MAVES

The Mid Arun Valley

2018 UPDATE

'Tangled Toads' by Ian Powell

Prepared by:
Jacqueline Thompson BSc (Hons) MSc MCIEEM
Consultant Ecologist and Botanist
Wildlife Splash
Green Oak Lodge
East Street
Mayfield
East Sussex TN20 6TZ

wildlifesplash@live.co.uk

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EXECUTIVE SUMMARY

- This report is to be read in conjunction with the 2017 MAVES report as it solely concentrates on the 2018 survey data.
- This report was commissioned by MAVES (Mid Arun Valley Environmental Survey). MAVES is a community based not-for-profit charity. Partner organisations include the Sussex Wildlife Trust and Arundel Agenda 21.
- Three areas of secondary woodland within the Binsted Woods Complex were found, by Frances Abraham, to each contain more than 20 ancient woodland indicator species, which amounted to more than comparable nearby areas of ancient woodland. It was concluded that secondary woodland, due to its proximity to ancient semi-natural woodland, has acquired features of ancient woodland relatively swiftly.
- Badgers appear to have undergone a population expansion in the last few years and now appears to have exploited each and every suitable area.
- Fourteen bat species have now been found in the Binsted Woods Complex including three Annex II species and the vary rare and little known Alcathoe. WSP are in agreement with the MAVES statement that the Binsted Woods Complex is of National Importance.
- Bat activity throughout the Binsted Woods Complex and extending into The Shaw, The Lag and Lake Copse and around the woodland edges has been found to be extremely high during all bat surveys.
- In a single night in August 2018, Caroline Powell found bat activity at Lake Copse to be extremely high recording 4,957 fly-pasts with a Kaleidoscope Pro bat auto-ID. Eleven bat species were recorded.
- A total of 93 species of birds have been recorded (by MAVES) within the Mid Arun Valley, of which 20 are Birds of Conservation Concern (BoCC) Red-listed species and 21 are Amber-listed species. A total of 17 of the birds recorded have Biodiversity Action Plans and 9 are also Schedule 1 species.
- The majority of bird records have been submitted by local residents in and around Binsted and so are from gardens. However farmland birds have a good representation with species such as Starling (Red List, BAP), Yellowhammer (Red List), Linnet (Red List), Lapwing (Red List, BAP), Whitethroat and Skylark (Red List, BAP).
- Dormouse records remain strong throughout the Binsted Woods Complex. Dormice have now also been found in Lake Copse and The Shaw and nests in The Lag and the Boomerang field. Potential dispersal corridors are being investigated.
- A national Dormouse record was broken in September 2018 when Ian Powell (with Kate Whitton and Chris Drake) found 16 Dormice in one box. This comprised 5 adults, 5 juveniles and 6 pinks. This beats the (nearly) 30-year-old record of 14.
- Reptiles are throughout the entire area with Common Lizard having the most frequent and highest number of sightings, which is likely due to its habit of basking on logs.

- Brown Hare and Hedgehog both continue to be recorded just occasionally which is likely due to their nocturnal habits.
- A number of possible Harvest Mouse nests have been reported in several hedgerows in the area. This species has a good breeding population in the Boomerang field and there are many other suitable habitats such as Binsted Rife, some of the field and ditch margins and the Wayleaves in the woodlands. It is possible that this species could be relatively widespread in the area.
- The numbers of Common Toad continue to surprise us. Paul Stevens has estimated a breeding population of 5000 in and around the Madonna Pond and a local population of 15,000. Many toads have been killed along Binsted Lane and so we are trying to raise awareness and have registered the Madonna Pond as a major breeding site with Froglife.
- Another relatively major breeding pond was discovered along the western side of Binsted Lane where residents described hundreds of toads making way to their (large) pond.
- A total of thirty butterfly species (amounting to half of the British total) have now been recorded in the area which include the Purple Emperor (IUCN Red List – Near Threatened), Dingy Skipper and White Admiral which are both Section 41 Species of Principal Importance under the NERC Act (2006) and the elusive Purple Hairstreak *Favonius quercus.*
- Seventeen species of dragonfly and damselfly (amounting to over one third of the British total) have now been recorded in the Mid Arun Valley, of which sixteen have been recorded in the last two years.
- With each year, additional species are added to the MAVES data and the extent of populations and their movement across the landscape is just beginning to unfold.
- Although much of the Mid Arun Valley is arable land and agriculturally 'improved' grazing marsh this is juxtaposed with rich habitats, many of which are Habitats of Principal Importance (priority habitats). Most notable (in context of size and resident biodiversity) is the Binsted Woods Complex (Local Wildlife Site). Arteries of hedgerows and wet ditches extend from the woodland linking priority habitats such as wetlands, orchards and ponds as well as seldom farmed sheltered fields of rough grassland.
- All these habitats have become scarce in a national context and many continue to decline in extent and quality. It is these habitats that support the high range of species found in the area, some of which can also exploit elements of the comparatively impoverished arable and pastoral landscape.
- The first comprehensive review of the status of British mammal populations for over 20 years was published in June 2018 and assessed the trends in population status of mammals since 1995.
- Five mammals in the Mid Arun Valley are within the 'threatened' category - an appreciable risk of extinction in the near future (generally within the next decade, or 3 generations — whichever is longer). These are the Dormouse, Hedgehog, Water Vole, Barbastelle Bat and Serotine Bat.
- The authors of the review conclude that. *'Almost nothing is known about the cumulative effects of such threats, with the loss of foraging habitat, decreased habitat connectivity, and increased light pollution being of particular concern. Most mitigation activities lack a robust evidence base, meaning that resource may be wasted on ineffective actions'.*

