
Grayling	1 in 1992	0	0	0	1
Small Pearl-bordered Fritillary	1 in 1981 c.12 in 1989	0	0	0	0

Table 3. Maximum number of butterfly species found by year in Penparcau.

Butterfly Conservation run an annual “Big Butterfly Count”, (where citizens are asked to record butterflies for a period of 15 minutes) showing how species abundance has changed from 2017. We used this account to compare how species are doing in Penparcau, compared to throughout Wales as a whole.

The most commonly observed butterfly in Penparcau in 2018 was for once not Speckled Wood, but Gatekeeper, with an astonishing maximum of 43 seen on one survey. The highest number of this species seen at any one time before

was 12 in 2015, so this marks a significant increase. Interestingly, this was not the case throughout Wales, as its numbers were unchanged compared with the 2017 count, and it actually suffered a large decrease in England.

Another considerable increase was for the second most commonly observed species, the Small White, which had a maximum number of 29 seen during one survey. Its previous maximum was only 2 in several earlier years. According to the Big Butterfly Count results from Butterfly Conservation, this species was the most abundant in Wales for 2018. It was followed by the Large White as Wales' 2nd most abundant species, but the picture locally was not a big increase for this species, as only a maximum of 6 Large White were seen at one time, compared to 2 the previous year.

The third most abundant species in terms of maximum number at any one time in Penparcau was the Speckled Wood, with 15 seen, down from a high of 20 in 2017.

Common Blue and Small Tortoiseshell both doubled their maximum numbers seen at one time in Penparcau in 2018, from 5 to 10, and the former "showed the greatest year on year increase of any big butterfly count species in Wales in 2018." (Butterfly Conservation website).

In Wales the Holly Blue "did well with its numbers up 162% on 2017", although in our village its maximum number was similar, up from 1 to 2.

Declines across Wales were seen in Red Admiral, Comma and Ringlet, whereas locally our figures actually rose slightly for Red Admiral numbers (from 6 in 2017 to 8 in 2018), dropped only slightly for Comma, (from 6 to 5) but did fall significantly for Ringlet. We only saw a maximum of 1 at any time, when we had seen 10 in 2017.

Small Copper, Wall and Large Skipper did better locally in 2017, with numbers rising from 3 to 8 for Small Copper, and from 1 to 7 for both Wall and Large Skipper. We were delighted to find a single Grayling butterfly visiting a Penparcau garden in 2018, which hadn't been recorded in the village since 1992.

The first day of the year that butterflies were recorded in the village was the 8th of April (2 Peacocks), and the last was the 29th October (a Small Copper and a Red Admiral).

We were pleased to have our article titled "Butterflies on the West Coast of Wales" appearing in Butterfly Conservation's Wales Summer Newsletter 2018.

A Grayling in a Penparcau garden in 2018, not seen locally since 1992.

6. Moths

Moth species are divided in to Macros (the “big” ones we are most familiar with) and Micros (“little” ones (sometimes) that were historically less studied). We are very lucky in Ceredigion to have both a Macro and a Micro County Recorder for moths, and an excellent Ceredigion Moth Blog where sightings can be shared.

We increased our efforts in moth surveys from 3 in 2016 to 10 surveys in 2017 and to 11 in 2018 and this year we are delighted to report that 18 species of Macro Moth were recorded for the first time in Penparcau, with 8 of them being firsts for their 10km square. They included Orange Sallow, Brindled Pug and Treble Lines as well as the rarer, Local Alder Moth (form *suffusa*) and the very beautiful Merveille du Jour, a pale green and white moth which looks as if it is made of lace. This is a good increase on the 5 Macro Moth firsts made in 2017. Results like this show that with more light trapping across more locations, we have helped to establish a more accurate representation of the Moths actually present in this area. The “Moths Count Update November 2018” noted that “anecdotal evidence suggests that the abundance of moths seen was the highest it has been for several years” and the combination of more trapping and favourable weather has certainly produced more species for our village.

A total of 85 different Macro Moth species were recorded in 2018 by various recorders, almost double the amount noted in 2017 (47), itself an increase

from 2016, when the total stood at 31. The total number of macros ever recorded in Penparcau now stands at 127.

The Nationally Scarce Thrift Clearwing moth (*Pryopteron muscaeformis*) was seen in Penparcau on 2 occasions in 2018, by Simon Cox and by our County Moth Recorders, during the first week of June. A.P. Fowles reminds us of the first ever local record: "JH Salter had reported the species from Allt-wen, Aberystwyth in 1933 and 1934." (Dyfed Invertebrate Group Newsletter (1989), Vol. 12, p5). It was seen several times from 2006 onwards and it's tremendous to know that it's still present, benefiting from the large amount of Thrift flowers along our coastline.

Butterfly Conservation have produced a document called "The State of Britain's Larger Moths 2013" which details the national situation and reports that:

"Moths are declining in the UK. Studies have found the overall number of moths has decreased by 28% since 1968. These include (of species found in Penparcau)…the Garden Tiger and its familiar 'woolly bear' caterpillar (down 92% since 1968) and the elegant White Ermine (decreased by 70%)."

We are pleased to note finding both these species again in 2018 in the village, although the small sample size means we cannot comment on their relative abundance.

The popular Moth Morning supported by our County Moth Recorders

We also note that the familiar Silver Y (*Autographa gamma)* has bucked the trend of immigrant moths increasing over time in the UK, and has had a drop in population of 46% at the national level over the 40-year period mentioned above. In Penparcau we had 5 sightings with a maximum of 3 individuals at

one time in 2016, and 8 sightings with again a maximum of 3 individuals in 2017. However, in 2018 there was a significant increase to 25 sightings in 2018, with a peak number of 16 individuals at one time. Another moth which was seen in abundance in 2018 was the Six-spot Burnet, with 28 individuals seen at one time in July.

A species that we were particularly pleased about re-finding was the Chimney Sweeper, last recorded in Penparcau in 1982! This small black day-flying moth was found on the top of Pen Dinas, where the Pignut grows. The flowers and seeds of this plant are what its caterpillars need to feed on. It is fantastic to know they are still in our village. It was also good to see Straw Dot in 2017 and 2018, previously last recorded in the village in 1941.

Of the smallest moths, our micros, we note that 47 species had been recorded by various moth recorders in 2018, a substantial increase from 32 species in 2017, and from the 26 species recorded in 2016. Recorders made 22 firsts for the recording area in 2018, again an increase on the 14 firsts made in 2017. In 2017 we only had records of 71 micro moth species ever found in the village, but thanks to both exhaustive research by Ina Smith, and diligent recording by many moth recorders, especially Simon Cox, we can now say that 119 micro moth species have been recorded since 1924 in Penparcau.

2 pleasing refinds were *Eudonia lacustrata* and *Udea prunalis*, both seen in 2018, but not before that since 1938 for both moths. We also congratulate Ina Smith and Simon Cox for finding *Dichrorampha sequana*, a County First.

