Tunbridge Wells & Rusthall Commons

Literature & Data Review

Final Report

Dolphin Ecological Surveys 2023

Coralroot

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1.0 Background

1.1 Purpose of the Review

In 2022 the Freehold Tenants of Tunbridge Wells Commons commissioned Kate Ryland of Dolphin Ecological Surveys to prepare five-year management plans for Rusthall and Tunbridge Wells Commons ("the Commons") due to be completed in late 2023.

The Commons are valued by people for a variety of reasons. Their statutory and non-statutory designations (see 1.3) reflect their important for their ecological and geological importance and as accessible open space. Managing the Commons is a complex task that has to take into account different, and sometimes conflicting, demands.

Robust ecological data is needed to direct management that aims to conserve and enhance biodiversity. The purpose of this report is to summarise existing biological information, identify apparent gaps in data and recommend surveys and other activity to address those data gaps. Some recommended actions are considered to be high priority because their results would be particularly helpful to inform the new management plans.

The focus of the review is on biodiversity rather than on other aspects of the Commons that will be addressed further in the management plans such as access and community engagement.

1.2 Data Sources

Information for this review was provided by Gemma Stapeley (Clerk to the Conservators), the Freehold Tenants, Daniel Colborne (current Commons ranger), Stephen Budden (former Commons ranger), Dr Ian Beavis (Tunbridge Wells Museum and Art Gallery), the Kent and Medway Biological Records Centre (KMBRC) and Kent Wildlife Trust (KWT). The data they provided and their generous assistance is gratefully acknowledged.

A full list of the documents reviewed can be found in the Appendix. The KMBRC data report is held by the Clerk to the Conservators and contains maps of designated areas and full details of the status of all species.

The first modern site management plan for the Commons was prepared in 1991, prompted by extensive tree loss in the great storm of 1987. Two subsequent management plans for the Commons were prepared in 2005 and 2017.

The 1991 plan included quite comprehensive records of fauna and flora on the Commons. This data was supplemented by a habitat survey in 2003 and series of targeted surveys in 2016. There has been subsequent biannual pond monitoring from 2016/17 to the present.

The Tunbridge Wells Museum and Art Gallery's 2001 publication "Tunbridge Wells and Rusthall Commons – A History and Natural History" is a rich source of information about the Commons. Traditional management of the Commons by livestock grazing ceased in the mid-20th century. For the next four decades they were left largely unmanaged, apart from maintenance of road verges, amenity areas and occasional woodland clearance.

All three previous Commons management plans acknowledge that the optimum management of heathland and acid grassland habitats on the Commons would be through livestock grazing. A feasibility study into

grazing the Commons was carried out by KWT in 2005. Despite the undoubted ecological benefits of using livestock to manage these habitats, the practical constraints currently outweigh those benefits and the Conservators do not wish to pursue this option further at present.

Biological surveys, monitoring and management work on the Commons have been carried out by a combination of the site rangers, the Freehold Tenants, volunteers including the Friends of the Commons, nature conservation bodies, individual naturalists and consultants.

1.3 Site Designations

The Commons are subject to several statutory and non-statutory designations. These are:

- Site of Special Scientific Interest (SSSI) Rusthall Common (a geological site designated in 1992 for sandstone weathering features, covering Toad Rock and Bulls Hollow).
- Local Wildlife Site TW24 Rusthall Common and Tunbridge Wells Common (designated in 1986, most recent revision 2011). The LWS excludes the Cricket Ground and Lower Cricket Ground on Tunbridge Wells Common but includes the SSSI and Rusthall Churchyard (which is outside the Commons boundary).
- Registered Village Greens (VG22 and VG23).

2.0 Summary of Key Species & Assemblages

The flora and fauna recorded on the Commons over many years include legally protected, rare and scarce species. Many such records are contained in the KMBRC data report (dated 14th December 2022) along with full details of their status. However, that source is not comprehensive since not all records are submitted to KMBRC and very recent records may not yet have been processed by KMBRC.

A large number of records supplied by KMBRC date back more than 40 years, in particular plant records from the period 1971-80. Some of these species may still be extant on the Commons but many are likely to have been lost as open grassland and heathland habitats have given way to woodland and scrub.

The following sections contain summaries of key species and species assemblages that have been recorded on the Commons with an emphasis on those found in recent years. Recommendations to fill gaps in data are made in each section (**in bold**). Section 4.0 contains a table with all recommendations and their priority ranking.