- A recent global review on invertebrate populations concludes that current declines could lead to the extinction of 40% of the world's insect species over the next few decades. Butterflies, moths, bees, wasps and dung beetles are amongst the most at risk along with freshwater dependent dragonflies and damselflies, stoneflies, caddisflies and mayflies.
- The diverse bird, reptile, amphibian and mammal life observed in the Mid Arun Valley is dependant upon the invertebrates at the base of the food chain – which in turn are dependant upon the habitat. Degrading these habitats with increased infrastructure and severing migration corridors (ranging from diurnal to annual) cannot be an option in this area.
- It has been demonstrated that the richness in biodiversity in the Mid Arun Valley area is not yet fully understood with more species being found year on year and the size and range of populations just beginning to be understood.
- It is clear that any new infrastructure in this part of the Arun Valley will have a negative impact on biodiversity and there is no reliable source of evidence to show that mitigation could be successful.
- Given the biodiversity value of the area within a background of decreasing biodiversity, some of the causes of which are impossible to untangle, it would be impossible to deliver a major road project through this area within the current legislative framework.

1 INTRODUCTION

BACKGROUND TO THE STUDY

1.1 MAVES has been surveying the Mid Arun Valley area for over three years and collating species and habitat information. This report is to be read in conjunction with the MAVES 2017 report as it simply presents the 2018 findings. It also discusses the area's relevance in light of the latest mammal and invertebrate studies that have been in the headlines.

1.2 This report was commissioned by MAVES (Mid Arun Valley Environmental Survey). MAVES is a community based not-for-profit charity. Partner organisations include the Sussex Wildlife Trust and Arundel Agenda 21.

1.3 MAVES policy allows information to be shared appropriately with other interested people, communities and organisations. The gathering of information is ongoing, and MAVES will consider requests for bespoke reports subject to time and financial resources being available and to any confidentiality restrictions that may exist for wildlife protection or landowner confidentiality reasons.

AIMS

1.4 The aims of this report are as follows:

- To present the latest 2018 Mid Arun Valley data.
- To give a short evaluation in light of recent mammal / invertebrate reports.

2 METHODS

DATA COLLECTION

2.1 In 2018 Daniel Whitby and Caroline Powell undertook bat surveys, Alison Barker carried out a dragonfly survey and Frances Abraham surveyed ancient woodland indicator species (AWIS) in areas of secondary woodland.

2.2 The remaining 2018 data has relied on a mixed team of individuals including local residents, Arundel residents and a number of professional ecologists who have carried out Dormouse surveys and helped with Toad patrols.

2.3 As such, most records have been collated on an 'ad hoc' basis over time and pulled together in this results summary. In addition to this, Excel files are provided with information on species found, locations and dates.

USE OF NOMENCLATURE

2.4 Plant nomenclature in this report follows Stace (2010) for native and naturalised species of vascular plant.

3 RESULTS

HABITATS

SECONDARY WOODLAND ANCIENT WOODLAND IDICATORS

3.1 The Binsted Woods Complex supports ancient woodland, regenerated secondary woodland, conifer plantation, species-rich pasture and ancient tracks.

3.2 In 2018, local botanist and co-author of the Sussex Flora, Frances Abraham, surveyed three areas within the Binsted Woods Complex that are not classified as ancient semi-natural woodland (ASNW) in order to assess whether ancient woodland indicator species (AWI's) were present and how they compared to adjacent areas of ancient woodland.

3.3 The three areas surveyed were:

- Scotland;
- Furzefield Copse (the majority); and
- Ash Piece (the majority).

3.4 Within these areas a small area of ancient woodland occurs in the southernmost part of Furzefield Copse and extends across the central part of Ash Piece.

3.5 These areas lacked the mature standard trees (which were restricted to areas adjacent to boundary banks) and the large ancient coppice stools found elsewhere. In some parts Ivy *Hedera helix* was found to cover much of the woodland floor – another common characteristic of secondary woodland.

3.6 However, ground flora in all these compartments was found to support numerous AWI's. These indicators have little significance when few occur in a wood and they must be used with caution, but where there are a considerable number they do show that the area is developing botanical interest.

3.7 Each of these compartments was found to contain over 20 (the entire woodland complex has 53). Early Purple-orchid *Orchis mascula*, Butcher's-broom *Ruscus aculeatus* and Wood Millet *Milium effusum* are all widespread in the parts south of Old Scotland Lane. Other species in these compartments include Guelder-rose *Viburnum opulus*, Soft Shield-fern *Polystichum setiferum*, Bluebell *Endymion non-scripta*, Sanicle *Sanicula europaea*, Tutsan *Hypericum androsaemum*, Wood Melick *Melica uniflora*, Wood Spurge *Euphorbia amygdaloides* and Wood Buttercup *Ranunculus auricomus*. Much of the southern part of Ash Piece resembles ancient woodland in its structure and flora.