Thanks to everybody's efforts, including recorders who are not connected to this project, we can now show that 246 species of both macro and micro moths have been recorded in Penparcau since records began. This represents many hours of effort by a dedicated group of people and is a significant increase from 180 in 2017.

7. Bees

In Penparcau we take part in a national bumblebee monitoring scheme called BeeWalk. This is a formal survey along a fixed route of 1km that is walked once a month from March to October. It has enabled us to create data that can be compared with the national picture for bees as it gives standardized information on how bumblebees are doing within specific habitats. Giving a measure of how many bees are seen also helps to model long-term abundance, which is important, as species will decline in abundance before they decline in distribution.

Bumblebee Conservation provided the national picture on how bees were doing in the first half of 2018:

"The late, wet spring saw queen bumblebees emerging late, with four of the seven common species emerging in late March and three of the common species emerging in early April. This is in contrast to the early emergence of all

seven common species in March of 2017." (Summer update: BeeWalk July 2018)

Comparing this with our data from Penparcau, we can see that all but 2 of our 7 bumblebees (Early, Garden, Common Carder, Red-tailed and White-tailed) emerged in mid-April 2018, with only Tree and Buff-tailed emerging in March (on the 20th). We are pleased to report a maximum count of 109 bumblebees of 4 species on the 19th of July 2019.

	1st date seen 2017	1st date seen 2018	+ or – variation from 2017
Buff-tailed	27 March	20 March	-7 days
Red-tailed	5 April	5 April	0
Early	7 April	11 April	+4 days
Tree	6 April	20 March	-17 days
Garden	26 April	16 April	-10 days
Common Carder	26 April	16 April	-10 days
White-tailed	6 June	16 April	-51 days

Table 4 shows the emergence dates recorded for 7 Bumblebee species in Penparcau in 2017 and 2018, with the number of days they emerged earlier or later in 2018 than in 2017.

Our local species seem to follow a different pattern to that happening at a national level. We can see from the table above that in 2018 all but 2 species actually emerged earlier than in 2017! As usual we need to say that our results are based on too small a sample size to be significant, as we can't hope to equal the recording power across the whole of the UK, but it is interesting at a local level to see the large difference between when the White-tailed Bumblebee emerged in 2017, on 6th June, and when it was first observed in 2018, 51 days earlier on the 16th April. We can compare this considerable variation with the Red-tailed Bumblebee's emergence date, which was exactly the same in both years.

10 members of our group attended an Invertebrate Training day with Liam Olds on the 5th June where he led us around some of the best habitats in the village, and managed to find a Nationally Scarce Red-girdled Mining Bee (*Andrena labiata*). This was only the 2nd time this bee has ever been recorded in Ceredigion, with the first record being at Mwnt in 2003. Thanks to Liam's expertise we also found a number of other firsts for the village, including Chocolate Mining Bee (*Andrena scotica*), the Grey-patched Mining Bee (*Andrena nitida*) and the one whose name reminds me of marshmallows, *Nomada marshamella*, Marsham's Nomad Bee.

Later in the year we made a special effort to find the elusive Ivy Bee (*Colletes hederae*) which is spreading across the UK, and were delighted to track it down to Felin-y-mor, where it was, naturally, enjoying the ivy flowers. This is only the 5th record in the County, and as it was seen on the 12th September in Llanbadarn Cemetery by George Ryley, we were particularly keen to find it in the village. Thanks to the group of volunteers who combed the hedgerows of Penparcau, we were successful on the 10th of October.

We are grateful to Bumblebee Conservation who worked in partnership with local volunteers to fund and plant a “Bee-friendly” garden next to the Penparcau Community Forum’s building, and we have already begun surveying this area for bees as the garden develops. Thanks also go to local people who have kindly provided extra pollinator-friendly plants to add to its appeal, and to Rachel Mills and Jon Hadlow from Ceredigion County Council who supplied 9 fruit trees for a new orchard next to the Bee Garden, as well as 482 wild flower plug plants to enhance the bank area nearby. This kind of hands on habitat improvement with 21 local volunteers, working on an area which used to be a toilet block is vital for creating better habitat for our bees.

8. Other Insects: Ladybirds, Grasshoppers and True Bugs.

The national picture shows that of the 1,971 insect species in Wales that were assessed, 5% are facing extinction. Of the 104 species listed as priorities, 67 were looked at, and it was found that just over half were stable, with about a quarter declining and only a quarter actually doing better. (The State of Nature 2016: Wales)

The UK has around 27,000 species of insect, so some degree of focus was required for the Penparcau recording. We focused on 2 key groups for 2018: ladybirds and plant gall causers. As well as these groups we carried out regular invertebrate surveys across the village and were pleased to make a number of firsts for the village. These included the Alder Sawfly (*Eriocampa ovata*), the Holly Leaf Gall Fly (*Phytomyza ilicis*) and the Shore Sexton Beetle which is only the 5th record for Ceredigion.

In September the project visited the Parc Slip Wildlife Trust reserve for some training on Leaf-, Plant- and Frog Hoppers, run by Nia Howells, and thanks to this were able to make a first record for the village of *Eupteryx aurata*, only the 9th record for Ceredigion.

George Ryley made a great contribution to the invertebrate list for the village, with a County First for *Deraeocoris flavilinea*, a Mirid bug which only arrived in the UK in 1996 and is spreading rapidly. He also added to the species list for the roadside verge next to the roundabout with 17 new invertebrates and carried out numerous surveys in the surrounding area for which we are very grateful.

Following our training in Dung Beetle surveys at the Oxford University Museum of Natural History we wrote an article on the subject for Buglife, and were pleased to have it published in their magazine, “The Buzz” Summer 2018.


Demonstrating the use of the Sweep Net.

Ladybirds

The project made great efforts to improve our Ladybird recording in 2018 and we made 82 records this year. By 2017 we had refound 6 of a total of 10 species of ladybird ever recorded in our area, with the Orange Ladybird (*Halyzia 16-guttata*) found for the first time in Penparcau in 2016. Further research in to the 47 species of Ladybird found in the UK turned up an extra species already recorded in the village back in 1989 (*Rhyzobius litura*: we did not previously realise that this was the name of a Ladybird!) We also found 3 more species for the first time in the village in 2018 and these were the 10-spot, the 18-spot and the Pine Ladybird. That brings the total number of species ever found in the village to 14, of which we managed to record 11 present in 2018.

Our most frequently found species in 2018 was the 7-spot Ladybird, the same as in 2017. It is the most common species in the UK, and we made 37 sightings of it in 2018, up from 18 in 2017. We didn't reach the same abundance of individuals in 2018 though, with a maximum of 8 seen at one time, down from 101 in 2017. In 2018 we refound the 11-spot and the 14-spot, neither of which had been recorded here since 1987.