2.1 Protected Species

Full details of the different levels of legal protection afforded some species of wildlife are summarised in the KMBRC report and are not reproduced here. In summary the Wildlife & Countryside Act 1981 (WCA) is one of the most important pieces of UK wildlife legislation. The Conservation of Habitats and Species Regulations 2010 transposes the Habitats Directive into UK law to provide for protection of European protected species (EPS).

The following protected fauna have been recorded on the Commons at various times. The confirmed or possible presence of legally protected species is an important consideration when planning and undertaking site management.

- Great Crested Newt *Triturus cristatus* (Rusthall 2018). Fully protected under the WCA and is a EPS.
- Bat species are all fully protected under the WCA and are EPS.
- Hazel Dormouse *Muscardinus avellanarius*. Fully protected under the WCA and is a EPS.
- Slow-worm *Anguis fragilis*, Common Lizard *Zootoca vivipara*, Grass Snake *Natrix helvetica*, Adder *Vipera berus*. Partially protected under the WCA
- Hedgehog *Erinaceus europaeus*. Protected under the WCA
- Badger *Meles meles*. Protection of Badgers Act 1992 (including setts)

2.2 Higher Plants

2.2.1 Habitat Indicators

Some plants are strongly associated with particular habitats of conservation importance ("indicator species"). Many indicator species themselves are rare/scarce either locally or nationally. Their presence in a particular area can help to target where habitat restoration will be most effective. They may also be important when monitoring management outcomes.

Table 1 shows records of some indicator species that are associated with the key habitats of conservation importance on the Commons (acid grassland, open sandy areas and relict heathland). There is obviously overlap and gradation between these habitats, which share some indicator species. Most of the recent records are taken from the Kent Rare/Scarce Species Inventory (KRSSI) and from the LWS citation with the date of the most recent record shown where possible.

Other habitats present on the Commons (ponds, neutral grassland, secondary woodland and scrub) are also important for wildlife and support characteristic plant assemblages but these generally comprise widespread species with less exacting requirements than habitat indicator species.

Areas of mature woodland on damp soils in the southern parts of the Commons appear to support a suite of plant species that are generally slow to colonise new sites. They may derive from relicts of ancient hedgerows or boundary features. These plants may be considered indicators of areas of botanically diverse woodland on the Commons. There is some uncertainty over the origin of two such species that were long-established on the Commons; Solomon's-seal and Lily-of-the-valley. Both are scarce native species in Kent, but are also widely grown in gardens so could be naturalised on the site.

Targeted botanical surveys for the more scarce indicator species would be helpful to establish their current status on the Commons.

Table 1. Habitat Indicator Species

HABITAT	INDICATOR SPECIES
Acid grassland & open, sandy areas	Harebell *Campanula rotundifolia* (2003), Mat-grass *Nardus stricta* (2000), Bird's-foot *Ornithopus perpusillus*, Sheep's Sorrel *Rumex acetosella*, Common Stork's-bill *Erodium cicutarium*, Buck's-horn Plantain *Plantago coronopus*, Heath-grass *Danthonia decumbens*, Fiddle Dock *Rumex pulcher*, Early Hair-grass *Aira praecox.* Upright Chickweed *Moenchia erecta* (LWS citation only, no other records found)
Relict heathy vegetation	Ling *Calluna vulgaris* (2017), Bell Heather *Erica cinerea* (2000), Cross-leaved Heath *Erica tetralix* (1980 formerly small amounts on Terrace Walk), Bilberry *Vaccinium myrtillus*, Heath-grass, Western Gorse *Ulex gallii* (2000), Mat-grass (2000), Sheep's Sorrel, Purple Moor-grass *Molinia caerulea*, Creeping Willow *Salix repens* (2001)
Mature woodland	Bluebell *Hyacinthoides non-scripta*, Early Purple-orchid *Orchis mascula*, Ramsons *Allium ursinum*, Wood Sorrel *Oxalis acetosella*, Wood Melick *Melica uniflora*, Pignut *Conopodium majus*, Orpine *Hylotelephium telephium*, Solomon's Seal *Polygonatum multiflorum*, Lily-of-the-valley *Convallaria majalis*

2.2.2 Rare/Scarce Plants

There are two particularly well-known rarities that occur on the Commons:

- Coralroot *Cardamine bulbifera*. This nationally scarce perennial is a speciality of damp woodland and hedgerows of the Weald. It has been recorded on both Commons from 1938 to 2022. Its populations on the Commons are believed to be declining in recent years and the main stands are subject to detailed annual monitoring by volunteers.
- Royal Fern *Osmundia regalis.* A spectacular fern, more common in the west of Britain and rare in Kent (RDB3 status i.e. recorded in fewer than 10 tetrads). This plant has been known from the Toad Rock area of Rusthall Common for many years.