3.8 True ancient woodland is precious, irreplaceable, cannot be replicated and should never be damaged. Nevertheless, secondary woodland can acquire botanical interest, especially where it adjoins ancient woodland and hedgerows: species, which would not readily cross an open habitat, may spread into it. Alternatively, if the removal of woodland cover was relatively short-lived and the soil structure has not been drastically altered (i.e. repeated ploughing) woodland

seeds may have remained in the seed bank. It is likely that a combination of these two scenarios has happened here.

3.9 This rich ground flora was compared to that along the boundary bank on the north side of Scotland – the ancient woodland on the north side was found to have a sparse ground flora with few species. However the adjacent secondary woodland on the south side supported a dense and diverse ground flora that includes interesting species such as Spurge-laurel *Daphne laureola* Butcher's-broom *Ruscus aculeatus*, Tutsan *Hypericum androsaemum*, Sanicle *Sanicula europaea* and many more.

3.10 This shows that the secondary woodland, due to its proximity to ancient semi-natural woodland and / or relatively short duration of canopy loss, has acquired features of ancient woodland relatively swiftly.

PROTECTED SPECIES

BADGER

3.5 Badger *Meles meles* activity continues to be extremely high with records of constant activity and excavations throughout the area.

3.6 Active setts have been confirmed in the Barns Copse, Hundred House Copse, Fowlers Copse Paines Wood, Furzefield Copse, Spinningwheel Copse, The Shaw, The Lag, virtually the entire length of Binsted Rife (on higher land) and to the south of the solar farm.

3.7 Two smaller setts, in gardens around Binsted, have been enlarged with signs of excavations and new entrances.

3.8 This species appears to have undergone a population expansion in the last few years and now appears to have exploited any suitable area. However, much of the Binsted Woods Complex has not yet been surveyed for Badger.

BATS

3.9 Bat trapping and tagging surveys have been carried out for three years by AEWC (Whitby 2016, 2017, 2018) within the Binsted Woods Complex. These surveys have confirmed presence of the following species:

- Barbastelle *Barbastella barbastellus*
- Serotine *Eptesicus serotinus*
- Alcathoe bat *Myotis alcathoe*
- Bechstein's bat *Myotis bechsteinii*
- Brandt's bat *Myotis brandtii*
- Daubenton's bat *Myotis daubentonii*
- Natterer's bat *Myotis nattereri*
- Whiskered bat *Myotis mystacinus*
- Noctule bat *Nyctalus noctula*
- Common Pipistrelle *Pipistrellus pipistrellus*

- Nathusius's Pipistrelle *Pipistrellus nathusii*
- Soprano Pipstrelle *Pipistrellus pygmaeus*
- Brown Long-eared bat *Plecotus auritus*

3.10 This list includes Bechstein's bat and Barbastelles, which are Annex II species and the rare Alcathoe bat.

3.11 Bat surveys undertaken in 2018 by Caroline Powell from the Hampshire Bat Group using Kaleidoscope Pro bat auto-ID type software recorded nine species of bat at the southern end of Binsted Village (SU990051) during a single night in August (17.08.18). Fly-pasts amounted to 593 including 19 from Barbastelles.

3.12 The same software recorded very high bat activity at Lake Copse, an arm of woodland with a stream leading to and from a large pond extending from the south of the Binsted Woods Complex. In a single night (18.08.18) 4,957 fly-pasts were encountered with the most frequent recordings from Daubentons and Soprano Pipistrelle. Seven additional confirmed species were recorded that night and two more that could not be identified to species level.

3.13 Daniel Whitby, over three nights in 2018, trapped eight species of bat in Lake Shaw, The Copse and The Lag, which, together with Caroline Powell's data brings the number recorded during four sessions in that area up to eleven which includes Bechsteins and Alcathoes.

3.14 In his 2018 survey Daniel Whitby concluded that:

> '*surveys of the site continue to clearly show that this is an important area for bats, with two Annex II species present and several other rare or threatened species, including the recently discovered Alcathoe bat, showing that this is clearly an area of high bat diversity. Bats can be used as indicators of biodiversity, accounting for over 1/3 of all native mammal species. The number of bat species found present in Binsted clearly demonstrates how important this area is with a rich bat fauna.'*

3.15 In their interim report (WSP 2019), from 2017 surveys, WSP added Greater Horseshoe Bat *Rhinolophus ferrumequinum* (another Annex II species) to the list, although they said it may be some distance from its roost site. This brings the total number of bats recorded in the woodland to fourteen species.

3.16 WSP recorded bat activity at crossing points along proposed routes 5a and 3 and found the highest number of passes at a point along the proposed route 3 within the Binsted Woods Complex. They analysed the height that species were crossing and found the highest number of bats crossing at a dangerous height (i.e. in the traffic collision zone) to be at a point along route 5a. However, such things as predator presence and thermal feeding patters may impact the height of flight in a given area.

3.17 Regarding general bat activity they found no seasonal, temporal or habitual patterns.

> *'It may be inferred that these animals are moving across the survey area to perhaps manipulate resources (such as roosting and foraging resources) when available or preferred, and that no one location is more important than any other to these animals.'*

3.18 Bats are often cited as biodiversity indicators as they are the top predators of common nocturnal insects and are therefore sensitive to changes in land use practices. They are subject to the same pressures as all other wildlife including agricultural intensification, development, and habitat fragmentation. As such, a high bat diversity and high levels of activity in and around the Binsted Woods Complex would suggest that the Mid Arun Valley Area is in remarkably good health.