However, the invasive Harlequin Ladybird was unsurprisingly still present in the village in 2018, with 11 sightings, and a huge increase in maximum number of individuals seen at one time – up from 24 insects at a time in 2017 to 337 in 2018. This is a continuation of the trend of its increasing in our area since it was first recorded here in 2011. This is particularly important, because research by Helen Roy et al (2015) has shown that the Harlequin Ladybird eats other species of Ladybirds, which most ladybird species do not. It is noted that the 2-spot Ladybird declined by 44% after the Harlequin arrived in UK in 2003. In some good news, we can show that the 24-spot Ladybird has been recorded in the village since 1987 and is still here; we made 4 records of it in 2017 and 14

in 2018, with a maximum of 15 individuals seen at one time. We're also pleased to have re-found the Cream-spot Ladybird, last recorded in Penparcau in 1991 and seen here again in 2017 and 2018.

Species	1st Penparcau record	Number of records Nov 2015 - Oct 2016	Number of records Nov 2016 – Oct 2017	Number of records Nov 2017 – Oct 2018
7-spot	1989	5	18	37
Harlequin	2011	2	4	11
24-spot	1987	2	3	14
Orange	2016	1	1	2
Cream-spot	1991	0	1	1
2-spot	1989	1	0	4
5-spot	1987	0	0	0
11-spot	1987	0	0	1
14-spot	1987	0	0	3
Coccidula rufa	1987	0	0	0
Rhyzobius litura	1989	0	0	0
10-spot	2018	0	0	8
18-spot	2018	0	0	1
Pine	2018	0	0	1

Table 5. Ladybird species found in Penparcau.

Learning to recognise Ladybirds to species level in three of their four life stages, as larva, pupa and adult, has enabled us to greatly increase our understanding of what species are active at what point in the year, and I thank George Ryley particularly for his collaboration in this effort. We are not yet up to recognising them to species level when they are eggs!

We made efforts to refind the 5-spot Ladybird, which lives in river shingles, but this has not been recorded in the village since 1987 and we did not refind it in 2018. We'll be trying again next year.

Grasshoppers and Bush-crickets

The project benefitted from training in both 2017 and 2018 by local naturalist Roger Bray. With his help we were able to identify and record 4 species in various locations throughout Penparcau, including the Meadow and Field grasshoppers and the Oak Bush-cricket. There are surprisingly few records for these species in Penparcau, and apart from Meadow Grasshopper, we have been unable to find any that predate our project's records. However, these insects can be assumed to have been in the village previously, and we have found records just outside our boundaries for all 4 species, as well as one pre-1991 record for Common Green Grasshopper (*Omocestus viridulus*) on Allt Wen. We searched for this species in 2018 and were pleased to finally find it still present close to where it was first recorded, on the grassland bank next to Tanybwlch beach and on Pen Dinas itself. This Grasshopper is said

to be more local and declining in the lowlands so it's particularly pleasing to find it still present in our area. Our records will be incorporated in to the new National Atlas for Orthoptera.

The Speckled Bush-cricket (*Leptophyes punctatissima*) was recorded in Parc y Llyn in 2016, and in the same location and on Pen Dinas in 2017 and in Parc y Llyn in 2018. We also learned via local naturalist Red Liford that Mottled Grasshoppers have been recorded previously at the top of Pen Dinas, on "short grassy areas with heather, near the Monument" (pers. comm.) so we will attempt to re-find these in 2019.

9. Slugs and Snails (Land Molluscs)

In May the project travelled to the Wildlife Trust reserve of Teifi Marshes to attend a fantastic course on identifying slugs and snails, run by Imogen Cavadino and provided by WWBIC. Thanks to this training we were able to make a series of 4 firsts for our village, which were the Dusky Slug (*Arion subfuscus*), the Green-soled Slug (*Arion flagellus*), the Worm Slug (*Boettegerilla pallens*) and the Copse Snail (*Arianta arbustorum*). This snail is an interesting one because, unlike most UK slugs and snails which live for between 1-2 years, the Copse Snail can live up to 17!

10. Reptiles and Amphibians

We were lucky to have a survey of Reptiles and Amphibians done in 2011-12 by the Wildlife Trust to compare our results with, by Parry, R.J. (2012). In 2016 we set up a survey on Pen Dinas using 30 artificial refugia (places for the animals to hide under, or bask on top of) and checked them on 19 separate occasions. Repeating this survey of 19 visits in 2017 showed that our Common Lizards appear to be doing even better than in 2016, as sightings of them increased by 12% on the previous year.

However, during the 19 surveys in 2018 we observed a large drop in the number of Common Lizards and a rise in the number of Slow-worm. We hypothesize that this may be a result of paths being strimmed in May, removing all the long grass habitat that we normally see the lizards amongst during the visual surveys, followed by the heat wave of June and July, which meant that the grass and wild flowers did not grow back. Lacking suitable habitat to bask in, the lizards may have moved away from the paths we follow on our survey to more suitable habitat elsewhere on Pen Dinas.

Unlike the lizards, which we see more frequently along paths and away from refugia, the Slow-worm are almost always seen underneath the refugia. They may therefore have been less affected by the removal of habitat along paths and may have benefitted from the heat wave as more daylight hours would have been suitable for catching food.

In 2017 we discovered what appeared to be a second population of Common Lizards on Tanybwlch beach itself, separated from the main colony on Pen Dinas by the narrow and fairly shallow River Ystwyth. Reptile specialists from ARC (Amphibian and Reptile Conservation) have noted that it is likely that the lizards are swimming across and are thus able to benefit from the genetic

diversity of both populations, and the resources of both territories. However, the heat wave in the summer of 2018 had the effect of scorching off the long grass vegetation around the stones that the lizards need to hide amongst, and we did not find any in this location during numbers of visits in 2018.

We made 37 observations of lizards over the whole year, a decrease from 119 the year before, and it is interesting that the maximum number of lizards we managed to see on any one day was only 11, down from 32 in both 2016 and 2017.

Common Lizard posing obligingly on its Reptile Refugium

Slow-worms are also resident in and around Pen Dinas. Although the number we recorded in 2016 decreased by 30% (26 sightings in 2011-12 compared with 18 in 2016) it was back to nearly its 2011-12 figure by 2017 with 25 sightings. This went up again to 43 in 2018 and our maximum count went up from 5 individuals on one day in 2017, to 8 in 2018. One of our volunteers, a reptile specialist, took some of the Slow-worm sloughs that we found this year and sent them to Amphibian and Reptile Conservation to be included in their DNA database of Reptiles. This will assist other scientists wishing to carry out research on these animals in the future.

We have yet to record any snakes in Penparcau during our surveys since 2016, although Grass Snake and Adder were seen in 2011. However, personal communications state that Grass Snake have been found in gardens close to Pen Dinas, and have been brought in by dogs in 2017. It may be that our refugium locations on the hillside are simply too regularly disturbed by walkers and dogs to appeal to our native snakes and we are therefore not observing them.

Common Frogs and Toads are seen more rarely, as Penparcau does not have many large pools for them, and numbers fell from 2017 levels. We recorded 6 sightings of Toads in 2018 (down from 11 in 2017) and no Frogs during the surveys. Toads are now considered “at risk” and so it is alarming that Toad sightings increased have fallen and that no Frogs were seen at all. Again the heat wave may have had an effect.