2.3 Lower Plants

Records of lichens and bryophytes (liverworts and mosses) from both Commons are surprisingly patchy for a site where the sandstone outcrops could be expected to support a variety of these lower plants.

Most lower plant records derive from the 1990 survey whilst the LWS citation (written in 1986) notes that the sand rocks are generally too well used for climbing and amenity to support important assemblages of lower plants.

Nevertheless, several liverworts and mosses that are listed on the Kent Rare/Scarce Species Inventory have been recorded from the Commons:

- "Hungershall Rocks" (= Wellington Rocks) on Tunbridge Wells Common have supported Forcipated Pincerwort *Cephalozia connivens*, Earth-cup Flapwort *Nardia geoscyphus,* Western Earwort *Scapania gracilis* and Brown's Four-tooth Moss *Tetrodontium brownianum.*
- The Happy Valley area of Rusthall Common has supported Inflated Notchwort *Gymnocolea inflata* and Lesser Notchwort *Lophozia bicrenata* (2016), Reddish Notchwort *Lophozia longiflora* and Bristly Fringe-moss *Racomitrium heterostichum* (1973).

The 1990 survey recorded 67 species of lichen on the Commons. Of these *Lecanora gangaleoides* on the sandrocks at Rusthall was considered the most important although it is a relatively common species (RDB status Least Concern). Five *Cladonia* species were recorded on the sand rocks and in acid grassland areas.

A systematic, updated survey of lower plants associated with the sandstone outcrops should be considered high priority. Current records are patchy and the presence of any rare species that may be sensitive to changes in light, shade, humidity or temperature would influence management decisions, especially concerning tree and shrub clearance around rock outcrops.

2.4 Fungi

The 1991 management plan contains 123 collated records of fungi found on the Commons. At that time the most important fungi records were considered to be:

- Split-gill mushroom *Schizophyllum commune* (a species found on deadwood previously considered near extinct but records apparently increased after the 1987 storm when deadwood became much more abundant).
- Cedarwood Waxcap *Cuphophyllus (Hygrocybe) russocoriaceus* (at that time the only other Kent record of this grassland species was at Bedgebury).

Waxcap fungi are strongly associated with mycologically-rich grasslands. These are ecologically important, rare and declining grassland habitats that are associated with uncultivated, nutrient-poor soils that have short swards in the autumn months. Commons and churchyards can support rich assemblages of these colourful fungi, indeed the Tunbridge Wells cemetery is known to be an extremely important site for grassland fungi.

A survey of grassland fungi on the Commons is recommended to establish whether any areas can be described as mycologically-rich.

2.5 Invertebrates

The Rusthall and Tunbridge Wells Commons LWS citation states that the invertebrate fauna is the most significant and important feature of the Commons. This assertion is supported by records of numerous invertebrates considered rare or scarce in Kent combined with the sheer number of invertebrate records from the Commons. Observations over recent years are dominated by insects but also include spiders and molluscs.

It is the aculeate Hymenoptera (ants, bees and wasps) that are particularly significant with in excess of 130 species of solitary and social bees and wasps recorded to date. This impressive assemblage includes mining

bees, cuckoo bees, nomad bees, flower bees, carpenters and leaf cutters. There are recent records of some scarce and declining species, most notably the Shrill Carder Bee *Bombus sylvarum* (2009) and Long-horned Bee *Eucera longicornis* (2015).

The open and sparsely vegetated sandy ground around sandrocks are particularly important areas for the ground-nesting and mining bees. However, a combination of resources that includes rich sources of nectar and pollen throughout the year as well as over-wintering habitat is essential to support diverse populations of these charismatic insects.

Identifying which habitats and specific areas of the Commons are currently of most importance for assemblages of bees and wasps is crucial for good site management. There are known to be important colonies of ground-nesting wasps around Wellington Rocks, Toad Rock and Denny Bottom. Favoured areas for mining bees are south-facing parts of Pope's Terrace Walk, the back of Brighton Lake and Happy Valley. The 2017 management plan identified the Wellington Rocks area as being very important for the Large Shaggy Bee *Panurgus banksianus* a locally widespread habitat specialist.

The key areas on the Commons for bees and wasps should be identified and mapped in consultation with the expert local entomologist Dr Ian Beavis.

Butterflies and moths are well-represented in the data with more than 24 butterflies recorded from the Commons including woodland species such as Silver-washed Fritillary *Argynnis paphia*, White Admiral *Limenitis camilla*, Speckled Wood *Pararge aegeria* and Purple Hairstreak *Neozephyrus quercus* as well as species of open grassland and heathland habitats such as Small Heath *Coenonymphya pamphilus*, Small Copper *Lycaena phlaeas*, Common Blue *Polyommatus icarus*, Orange Tip *Anthocharis cardamines* and (rarely) Brown Argus *Aricia agestis*.