BIRDS

3.19 A total of 93 species of birds have been recorded (by MAVES) within the Mid Arun Valley, of which 20 are Birds of Conservation Concern (BoCC) Red-listed species and 21 are Amber-listed species. A total of 17 of the birds recorded have Biodiversity Action Plans and 9 are also Schedule 1 species.

3.20 The majority of bird records have been submitted by local residents in and around Binsted and so are from gardens, lanes or areas where they can be heard or seen in adjacent fields. As such, the records are skewed more towards garden and farmland birds rather than wetland and woodland species.

3.21 Never-the-less, the farmland birds (taken from the British Trust for Ornithology Farmland Bird Indicator List) have a good representation with species such as Starling *Sturnus vulgaris* (Red List, BAP), Yellowhammer *Emberiza citrinella* (Red List), Linnet *Carduelis cannabina* (Red List), Lapwing *Vanellus vanellus* (Red List, BAP), Whitethroat *Sylvia communis*, Skylark *Alauda arvensis* (Red List, BAP), Kestrel *Falco tinnunculus* (Amber List), Greenfinch *Chloris chloris*, Goldfinch *Carduelis carduelis*, and Wood Pigeon *Columba palumbus*.

3.22 Some farmland species have been seen only very rarely, such as Tree Sparrow *Passer montanus* (Red, BAP), Turtle Dove *Streptopelia turtur* (Red, BAP), and Stock Dove *Columba oenas* (Amber), which could be for a number of reasons such as lower populations sizes, elusiveness and variation in identification skills.

3.23 Remarkably, Reed Bunting *Emberiza schoeniclus* (Amber, BAP) appears to have become accustomed to garden feeders in the area, for this species was recorded on several occasions in the spring (2018) on the feeders in the Old Rectory garden.

3.24 Many Birds of Conservation Concern continue to be recorded year on year such as Song Thrush *Turdus philomelos* (Red List), Cuckoo *Cuculus canorus* (Red List), Meadow Pipit *Anthus pratensis* (Amber List), Marsh Tit *Poecile palustris* (Red, BAP).

3.25 Mute Swans were seen in far lower numbers (just 20 – 30 individuals) in the two arable fields to the west of the Arun and just south of Arundel. In March 2018 a field just to the north of this, adjacent to the Arun at OS Grid Reference TQ009061, was being used by 100's of Herring Gulls *Larus argentatus* intermixed with Black-headed Gulls *Chroicocephalus ridibundus* (Photograph 1).

Photograph 1: *Fields of gulls*

DORMOUSE

3.26 Paines Wood, Ash Piece and recently Noor Wood (Tortington Common), are part of the National Dormice Monitoring Programme (NDMP). Good (though fluctuating) populations of Dormice *Muscardinus avellanarius* have been recorded consistently at Paines Wood and Ash Piece for fifteen years.

3.27 Dormice are now routinely recorded at Noor Wood, within which nest boxes were erected when it was added to the programme in 2015. A Dormouse with young was recorded in 2018 in Jupps Wood, to the north east of Noor Wood.

3.28 In 2016 Lake Copse and The Shaw were added to the National Dormouse Monitoring Programme. At first just Dormice nests were found, but in 2018 Dormice were found in both arms of woodland.

3.29 In 2017 Manor House and Meadow Lodge were added to the National Dormouse Monitoring Programme. Dormouse nests have been recorded at Meadow Lodge, the field to the south of Meadow Lodge (Boomerang Field) and The Lag to the north.

3.30 Additional Dormouse nests have also been found in Hundred House Copse and in the hedgerow along Muddy Lane. The approximate locations of Dormice / Dormice nests are shown in Figure 1.

3.31 We believe that this is indicative of a strong Dormouse population in the woodland complex and that this species may disperse through linear features, such as hedgerows, in order to find other pockets of suitable habitat that may support small populations of breeding Dormice.

3.32 We have set up another National Dormouse Monitoring Site through suitable hedgerows leading from the Binsted Woods Complex, out towards the west and south to Binsted Rife, in order to ascertain the occurrence and magnitude of movement / activity in that direction.

3.33 We have previously stressed the importance of dispersal in the life cycle and believe it likely that there are smaller populations in the area that are shored up by the Binsted Woods Complex population.

3.34 A national Dormouse record was broken on the 10th September 2018 when Ian Powell (with Kate Whitton and Chris Drake) found 16 Dormice in one box. This comprised 5 adults, 5 juveniles and 6 pinks. The People's Trust for Endangered Species said that it is a National Dormouse Monitoring Programme record. The previous record was for 14 Dormice in one box nearly 30 years ago.

Figure 1: *Known Dormouse locations 2018*

GREAT CRESTED NEWT

3.35 Smooth Newt *Lissotriton vulgaris* and Palmate Newt *Lissotriton helveticus* have both been recorded in relatively high numbers in Sandy Hole Pond, the Madonna Pond, along Binsted Lane to the north and south of the Madonna Pond, and in shallow ephemeral pools along the lane and at the edges of the fields.