However, we were pleased to have 3 records of Frogs in the village (not part of the surveys above) in 2017 and 2 in 2018. In August a Frog was observed “screaming” at a cat in a Penparcau garden – we are assured that both were unharmed! Frogspawn has been seen in Parc y Llyn, but sadly it has failed because of the poor state of the ponds there, also 1 dead Palmate Newt was found in this area. 5 Toad records were made in 2018 outside the Reptile and Amphibian survey, and all were found on Pen Dinas.

We were delighted to find Palmate Newt using Pen Dinas in 2016, in a first for the village. Both adults and young were found again in 2017 and 2018, with a welcome rise in sightings from 2 in 2017 to 6 in 2018 with further proof of their breeding in our area. Anecdotal evidence suggests they are also breeding in Parc y Llyn, although the poor state of the 2 small ponds there may be a threat to their future success. The edge of this area where there are allotments is also habitat for Slow-worms, and one has been regularly seen here by a member of the public in 2017 and 2018.

A separate report on the Pen Dinas Reptile and Amphibian surveys for 2018 has been produced and is available via the link in the References at the end of this report. We shared this report with Froglife, who responded “Thank you very much for sharing this with us, it is incredibly useful and much appreciated. I will forward it to our Science and Research Manager. Well done on the terrific work you do for amphibians and reptiles.” Kathy Wormald Chief Executive Officer – Froglife.

Small mammals, including an exciting find of Water Shrew in 2016, and Pygmy Shrew and Wood Mouse for the first time in 2017, were also seen either on or under the refugia sheets, as recorded in the Mammal section below. The following table shows the number of total observations of reptiles, amphibians and small mammals during the surveys, including refugia and visual search results.

Species	2011-12	2016	2017	2018
Common Lizard	3	106	119	37
Slow-worm	26	18	25	43
Toad	1	5	11	6
Frog	0	2	1	0
Palmate Newt	0	2	2	6
Small mammal	6	6	10	12

Table 6. Total observations of species recorded on Pen Dinas during refugia checks and visual searches by year.

11. Birds

The very cold weather of late February – early March 2018, with ground frozen solid, meant an influx of ground feeding birds to Penparcau gardens. We noted our first ever Redwing and Fieldfare and were told of Lapwing venturing in to people's gardens and allotments. This was also seen at a national level, with BTO noting that Fieldfare appeared on "over 35% of complete lists, compared to the historical average of 13% for the first week of March!"

In January we took part in the RSPB's Big Garden Bird Count for 2018, and we note their results showed that "The house sparrow remained the most frequently spotted garden bird in Wales having been spotted 6.1 times per garden on average, with the blue tit overtaking the starling into second place." Given that the House Sparrow is a Red Listed species, (needing urgent action for conservation), it is good to hear that it is still a regular garden visitor across Wales, and indeed, a resident in many Penparcau gardens. This is borne out by the BTO's findings in their "State of Birds in Wales 2018" report, which notes the "positive trajectories of Wales urban populations of House Sparrow, Feral Pigeon and Collared Dove relative to in the UK overall. Welsh House Martins are holding their own, but Starlings are in steep decline."

Long-tailed Tits are often seen in our village working their way along the trees beside the River Rheidol, and Coal Tits (seen less often) close by in the scrubby areas. Across Wales the above survey shows that both species saw an increase in their sightings: the Long-tailed Tit +26.4% and Coal Tit +20.4%. Siskins and Goldcrests also increased in Wales' gardens, and though present in our village, we don't see them often. Lastly, the survey high-lighted a downturn in the recorded sightings of Blackbirds (-12.6%) and Dunnock (-7.3%) on last year's figures. We have records of these last 2 species being seen regularly in the village since 2016 and have not seen evidence of a decline yet.

Many readers will know that the BTO are running a Tawny Owl Calling Survey at the time of writing (February 2019) to increase understanding of their calling behaviour and distribution. They note "Predatory birds are particularly important to monitor because they can be useful indicators of the health of the wider environment." We note that there is one record in Penparcau from 2015, and one more, sadly found dead by the side of the road, in 2018. We look forward to the results of the survey to increase what is known locally, as well as nationally, about the distribution of this bird.

The State of Birds in Wales 2018 report has a section on "Patterns of Change" in Welsh birds, and we comment below on their findings that affect birds we find in Penparcau. They highlight "key Wales-specific outputs of the 2017-11 Bird Atlas (Balmer et al. 2013)" and include:

"...measures of the importance of Wales in supporting the UK breeding populations of (…) Chough (76%), as well as significant proportions of the UK wintering populations of coastal species such Common Scoter and Guillemot."

Chough is well-recorded in our area, and we have records every year back to 2016 in the village. We also note that Common Scoter and Guillemot were seen in our area in 2018. We have no record of the former being present in our area prior to this year's sighting. Other birds seen in 2018 for which we have no previous record in Penparcau or Parc y Llyn were:

Brent Goose, Canada Goose, Fieldfare, Gannet, Great-crested Grebe, Lapwing, Lesser Black-backed Gull, Manx Shearwater, Mistle Thrush, Mute Swan, Red-throated Diver, Redwing, Water Pipit, Whimbrel, White Wagtail, Wigeon, Woodcock.

If any readers have dated records of these birds being present in this recording area before 2018 we would be very grateful to hear from you with your dated records, so that we can amend our own data. We have only regarded a record as being within our survey area if it specifically says so, e.g. "off Tanybwlch" and not if it was more general, e.g. "off Aberystwyth" or just "Aberystwyth harbour".

The Curlew is a well-loved bird of the farmed uplands, as well as using our wet coastal grasslands for feeding, and the above-mentioned report states that it suffered a "marked range loss" over the last 40 years and is "one of Wales' most vulnerable species". We are pleased to say that our records show it continues to use areas of our village for feeding, and that its bubbling song can be heard from the slopes of Pen Dinas.

Birds which have increased their range across Wales are some of the non-natives, like Mandarin Duck, and we have annual records of this colourful bird in Penparcau since 2016.

There has been a long-standing tradition of a race to spot the first Wheatear of the year in the village, usually seen in the fields behind Tanybwlch, and we are delighted that this summer visitor is still regularly returning to our area. The Whitethroat is also annually returning to our village, in spite of a recent national dip in numbers, and is starting to make a recovery.

We are fortunate that birds are extremely well recorded in Ceredigion and at a local level there are many active and highly skilled bird recorders who regularly send their records to the County Recorder and the Ceredigion Bird Blog. We are very grateful to local bird experts Naomi Davis, Moira Convery and Ina Smith for sharing their expertise and leading walks. In 2018 we carried out 12 bird surveys and we again took part in the annual RSPB Big Garden Bird Watch, the largest wildlife survey in the world, which half a million people take part in. Thanks to a combination of our own surveys, the Ceredigion Bird Blog, the Ceredigion Bird Report 2016 and 2017, BTO's BirdTrack maps, the Facebook page "Ceredigion Birds and Wildlife" and generous sharing of data from individuals, including County Bird Recorder Russell Jones and Harry

Pepper, we now have a much better idea of what bird activity there is in Penparcau. We can show that 98 species were recorded here in 2018 (82 were recorded in 2017), out of a total of 144 bird species ever recorded in Penparcau. Having access to the various sources of bird records noted above means that we can increase the known number of birds ever recorded in the village by a considerable 53% (the total stood at 91 in 2017).