Day flying moths noted have included Orange Underwing *Jodia croceago*, Small Yellow Underwing *Panemeria tenebrata*, Cinnabar *Tyria jacobaeae* and Six-spot Burnet *Zygaena filipendulae*. Buff Ermine *Spilosoma lutea* (2014) and Grey Dagger *Acronicta psi* (2005) are both species of conservation concern. Moth trapping in 1992 recorded 150 species but the actual total visiting or resident on the Commons is likely to be much higher.

In excess of 60 species of hoverflies, robber flies, soldier flies, craneflies and other Diptera have also been recorded from the Commons.

In 2001 Brighton Lake, Fir Tree Pond, Bracken Pond and Marl Pits were considered the best area for dragonflies and damselflies (Odonata) with 17 species recorded to that point but since then more ponds have been restored on the Commons.

More systematic recording of familiar and popular insect groups (for example butterflies, moths and dragonflies) is needed. There is an opportunity for volunteer and community involvement in this aspect of biological recording and monitoring through moth trapping and regular butterfly recording transects.

2.6 Amphibians & reptiles

Great Crested Newt, Palmate Newt *Lissotriton helveticus*, Smooth Newt *Lissotriton vulgaris*, Common Frog *Rana temporaria* and Common Toad *Bufo bufo* have all been recorded from ponds on the Commons. In 2016 ponds were assessed for their suitability for Great Crested Newt and other breeding amphibians.

Pond reviews were carried out on selected ponds by Kent Reptile and Amphibian Group (KRAG), volunteers and the site ranger from 2017 to 2022. These were largely visual assessments of the pond vegetation and surrounding habitats but also incorporated some net and torch surveys for amphibians.

The amphibians recorded were:

- Great Crested Newt, Smooth Newt and Palmate Newt (Marlpit Pond 2018)
- Frog spawn (Marlpit Pond 2020)
- Toads (Brighton Lake 2018)

Incidental records of reptiles from both Commons have been supplied by Dr Ian Beavis but there is no indication that any systematic reptile surveys have been carried out.

- Adder - the most threatened of our widespread reptiles (most recently Race Course south on Tunbridge Wells Common 2003)
- Common Lizard - described as quite frequent on the Commons "especially grassland near Highbury or along Mount Ephraim" (most recent record 2005)
- Grass Snake (Happy Valley lakes 2012, Pope's Terrace Walk 2004 and Brighton Lake 2003)
- Slow-worm has a single record from Gibraltar (1999)

Species observations should be extracted from the regular pond condition reviews to help monitor amphibian breeding activity.

Surveying ponds by sampling eDNA could be carried out to determine whether Great Crested Newt is present in additional ponds on the Commons.

A systematic reptile survey would be desirable but there may be constraints to using cover objects in areas with high levels of public access.

2.7 Birds

Historic records of birds on the Commons (TWMAG 2001) estimated there were around 40 resident species with approximately 15 winter/summer visitors including species now considered of high conservation importance (Red List of UK Birds). Some of these are now much less likely to occur on the Commons due to national population declines, for example Lesser Spotted Woodpecker *Dendrocopus minor*, Nightingale *Luscinia megarhynchos* and Linnet *Carduelis cannabina*.

Bird data supplied by KMBRC is largely at tetrad scale so records are not specific to the Commons but records of Waxwing *Bobmycilla garrulus* (2013), Firecrest *Regulus ignicapilus* (2018), Hobby *Falco subbuteo* (2005) and Common Redpoll *Carduelis flammea* (2012) are associated directly with the Common.

KOS carried out quarterly surveys in 2019/20 that recorded various woodland and garden birds including Blackbird *Turdus merula*, Blackcap *Sylvia atricapilla*, Coal Tit *Parus ater*, Long-tailed Tit *Aegithalos caudatus*, Robin *Erithacus rubecula*, Song Thrush *Turdus philomelos* and Wren *Troglodytes troglodytes*. Magpie *Pica pica* and Wood Pigeon *Columba palustris* were both recorded with some frequency.

Information about the diversity of breeding birds on the Commons and the location of their territories would be invaluable to inform habitat management decisions. A breeding bird survey in 2023/24 is recommended.

2.8 Mammals

2.8.1 Bats

10 of the 17 bat species found in Kent have been recorded within 5km of the Commons, however, bat data provided by KMBRC is predominantly derived from roost and hibernation sites in buildings around Tunbridge Wells Common.