3.36 Great Crested Newt *Triturus cristatus* has not been found in the ponds that have been explored around Binsted Village, though no targeted surveys have been undertaken. It is thought that if this species were present in the area it would have been seen by now.

3.37 However, there is much suitable habitat in the area such as Binsted Rife, Tortington Rife and ponds around Tortington.

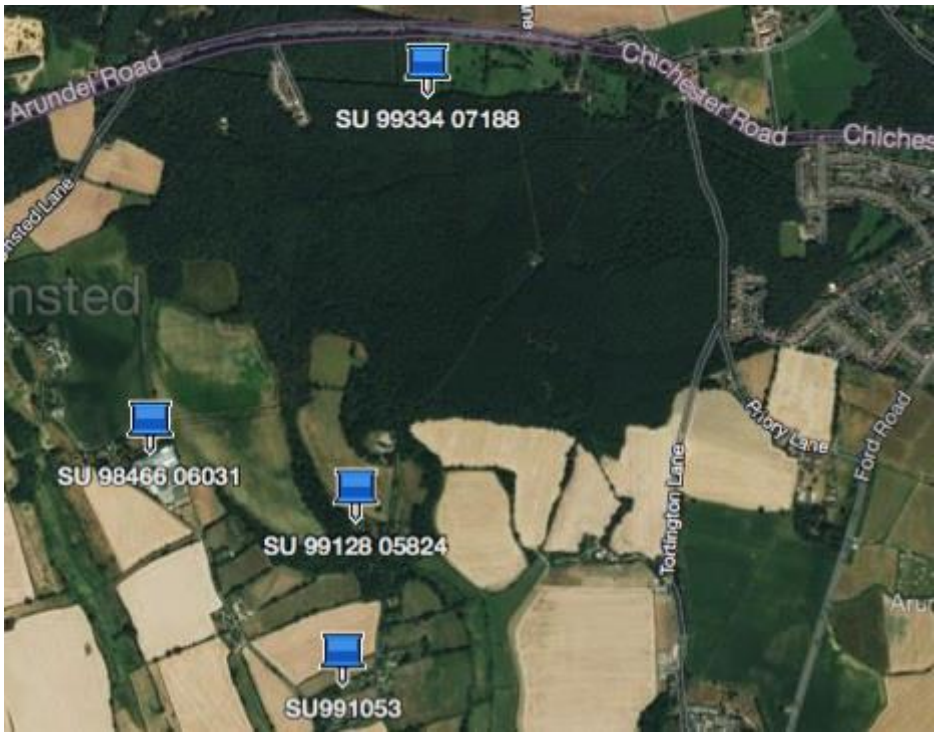
REPTILES

3.38 All four species of 'common' reptiles have been recorded in the Mid Arun Valley. These species have all declined dramatically and are therefore given protection wherever they occur.

3.39 There have been no targeted surveys for reptiles and the following are 'ad hoc' sightings from ecologists and residents.

3.40 Adder *Vipera berus* is seldom seen and this species has only been recorded four times by MAVES. The locations are shown below in Figure 2 below.

Figure 2: *Adder locations*



3.41 Common Lizard *Zootoca vivipara* is widespread in the area with many sightings in the last two years (Figure 3). It is mostly seen basking along field edges, in rough grassland and in gardens where it is usually either on logs, fallen trees or bare areas of ground.

3.42 It has also been recorded basking in Noor Wood in a relatively open area of woodland. It is likely to be in other locations within the Binsted Woods Complex given the wayleaves and rides.

Figure 3: *Common Lizard locations*

3.43 Slow Worm *Anguis fragilis* has not been found as extensively as Common Lizard, which may be as a result of slightly different basking habits. However, when it has been recorded it is in the same kind of areas as shown in Figure 4.

Figure 4: *Slow Worm locations*

3.44 Grass Snake *Natrix natrix* move several kilometres across a given landscape from hibernation sites to breeding and foraging grounds and have been recorded across the entire landscape. The locations of the records are in Figure 5 below.

Figure 5: *Grass Snake locations*

UKBAP PRIORITY SPECIES / SPI – BROWN HARE

3.45 The European Brown Hare *Lepus europaeus* was recorded near Lake Copse in 2016 and has also been recorded in Ford.

3.46 In 2017 there have been three recordings in and around Binsted, one of which was a dead Hare killed by a car on Binsted Lane.

3.47 At the beginning of 2019, two Brown Hare's were seen in a field adjacent to Marsh Farm. The wide and open arable and pastoral landscape that is interspersed by fields with rough grassland provides ideal habitat for this species.

UKBAP PRIORITY SPECIES / SPI – COMMON TOAD

3.48 Common Toad *Bufo bufo* is widespread throughout the area with sightings throughout the Mid Arun Valley. Ponds and ditches are throughout the Binsted and Tortington areas and it is possible that those suitable may support breeding populations of Common Toad.

3.49 In 2017 we estimated one thousand plus Common Toads to be breeding in the Madonna Pond. In 2018 hundreds of Common Toads were recorded wihtin the Madonna Pond and hundreds observed making their way through the woodland to the Madonna Pond with numbers peaking mid-March.

3.50 Paul Stevens, of the Arundel Wetland Centre, has estimated a local breeding population of approximately 5000 Common Toad, with a far larger local population giving a 'conservative' estimate of 15,000.