To compare our bird records with the most recent data on birds in the UK we looked at the Birds of Conservation Concern 4 (BOCC4) document. The following table shows how many of each of our species were on either the Red or the Amber list (Red is the highest conservation priority, with species needing urgent action. Amber is the next most critical group). In Penparcau there were 36 species on the Amber list and 22 on the Red list, including Ringed Plover, Curlew and Linnet. The diverse habitats of our village may be providing vital resources to these endangered birds.

Here we list those species with a record in our recording area more recent than January 2014, given the data available to us.

Bird species on Amber list	**Bird Species on Red List**
Black-headed Gull	Arctic Skua
Bullfinch	Black Redstart
Brent Goose	Common Scoter
Common Gull	Cuckoo
Common Redstart	Curlew
Common Sandpiper	Fieldfare
Dipper	Grey Wagtail
Dunlin	Herring Gull
Gannet	House Sparrow
Glaucous Gull	Kittiwake
Great Black-backed Gull	Lapwing
Guillemot	Linnet
House Martin	Mistle Thrush
Kestrel	Redwing
Kingfisher	Ringed Plover
Lesser Black-backed Gull	Shag
Mallard	Song Thrush
Manx Shearwater	Starling
Meadow Pipit	Whimbrel
Mediterranean Gull	Whinchat
Mute Swan	Woodcock
Osprey	Yellow Wagtail
Oystercatcher	
Redshank	
Sanderling	
Sandwich Tern	
Short-eared Owl	
Stock Dove	
Swift	

Tawny Owl	
Teal	
Turnstone	
Water Pipit	
Wigeon	
Willow Warbler	
Yellow-legged Gull	

Table 7. Bird species seen in Penparcau in 2018 which are on the Red or Amber list of Conservation Concern.

There are some birds we have not seen records for in the village in 2018, which would be worth keeping an eye out for: we welcome records of Cuckoo, Whinchat and Water Rail in particular. The first two are on the Red List of Conservation Concern, and their numbers are declining, rapidly in the case of the Cuckoo. The Ceredigion Bird Report of 2017 notes that there were Cuckoo records "from 20 sites throughout the county" in 2017, which was a decrease from the previous year. We are very lucky to have this highly detailed report on birds in Ceredigion, which gives an excellent over-view of how species are faring in the wider area.

Watching the Kingfisher fly up the river from Parc y Llyn.

12. Mammals

Mammals are a notoriously difficult group of animals to survey and monitor, as they generally keep themselves well hidden. Survey methods often involve looking for signs of the mammal, rather than the mammal itself (e.g. nests, hair,

droppings, feeding signs and footprints). We found signs of a wide range of animals, including Otter and Water Vole living in Penparcau. The "Review of the Population and Conservation Status of British Mammals" was published in 2018 by Natural England and shows considerable change in the status of many of our Penparcau species. Hedgehog, Rabbit and Water Vole amongst others have all suffered major declines in either range or population size while increases in the geographical range and population size were seen in Otter.

Water Vole

We have been taking part in the National Water Vole Monitoring Programme since 2015, and we are still one of only 5 sites in Wales known to monitor their Water Voles. 146 sites are monitored across the UK (only 63 of these showed Water Vole signs) but there are very few being monitored in Wales; this makes our work even more important at a national level.

We were delighted to find Water Vole at a location in the Aberystwyth area; a population first recorded in 2004. This was fantastic news, as these animals have suffered a massive decline of around 90%. Aberystwyth's population is now important on a national scale as one of the few that has managed to hang on.

We found signs that Water Vole were still present back in 2015, and when we resurveyed this area in 2016 and 2017, we found signs of active latrines, (their droppings were trampled, suggesting they are breeding) and also feeding signs (pieces of rushes neatly chopped off at an angle of 45 degrees). In 2017 we were even lucky enough to see the animal itself coming out of a burrow, although it did disappear very quickly when it saw us all staring at it! However, the results in 2018 were more worrying, with only 1 latrine and 2 piles of feeding remains found. American Mink have been spotted in the area, and there is concern that the Water Vole may be being predated by them. Ceredigion County Council and other conservation bodies have been made aware.

Our data will be included in a new report by the People's Trust for Endangered Species in 2019: "The State of Britain's Water Voles." We were pleased to have an article published in "Wildlife World" magazine, published by the People's Trust for Endangered Species and in their Water Vole Update 2018.

Bank Vole and Field Vole

Like many of the small mammals, there are very few records in Penparcau for these animals, with only one Bank Vole seen on Pen Dinas in 2016. In 2017 we made 6 records of them, one of which we discovered by dissecting an owl pellet found near one of the meadows. This is a great way to find out what small mammals are living in an area without having to trap them. The number of Bank Vole we recorded increased in 2018 with 9 observations, including of a woven grass nest with 4 juveniles (eyes shut) in it on the 1st of May 2018. Owl pellet dissection from a pellet found on the western slopes of Pen Dinas confirmed that they were still active on or before the 7th of December 2017.

Field Vole had one record in 2017 and in 2018 we found a grass nest of 4 juveniles under a reptile refugium on Pen Dinas.

Harvest Mouse
Harvest mice build very distinctive nests, often at the top of reeds or long grass, and searching for these nests is the method most often used to find out if harvest mice are present. We undertook 3 annual surveys on Pen Dinas for Harvest Mouse nests, one in November 2015, one in October 2016 and one in November 2017, but did not find any. This was in response to a find of a possible nest by a keen young naturalist back in the summer of 2014. It seems likely that Harvest Mice could be using this site as it does have good areas of suitable habitat for them, but searching for their nests is a true case of "needle in a haystack": our lack of success so far does not mean they aren't there! Harvest mice are quite rare in Wales - there are only about 30 recent records – but given 3 unsuccessful surveys we have decided to turn our attention to other mammal species until any further sightings are made.

Wood Mouse
Recognisable by their large ears, Wood Mice had few sightings in Penparcau, one in May 2015, and one in May 2016. They are one of our most common and widespread rodents and we were glad to have three records of them in 2017, although none in 2018.

Bats
In 2016, two Bat walks were led for us by members of the North Ceredigion Bat Group, one through Parc y Llyn and one from the base of Pen Dinas. We were delighted to discover the same 3 species of Bat at both locations: Soprano and Common Pipistrelles, and Noctules.

International Bat Night run by the North Ceredigion Bat Group on 25th August 2018 at the base of Pen Dinas.

Both Pipistrelle species have increased their numbers recently, according to the Bat Conservation Trust's latest research which covers 2017, and Noctule numbers are stable.