3.51 High numbers of toads have been found on Binsted Lane all around the Madonna pond and for a good distance to the north and to the south during the breeding season.

3.52 Relatively high numbers have also been found along another stretch of Binsted Lane to the west where local residents with a pond described seeing hundreds of toads heading into the pond one night (spring 2018). This is likely to be another major breeding site in the area.

3.53 Common Toads have also been recorded in high numbers in Tortington Rife. Low numbers have been observed at two garden ponds near Tortington Rife. Toads have also been seen at a pond at a field edge in Tortington. There are several ponds in the Tortington area, which have not yet been investigated during the breeding season.

3.54 Low numbers have been seen on Binsted Lane near Sandy Hole Pond just to the south of the A27. Figure 6 showns the locations of known breeding sites.

3.55 Common Toads are also routinely sighted throughout the year by woodland owners within the Binsted Woods Complex and along Tortington Lane and Hedgers Hill.

Figure 6: *Approximate locations of known Common Toad breeding sites*

Dark blue areas – water bodies with high numbers of breeding toads seen
Pale blue areas – water bodies with low numbers of toads seen
Green area – pond with high numbers of breeding toads reported – needs further investigation
Yellow dashed areas – high numbers of toads on the lane

UKBAP PRIORITY SPECIES / SPI EUROPEAN EEL

3.56 The European Eel *Anguilla anguilla* has been previously recorded in Lake Copse at Binsted and the Black Ditch at Lyminster.

3.57 In July 2018, a predated and deceased specimen was found in Binsted Rife showing that they are still in the area using the ditch network.

UKBAP PRIORITY SPECIES / SPI – EUROPEAN HEDGEHOG

3.58 European Hedgehog *Erinaceus europaeus* has consistently been recorded over the past few years with an additional five records in 2018.

3.59 Records are from throughout the survey area (though Tortington has not been investigated). In 2018 an adult female and a young male were seen, on different occasions, in a garden in Binsted Village, near Binsted Rife.

3.60 Extensive field signs have been seen for approximately 300 m along Muddy Lane and faeces in Noor Wood, which is in Tortington Common.

UKBAP PRIORITY SPECIES / SPI – HARVEST MOUSE

3.61 A survey in one of the suitable locations for Harvest Mouse *Micromys minutus*, a field to the west of Tortington Rife, was undertaken in October 2016 by Sam Buckland, Lucy Groves and Ian Powell. A total of eleven nests were found throughout the field.

3.62 Since that time likely (unconfirmed) nests have been found in various 'edge' habitats around Binsted village, with the latest record in November 2018.

3.63 It is possible that this species is throughout the area with hubs of populations in less disturbed locations such as that found in the Boomerang field in 2016. Other possible locations include some of swamp, fen and rough vegetation around Binsted Rife and the open wayleaves throughout the Binsted Woods Complex.

WATER VOLE

3.64 No surveys have been undertaken since the 2015 spot checks where signs of Water Vole were found along Binsted Rife, the reservoirs to the north of the railway line and possible footprints at Lake Copse.

INVERTEBRATES - BUTTERFLIES

3.65 A total of thirty butterfly species have now been recorded in the area which include the Purple Emperor *Apatura iris* (IUCN Red List – Near Threatened), Dingy Skipper *Erynnis tages* and White Admiral *Limenitis camilla* which are both Section 41 Species of Principal Importance under the NERC Act (2006) and the elusive Purple Hairstreak *Favonius quercus.*

3.66 Thirty species amounts to approximately half of the UK butterfly total (including resident and frequent migrant species).

INVERTEBRATES - GENERAL

3.67 With the exception of the Odonata (dragonflies and damselflies) further targeted invertebrate surveys have not been undertaken since 2017. Previous surveys found a high diversity of invertebrates due to the wide range of habitats in the survey area. These habitats include dead wood, a large amount of 'edge' habitat adjacent to the ancient woodland and hedgerows and a range of microclimates created in these sheltered edges as well as woodland glades and wayleaves and the Binsted Rife Valley.

3.68 Probably the most notable group of invertebrates are those associated with dead wood habitat, which includes some of our rarest species. Dead wood, particularly standing dead wood, is an abundant resource in the area and sadly uncommon in many woodlands in the UK.

INVERTEBRATES - ODONATA

3.69 Seventeen species of dragonfly and damselfly have now been recorded in the Mid Arun Valley, of which sixteen have been recorded in the last two years. This is over one third of the total resident species in the UK.

3.70 Records are mostly from Binsted and Tortington rather than the floodplain ditches due to access limitations.

INVERTEBRATES – AD HOC SIGHTINGS

3.71 Ad hoc sightings of invertebrates continue, though these are mostly limited to the larger and easily identifiable species.

3.72 Of note, is the continuing presence of the Glow-worm *Lampyris noctiluca* along Old Scotland Lane and the southern end of The Shaw.

3.73 The relative seclusion of the woodland with numerous trees with hollows has allowed a good Hornet *Vespa crabro* population to develop with fairly frequent sightings. Bumblebees are also seen relatively frequently, though often these are not recorded as several types cannot be identified to species without capture and close examination.

4 EVALUATION

THE IMPORTANCE OF HABITATS ON SPECIES

4.1 With each year, additional species are added to the MAVES data; the sizes of populations known to be present is becoming better understood and the way species are utilizing the landscape is just beginning to unfold.