In 2017 we were lucky to have another walk led for us by the Bat Group, at Parc y Llyn, which 15 people attended, and where both Noctules and Soprano Pipistrelles were again recorded. Comments from the Bat Group's walk by an enthusiastic public included "That was tremendous! What a show!" and "This is amazing! I just love it!" For International Bat Night in 2018 we had a walk with bat detectors and two experts along the cycle path near Pen Dinas which 11 people attended. The group found both Common and Soprano Pipistrelles feeding and commuting and we are particularly grateful to Aline Denton and Annette Smith for their expertise and for organising this very popular night out.

Otter

It is fantastic to report that Otters remain living in Ceredigion and can sometimes be seen in the harbour at Aberystwyth. We have a sighting in Penparcau from 2011 and were delighted that mammal specialist Aline Denton found 2 spraints (their tarry black droppings) along the Rheidol in May 2016 and that there was further evidence along the Ystwyth in 2017. This shows that they are likely to be using the riverbanks as part of their territory, for hunting and maybe even sleeping. This is in line with the national picture, as they are known to be making a return to most, if not all UK rivers. We were delighted to receive a record of an otter sighting in February 2018, an active adult in the River Rheidol.

Grey Squirrel and European Rabbit

These well-known animals are often seen around Penparcau, but not often recorded. We have a record of Rabbit in the Pen Dinas area from 2010 and their droppings, as well as the animals themselves, have been seen frequently since 2015, also in Parc y Llyn. Grey Squirrels have also been seen regularly from 2015 to the present day.

Hedgehog

The earliest record we have for Hedgehogs in Penparcau is back in 1988, but very few have been recorded since then. These animals are in decline nationally, especially in rural areas, and we only had 2 sightings in our area in 2016, and a further 2 in 2017. In 2018 we had 5 sightings, all in the Southgate area. There is a small woodland next to this housing estate and it is possible the hogs may be using this as a nesting site, as well as visiting local gardens. Records show at least one animal present in mid-April, one dead on the road by May, but 2 present in June, and 1 seen in July.

The "Aberystwyth Hedgehog Project" was set up by Naomi Davis in response to this lack of sightings, and she has kindly created a version of her Hedgehog Distribution Map showing Penparcau in detail for 2017 and for 2018.

Image 2. Hedgehog Distribution Map for 2017 in Penparcau. © Naomi Davis.

Image 3. Hedgehog Distribution Map for 2018 in Penparcau. © Naomi Davis
Red dots indicate road kill, blue dots are either live sighting, video or field sign.

Naomi writes:
“Aberystwyth Hedgehog Project is a citizen science project focused around locating hedgehog populations in North Ceredigion and informing communities about how they can help hedgehogs. Since starting in 2016 the project has gathered over 80 records of hedgehogs in north Ceredigion; this data is available for anyone to use and our records can be found on the Hedgehog Street's Big Hedgehog Map (where you can also map your hedgehog hole). AHP also works closely with West Wales Hedgehog Rescue, in 2018 we were able to rehabilitate and release an underweight hedgehog back into Penparcau in the same garden it was found. A big thank you to supporters of both project and rescue as they rely solely on volunteer effort and would not be able to continue without your help.”

We were pleased to be able to send our records to Naomi, as well as to our County Mammal Recorder, so that she could map out how hedgehogs are using our village. Naomi notes that in 2017 there were: “50% road kill, 50% live sightings” and that the figures “suggest a population of some size in the area. By 2018 the distribution of sightings is slightly different, with more found in Southgate and fewer along Min-y-ddol, although some of this may be explained by a change in survey effort, with more adhoc sightings coming in from the public.

Common Shrew and Pygmy Shrew
There are very few records of these small mammals, which are seldom seen by the public, however they are thought to be fairly common in Wales. We have 3 records for Common Shrew in 2016, none in 2017, and 3 for Pygmy Shrew in both years. One had fallen victim to a cat. In 2018 numbers dropped and we had zero records for Common Shrew and only 1, on the 26th March, for Pygmy Shrew.

Water Shrew
Water shrews are under-recorded and very rarely seen, so it was an exciting discovery to find one during a Reptile survey on Pen Dinas in 2016, making use of an artificial shelter, as this is the first one ever recorded in Penparcau. The only previous record nearby is in 1992 at Rhydyfelin, sadly noted as “cat prey”. We did not refind it in 2017 or 2018.

European Mole
Although the actual creature is rarely seen, active mole hills were found in various locations around Penparcau in December 2015, and in January and May 2016, with our earliest record of them being in 2010 near Pen Dinas. Molehills were found all over Penparcau throughout 2017, and we also had a dead adult on Pen Dinas, and a live one in the middle of creating a mole hill next to the Monument on the very top of the hill. In 2018 they were similarly active and recorded from molehills in both November and May.

Red Fox
Unlike more urban areas, where they are regular visitors to gardens, Penparcau has very few records of fox sightings. The earliest are in 2010 and 2012, near Pen Dinas, and in April 2016, walking across a field in the same location. A

further record of Red Fox was made here in April 2017, with various personal communications suggest a family of them living on this hill. In the 2017-2018 recording year we were sad to find a dead adult fox washed up on Tanybwlch beach in November 2017, but a happier sighting was 3 energetic fox cubs yattering at each other as they played on the slopes of Pen Dinas in August 2018.

Recorded for the first time in 2018
Stoat, American Mink and Weasel
Weasels and Stoats are known as "small mustelids" and are rarely seen by the public as they are expert at hiding themselves away, just one of the reasons they are such proficient hunters. However, we were very lucky to have one record of each made in 2018, by our eagle-eyed contributors. The Weasel was found dead on the edge of Pen Dinas, and the recorder noted that they had heard "a lot of commotion, squeaking and banging", before the find was made. The live Stoat was found not far away, along the River Ystwyth. It is fantastic to know that both these animals are making use of our area and we can report that a live Weasel has already been seen in the 2018-19 recording year.

A less welcome new arrival is the American Mink, an invasive, non-native species that unfortunately was released in to the wild in the UK in the 1920s and has rapidly spread throughout Wales. It is a particular threat to our Water Vole population as it is well recognised as one of their key predators. A sighting of Mink was made this year, and unfortunately, we must also report lower numbers of Water Vole sign found during our Water Vole survey.

13. Seashore and Rock Pools (Intertidal zone)
There has been very little data on this range of species held by WWBIC in the past, so adding to this is a key aim for us. As well as a good range of rock pool species like Beadlet, Strawberry and Snakelocks Sea Anemones and the Broad-clawed Porcelain Crab, we also found Chitons, Acorn Barnacles and a colony of Sea Squirts living underneath rocks, and visible at a very low tide. Louise King has provided important records to this area of our work, and we thank her for her efforts and her expertise.

Live and stranded animals
We were pleased to have reports of both Bottlenose Dolphin and Atlantic Grey Seal swimming off Tanybwlch beach in October, as they use this shallow area with their young. Sadly, we also recorded three dead Grey Seal, two adults and one pup still with its white coat. One of these animals was found in the middle of June 2018 and the other two over Winter 2017. One dead Harbour Porpoise was found, the most commonly observed cetacean in the UK, washed up in January. We have found one dead Porpoise each year from 2016 to 2018 on Tanybwlch beach, and these are reported to the Strandings Officer.