4.2 It would be impossible, in an area such as this, to uncover the full extent of the biodiversity present in just a few years.

4.3 Much of the Mid Arun Valley is arable land and agriculturally 'improved' grazing marsh, which, if uninterrupted would not be of particular note and likely support the impoverished level of biodiversity seen over much of the British landscape.

4.4 However, these habitats are juxtaposed with rich habitats most of which are Habitats of Principal Importance (HPI). Most notable (in context of size and resident biodiversity) is the Binsted Woods Complex (Local Wildlife Site). Other rich habitats either form corridors from the woodland and / or a network throughout the area, linking it all together.

4.5 All these habitats have become scarce in a national context and many continue to decline in extent and quality. It is these habitats that support the high range of species found in the area, some of which can also exploit elements of the comparatively impoverished arable and pastoral landscape. Their importance in terms of the landscape and biodiversity context is detailed in Table 1 below.

Table 1: *HPI's (priority habitats) and their importance*

Habitat	Description
Arable field margins	Corridors and cover for mammals, reptiles and amphibians. Some support nectar-rich flowering plants for invertebrates –particularly important for bees and butterflies.
Chalk stream	Fed from groundwater aquifers beneath the South Downs and therefore unpolluted. Lead to Binsted Rife through wet woodland in Little Danes Wood and Hundred House Copse. Uncommon plants have been found in and around Binsted Rife as well as high numbers of Odonata and the European Eel.
Coastal and floodplain grazing marsh	Grazing marsh is periodically inundated pasture and much, adjacent to the Arun, is improved grassland. However, Mute Swans roost here (sometimes in hundreds), as do Herring Gulls and Black Headed Gulls. The ditches are important in this habitat, providing veins of biodiversity through the fields and likely to support Water Vole (as evidence of this species has been found in the area), and a range of invertebrates.
Lowland fen and swamp	There are remnant pockets of lowland fen mixed with swamp habitats along Binsted Rife. This is a very narrow valley that is far removed from the adjacent arable landscape, though there are pockets of wetland vegetation throughout the Mid Arun Valley that could potentially provide 'stepping stones' of habitat linked together by the corridors along the ditch network.

Habitat	Description
Hedgerows As	Hedgerows radiate out through the Binsted Woods Complex and form a loose network across the landscape in a variety of forms from low and dense, laid and tall and overgrown. The hedgerow and the adjacent habitat (be it banks or ditches) are used by species from all groups although of particular significance are evidence of Dormouse and Harvest Mouse nests demonstrating dispersal and the importance of habitat linkages in the area.
Lowland mixed deciduous woodland a primeval	The Binsted Wood's Complex is extremely diverse with pockets of wet woodland, plantation, open areas in the form of wayleaves, glades and rides with veteran and notable trees throughout. It supports an extremely high diversity of ground flora with an incredible 54 Ancient Woodland Indicator species. It has now been shown to support fourteen species of bat, a robust and widespread population of Hazel Dormouse, a large population of Common Toad, four reptile species, uncommon butterflies, and a good range of invertebrates and fungi (though these have barely been surveyed). It is likely to support Harvest Mouse (in glades / wayleaves), a reasonably good Hedgehog population and a high diversity of woodland bird species. It is likely to support core populations of species that are found throughout the area.
Wet woodland under,	Three areas of wet woodland have been identified to date at Little Danes Wood and Hundred House Copse, The Lag and Paines Wood. These three areas differ markedly in species structure, again adding to the area's overall biodiversity.
Lowland heathland the	The historic area of heathland mapped by the Sussex Biodiversity Records Centre has not yet been verified by MAVES.
Lowland Meadow habitats	The area of lowland meadow at Steward's Copse provides a refuge for invertebrates in the area. Areas with a high diversity of flowering plants are limited in space and time, and this field forms part of a 'stepping stone' network with other areas supporting a diversity of plants / nectar supply such as the Binsted Woods Complex, Binsted Rife valley, some areas of semi-improved grassland and some arable field margins.
Ponds that	The Mid Arun Valley is littered with ponds both permanent and ephemeral some shaded and others in the open. These provide another 'stepping stone' network throughout the area for amphibians, invertebrates and plants. We are just beginning to discover the extent of toad breeding sites in the western part of the area. Moreover, toad spawn and particularly frog spawn has been seen in ephemeral ponds throughout the Binsted Woods Complex. Collectively, within the landscape, they are an important habitat.
Reedbed that	Reedbeds are amongst the most important habitats for birds in the UK. The Mid Arun Valley supports ribbons of reedbed together with two slightly larger areas of reedbed around reservoirs to the north of the railway line SU 98788 04497 and along the Arun TQ 01157 05562. Birds such as Reed Bunting *Emberzia schoeniclus* (Amber List) and Reed Warbler *Acrocephalus scirpaceus* have been recorded in these areas and are likely to occur throughout, along with less common species.
Saltmarsh remain	Fragments of this habitat are along the Arun with a totally different range of plant species and associated invertebrates.
Traditional orchard	There are two main traditional orchards at OS grid references SU 98745 05792, TQ 00165 05195 and a remnant orchard at SU 99268 05530. These serve to extend the old wood habitat and provide a plentiful nectar source in the spring.
Wood pasture and parkland / veteran trees	Although Binsted Park would come under Wood Pasture / Parkland it is a remnant habitat with just three veteran trees of which most is now arable land. The veteran trees, however, are an important feature of the landscape and are throughout the area providing potential bat roosts, nesting sites for birds and dead wood habitat for invertebrates.

BRITISH MAMMALS - STATUS

4.1 The first comprehensive review of the status of British mammal populations for over 20 years was published in June 2018 (Mathews et al. 2018). This was to assess the trends in population status of mammals since 1995.

4.2 The categories CR, EN and VU indicate an appreciable risk of extinction in the near future (generally within the next decade, or 3 generations — whichever is longer), and are collectively described as 'Threatened'.

4.3 CR indicates the highest level of extinction risk in the wild, and EN and VU indicate progressively lower levels of risk. Five mammals that occur within the Mid Arun Valley are within this 'Threatened' category (Table 2). This table also shows mammals within the area that are threatened by a general decline in habitat quality.

Table 2: *Locally found mammals with declines in population, range and / or habitat quality*

Species	Population status	Range status	Habitat status	Est. 20 yr decrease	IUCN Red List
Dormouse	Decline	Stable	Decline	52% (1995-2015)	VU
Hedgehog	Decline	Stable	Decline	66% (since 1995)	VU
Brown Hare	Stable	Stable	Decline	N/A	LC
Water Vole	Decline	Stable	Stable	50% (since 1998)	EN
Harvest Mouse	Decline	Stable	Decline	Data deficient	LC
Bechsteins Bat	Unknown	Stable	Decline	Data deficient	LC
Barbastelle Bat	Unknown	Unknown	Decline	Data deficient	VU
Serotine Bat	Unknown	Increase	Decline	Data deficient	VU

4.4 The estimated declines in population cited in the report are on top of major previous population declines in the twentieth century due to widespread agricultural intensification.

4.5 The most worrying finding is that although the range for these species stays stable, there has been a decline in the status of the habitat in all cases, bar that of the Water Vole, This is due to targeted effort, since the year 2000 and driven by the EU Water Framework Directive, to improve both water quality and riparian habitat.

4.74 The Dormouse gives an example of some of the typical problems, where drivers in population decline are cited as being fragmentation and reduction in woodland species' diversity with climate change potentially causing a change in food availability through alteration of fruiting cycles, invertebrate egg-laying and disease.

4.6 When species have a stable range but face gradual declines in habitat quality over time (Table 2), the only conclusion to draw is that with the increasing erosion of habitat quality and extent, populations will begin to disppear.

4.7 The authors of the review conclude that

'*The scale and nature of the impact associated with many potential future threats (e.g., major infrastructure developments; new housing allocations; increased traffic volume; and changes to farming practice in the face of climate change and altered subsidy scenarios) are extremely poorly characterised, and many of the approaches currently used to monitor them*

are not suitable for answering these questions. Almost nothing is known about the cumulative effects of such threats, with the loss of foraging habitat, decreased habitat connectivity, and increased light pollution being of particular concern. Most mitigation activities lack a robust evidence base, meaning that resource may be wasted on ineffective actions'.

BRITISH INVERTEBRATES - STATUS

4.8 A recent global (though mostly Europe and the USA) review of published invertebrate studies (Sánchez-Bayo and Wyckhuys 2019), predict the loss of 40% of invertebrates in the next couple of decades.

4.9 Butterflies, moths, bees, wasps, and dung beetles are amongst the most at risk along with freshwater dependent dragonflies and damselflies, stoneflies, caddisflies and mayflies. The research shows that a small number of generalist and pollutant-tolerant species are replacing the rich diversity of specialist species and highlights four commonly reported drivers behind the declines: habitat loss due to urbanisation and agricultural intensification; pollution including fertilizers and pesticides; biological factors such as non-native species and pathogens; and climate change.

4.10 As a response to this review, the chief executive of Buglife, Matt Shardlow stated:

'*Insects make up over half the species on Earth, the planet's health depends on them, so it is very worrying that insect life is disappearing much faster than the more obvious birds and mammals – the local extinction rate for insects is eight times higher! There is not a single cause, but the evidence is clear, to halt this crisis we must urgently reverse habitat fragmentation, prevent and mitigate climate change, clean-up polluted waters and replace pesticide dependency with more sustainable, ecologically-sensitive farming*.'

4.11 The diverse bird, reptile, amphibian and mammal life observed in the Mid Arun Valley is dependant upon the invertebrates at the base of the food chain – which in turn are dependant upon the habitat. Degrading these habitats with increased infrastructure and severing corridors cannot be an option in this area.

5 CONCLUSIONS

5.1 It has been demonstrated that the richness in biodiversity in the Mid Arun Valley area is not yet fully understood with more species being found year on year and populations just beginning to be understood and their extent realised (as in the case of Common Toad and Hazel Dormouse).

5.2 It is clear that any new infrastructure in this part of the Arun Valley will have a negative impact on biodiversity and there is no reliable source of evidence to show that mitigation could be successful.

5.3 Given the biodiversity value of the area within a background of decreasing biodiversity, some of the causes of which are impossible to untangle, it would be impossible to deliver a major road project through this area within the current legislative framework.

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Document Information

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