Portuguese Man o' War
There was a massive influx of these creatures in to the seas around the UK in September 2017, lasting until December that year. We reported on the start of this phenomenon in the 2017 report and can now finish off the story. We

noted then that these “siphonophores” – not jellyfish but a colonial animal – entered Penparcau waters on the 6th of October and in fact remained on Tanybwlch beach until the 1st December. This was a first for the village, and only the third time they had ever been recorded in the County. At their peak there were 67 individual Portuguese Man o’ War on Tanybwlch beach, on the 11th November 2017. Then numbers gradually decreased, with 15 present on the 15th of that month, 4 on the 23rd, and only 1 on the 1st of December. It was astounding to see so many of these animals present in the village, truly an exotic visitor!

Our project contributed to the “live-tracking” of this species via social media, which resulted in an interactive map of their spread across the UK being created by beachstuff.uk which is available to view on their website. This is one of the ways that our biological recording in Penparcau can clearly show an immediate national impact. We can collaborate with the scientific community in close to real time to participate in increasingly accurate understandings of the spread of species in the UK.

Another fascinating free-floating species we found this year was the By-the-wind-sailor (*Velella velella*). It is a pelagic colonial hydroid, with short tentacles hanging down from a float, catching the wind by means of a stiff sail. They are occasionally found washed up en masse, and we found 30 stranded on Tanybwlch beach on the 9th of November 2017.

Goose Barnacles are a family of ocean-going animals that we find at least once a year in Penparcau, usually washed up after a winter storm. Last year was no exception, with more than 200 found attached to a tree trunk in the strandline on the same date as the *Velella* find. 2 types were identified, both the commonly found *Lepas anatifera* and the much less often seen *L. hillii,* known as “orange-collared”.


By-the-wind-sailor washed up on Tanybwlch beach.

14. Sharks and Skates

The Winter of 2017-18 was our third season of carrying out surveys for the Shark Trust's Great Eggcase Hunt. This Citizen Science project "aims to discover where different species of egg laying shark, skate and ray lay their eggs. (It)...can help to identify potential… nursery grounds". (Shark Trust website). We were pleased to be able to make an enormous number of records through systematic searches, and can now show that Cardigan Bay is likely to be a nursery ground for Nursehounds in particular, as we found 831 of their eggcases over Winter 2015-16, 683 over Winter 2016-17 and a further 730 over Winter 2017-18.

In the first year we recorded a total of 979 eggcases of 5 species: (Nursehound, Spotted Ray, Thornback Ray, Small-eyed Ray and Small-spotted Catshark) on Tanybwlch beach, Penparcau, and in our second year this fell by 13% to 847, although we had found 2 more species, bringing the count for our part of Cardigan Bay to 7 species of Shark and Skate eggcases. The 2 species new to our survey that year were the Cuckoo Ray and the Blonde Ray. In our third year we found the highest number yet of eggcases, 1,021, from our 5 key species, and also 1 more Blonde Ray.

At the suggestion of Dr. Pippa Moore from Aberystwyth University who lectures and leads a research group in marine ecology, we have been sharing data to benefit both her students' research projects on these animals, and our own. We contributed data to, and received it from the Aberystwyth University MSc. project: 'Is Cardigan Bay a nursery ground for Nursehound?' by Sasha Bannister, Ross McDonald and Dr. Pippa Moore. Sasha wrote in her acknowledgements that "A debt of gratitude is due to… Chloe Griffiths and the Penparcau Community Wildlife Group for their provision of data from Tanybwlch December 2017 to February 2018."

We keep our survey effort the same each year, running 11 searches over the season, but augmented our data with extra searches run by the above project during this year and the year previously. Data from the Nature of our Village project searches alone is available by request.

We note an increase in the number of eggcases collected across each of our 5 key species (Nursehound, Spotted Ray, Thornback Ray, Small-eyed Ray and Small-spotted Catshark). Comparisons of numbers of eggcases washed up may not reflect actual animal numbers at sea though, as the number of eggcases that come ashore can be affected by weather events. This might be storms affecting how currents and wave action move the cases on to the beach, or high winds then blowing them off it and in to fields beyond our surveyed area. We need to acknowledge therefore that making comparisons of year on year fluctuations at a very local level may not demonstrate significant change. However, there were very few records of Shark and Skate in Penparcau prior to our surveys, so we are pleased to be able to make our records available to the Shark Trust, in order that they may contribute to an understanding of whether these species are increasing or decreasing nationally.

For the third year running our most commonly recorded eggcase was that of the Nursehound, which is noted as being "Near Threatened" on the Red List of Conservation Concern, and although it may be "locally abundant…(it) has limited interconnectivity between populations and relatively low fecundity" which is a threat to its future survival. Its numbers dropped by 18% during the period from Winter 2015-16 to Winter 2016-17, from 831 to 683, but during the most recent survey season they were back up to 730, a rise from the previous season of around 7%.

Numbers of Small-spotted Catshark rose by more than a third on last year, and numbers of Spotted and Small-eyed Ray were approximately double what they were the previous Winter. Thornback Ray numbers were still the lowest recorded of our 5 key species for the third year running, but also rose, in an increase of almost three quarters compared to Winter 2016-17.

The Blonde Ray and the Cuckoo Ray are two species which we find only rarely. No Cuckoo was found this year, and only 1 Blonde, which has a Red List status of Near Threatened.

We are yet to find any eggcases with the young animal still inside, although personal communication shows that these were regularly found further south in Cardigan Bay in 2017 and previously. (Dr. Pippa Moore).

Species	Winter 2015-16	Winter 2016-17	Winter 2017-18
Nursehound	831	683	730
Small-spotted Catshark	58	63	99
Spotted Ray	60	61	119
Small-eyed Ray	20	24	48
Thornback Ray	10	14	24
Blonde Ray	0	1	1
Cuckoo Ray	0	1	0
Total eggcases	**979**	**847**	**1021**

Table 8. The number of eggcases found of Shark and Skate during the Great Eggcase Hunt over 3 survey seasons on Tanybwlch.

The BBC Wildlife Magazine published a piece we wrote in a 5 page spread called “Does Citizen Science Make a Difference”, which appeared in the May 2018 edition. This magazine has a readership of 240,000 people every month, so it was a fantastic opportunity for us to reach a wider audience.

15. Freshwater life

Similarly to Rock Pool data, there is little available data for Penparcau on freshwater creatures, and fish are very under-recorded, but we did find Flounder, Minnow and Freshwater Shrimp in all 3 years, by running two freshwater surveys each year. Other animals we found connected to the rivers between 2016 to 2018 were Caddisflies, Mayflies and Stoneflies, with the Wandering Snail (*Radix balthica*) seen in 2016 and again in 2018. We were pleased to make a first for the village with a record of Water Cricket (*Velia caprai*) which was found on the lower pond in Parc y Llyn. The fact that the 2 ponds in this area dry out regularly (due to a leak in their liners) is almost certainly why there are so few species present, as any eggs laid in to the water, or into/onto water plants would fail when the water soaked away.

16. Reaching our audience

The project’s success in recruiting so many volunteers has partly been due to an active use of social media, particularly Facebook. Our page “Penparcau Community Forum Wildlife Group” had 143 members in January 2017 and by January 2018 had increased by more than 40% to 204. By January 2019 this had increased to 242 members. We use it not just to advertise surveys, but also to feed back survey results, rare finds, and to encourage the community to post their own wildlife discoveries. We also run a mailing list as an alternative to social media, where interested parties can receive invitations to future surveys, and this currently stands at 88 people signed up.

We are grateful to the Wildlife Trust of South and West Wales, for allowing us to promote the project at their public meetings at Aberystwyth University. Being able to publicise surveys to a diverse group once a month has meant that a steady stream of new people hear about, and take part in our project. It has also been very useful to have articles in the Wildlife Trust and WWBIC newsletters on a regular basis to let people know what we have been doing.

We promote recording using apps, in particular the Mammal Tracker, the Woodland Trust Tree Id. app, and the Shark Trust Eggcase Hunt have proved popular. We are pleased to report more people signing up to use the online recording form on the WWBIC website to add their own records, as this will be a key legacy of our work. Some new recorders have added hundreds of records to the database of the Local Environmental Record Centre, and this is a fantastic outcome for the project.

17. What next?

The Nature of our Village project will continue in 2019, where we will aim to fill as many of the gaps as possible in the picture of how our wildlife is doing. There is a massive amount of work to do, and as the threats to nature continue to pile up, it is more and more vital to learn about and protect what we have. Please do get in touch if you would like to contribute in any way to this project, whether by coming out on a survey with us, sharing your expertise, or offering to share wildlife records in our area that you make independently of this project.

An amazing 81 firsts for the village were made this year, 2 of them also firsts for the County. These are the first time a species has ever been recorded in a particular place, and so it is clear that the work of various recorders, including Ina Smith, Tony Allenby, George Ryley, Simon Cox, and this project, has increased what we know about what makes up “The Nature of our Village”. The more people that get involved, the better our understanding of our local environment will be.

18. A note on the data

This project is very grateful to our Local Environmental Record Centre, WWBIC (West Wales Biodiversity Information Centre) which has kindly provided spread sheets and maps of the data we have gathered, and previous data from Penparcau, dating back to 1905. It is thanks to their organisation and its meticulous record keeping that we can have such high quality data to compare our latest results with.

Some of the data created by this project is sent directly to the relevant County Recorder, for Moths, Mammals, Dragonflies, Butterflies and Plants. Data on Sharks and Skates goes directly to the Shark Trust. All other wildlife records go directly to WWBIC. This means that the data we looked at for this report is not all the data we collected, as some is still in transit from County Recorder to WWBIC, undergoing checks for accuracy.

It is important to acknowledge that this report is based on a small amount of data, over a short period of time, and that some species groups received a lot more effort than others, e.g. Reptiles and Butterflies, whilst other groups may have had just one survey following an accepted scientific method, e.g. Water Vole. In many cases there was little data to compare our current results with, e.g. Rock pools and Freshwater animals. We also know that other records being made in Penparcau by other recorders may not have reached WWBIC yet, either because they will be sent to other agencies, like BTO (British Trust for Ornithology) for bird records, or because the recorders may have sent them to County Recorders, where they will be going through their own accuracy checks. There will be other wildlife records for Penparcau during this time period which were not available for this report.

If you would like to look at the records for Penparcau, you can find them on the Aderyn website. We are very grateful to all the recorders, those who took part in our project, and those who work independently, for sharing their data with us, via public platforms or personal communications. Please note that when we describe a species as being "refound", we do not mean that it was thought to be extinct previously, simply that we have refreshed a previous record, often one made more than a decade or two ago. The lack of data between the earliest records and our refinds is often a reflection of no surveys having been done on that taxonomic group, rather than the animal itself not having been present.

19. Thanks to our supporters

The Nature of our Village project has been generously supported by the Nineveh Trust, the Oakdale Trust and The D'Oyly Carte Charitable Trust, to whom we are sincerely grateful: thanks to them for making this work possible. Thanks to Aline Denton for her support and advice, and also to June Jones at the Co-operative for buying us identification guides. We thank George Ryley, Louise King and Naomi Davis in particular for running surveys for the project over 2018. The help of the County Recorders and other experts in our community is greatly appreciated, with thanks for their sheer hard work and dedication, especially Ina Smith, Tony Allenby, Em Foot, Lin Gander, Steve Chambers and Russell Jones. They have generously shared data and answered my many questions.

We thank the Wildlife Trust of South and West Wales and Ceredigion County Council, especially Rachel Mills who has provided vital equipment and Paul Evans. Thanks to David Kirby and Roger Bray for project supplies and advice and to Jenny Roberts and Meg Kirby for plants for the Bee Garden. We are grateful to the Greener Aberystwyth Group, the Ceredigion Moth Group and the Ceredigion Bat Group for help and expertise. Thanks go to the members of the Aberystwyth Botanical Society and of the Penparcau Community Forum for support and enthusiasm. Working in partnership with these organisations has also allowed us to assist with key habitat conservation and improvement works, for example the removal of Himalayan Balsam from Parc y Llyn.

We are grateful to Bumblebee Conservation and the Shark Trust, for training and advice, and to Phil Ward for identification and verification of invertebrate specimens. Dr. Ben Rowson, Senior Curator of Mollusca at the National Museum of Wales provided expertise in determination of Slugs and how to send them safely through the post! Thanks also to the staff and students of Aberystwyth University for their help publicising the sessions and for turning up and working hard! We thank Liam Olds from the Colliery Spoil Biodiversity Initiative for help with invertebrate identification and training. Darren Mann from the Oxford University Museum of Natural History provided a morning of guidance on Dung Beetle identification amongst that University's invertebrate collections and gave the project identification materials to share. I am grateful to Sally Whyman and Michael Wilson from Cardiff National Museum, thanks to Sally for a tour of the Welsh National Herbarium and the chance to examine the Plant Gall collection, and to Michael for access to their collection of UK Ladybird species and the loan of a microscope to examine them!

We thank The Royal Commission on the Ancient and Historical Monuments of Wales, Dr. Toby Driver and Jon Dollery, for help with mapping and a historical perspective on the features in the landscape. Arthur Chater provided a unique insight in to the natural history of Pen Dinas for which I am very grateful. His historic butterfly records have been invaluable for tracing the species distribution of Penparcau Lepidoptera and his peerless botanical knowledge has added greatly to our understandings of how the vegetation of the village is changing. Thanks to WWBIC staff, especially Colin Russell, Toni Henwood and Kate Smith, for answering endless questions and for providing the top quality data that have been the keystone of this research project.

We thank Roger Bray and Peter Major for their insightful comments on earlier reports, many of which I have used to strengthen this latest report. A very sincere thanks to all those who come out and survey with us, train us in identification, or share their own data, too many to mention by name but all very much appreciated.

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