Daubenton's bat *Myostis daubentonii* (2009), Noctule *Nyctalus noctula* (2008) and Common Pipistrelle *Pipistrellus pipistrellus* (2009) have been recorded on the Commons with Serotine *Eptesicus serotinus*, Whiskered bat *Myotis mystacinus*, Natterer's bat *Myotis nattereri*, Leisler's bat *Nyctalus leisleri* and Soprano Pipistrelle *Pipistrellus pygmaeus* recorded nearby since 2006. There are also numerous records of Brown Long-eared bat *Plecotus auritus* roosts around Tunbridge Wells.

The mixture of structurally diverse vegetation and abundant invertebrate prey on the Commons suggest that they are likely to provide very important bat foraging habitat. The woodland areas and crevices in rock outcrops could provide suitable roost sites.

Kent Bat Group should be approached to assist with bat activity and roost surveys on the Commons. The aim would be to record species found on the Commons and clarify their importance by identifying any areas and features of particular value to local bat populations.

2.8.2 Other Mammals

Patchy records of widespread mammals on the Commons include Grey Squirrel *Sciurus carolinensis*, Rabbit *Oryctolagus cuniculus*, Mole *Talpa europaeus*, Fox *Vulpes vulpes*, Badger *Meles meles*, Roe Deer *Capreolus capreolus* and the non-native Muntjac deer *Muntiacus reevesi* (TWMAG 2001). Common Shrew *Sorex araneus* is one of the few small mammal records uncovered (Fir Tree Pond 2001).

The records of Hedgehog *Erinaceus europaeus* (2005) and Hazel Dormouse *Muscardinus avellanarius* (2014), two declining and protected mammal species, are of most conservation significance.

The presence of Hedgehog and Hazel Dormouse on the Commons could be confirmed by footprint tunnel surveys. This non-intrusive and reliable survey method is very suitable for community involvement with volunteers or the Forest School.

Visitors could be encouraged to log their sightings of mammals and other wildlife via iRecord or submit photos to the Commons Facebook page.

2.9 Invasive Species

Invasive non-native species (INNS) can be a particular problem in urban fringe sites and a number of non-native and garden-origin plants species have been recorded on the Commons. Their presence and potential impact is an important consideration in planning land management for biodiversity.

Schedule 9 of the Wildlife and Countryside Act lists those plant species which it is illegal to plant or otherwise cause to grow in the wild. Unfortunately a number of species listed on Schedule 9 are present on the Commons in ponds and woodland areas. Particular care is needed in their management and control.

- Japanese Knotweed *Reynoutria (Fallopia) japonica* has been present on Tunbridge Wells Common for decades and there is an old record of it on Rusthall Common (1971-80). It was identified as a problem in the 1991 management plan and is believed to persist on both commons today.

Schedule 9 INNS have been recorded in ponds and wet areas on both the Commons. Some of these have already been subject to control work in recent years and their current status is uncertain. These are:

- Parrot's-feather *Myriophyllum aquaticum*, New Zealand Pigmyweed *Crassula helmsii*, Curly Waterweed *Lagarosiphon major*, Nuttall's Waterweed *Elodea nuttallii*, Canadian Waterweed *Elodea canadensis* and Himalayan Balsam *Impatiens glandulifera*.

In woodland areas the invasive shrubs Cherry Laurel *Prunus laurocerasus* and Rhododendron *Rhododendron ponticum* can be particularly detrimental to species diversity due to the dense shade they cast. A considerable amount of effort has been put into reducing the dominance of these woody species in recent years.

In some situations woodland ground flora can be suppressed by non-native species (although not all garden escapes are equally problematic). Non-native woodland species recorded on the Commons include:

- Variegated Yellow Archangel *Lamiastrum galeobdolon* ssp.*argentatum*, Three-cornered Leek *Allium triquetrum*, and Spanish/Hybrid Bluebell *Hyacinthoides hispanica* and *H.x massartiana*.

Finally the invasive Heath Star Moss *Campylopus introflexus* was recorded on Happy Valley Rocks in Rusthall Common (2005).

Control of INNS is an important but sometimes problematic aspect of habitat management. The first step is to have an accurate record of where Schedule 9 and other INNS occur on the Commons before developing a long-term management strategy for their control. Mapping the location and monitoring the extent of INNS on the Commons should be a high priority.

3.0 Current Monitoring Activities

From 2016 onwards biological monitoring activities have been instigated on the Commons. These include:

- Annual tree safety survey carried out by the site ranger.
- Biannual pond condition reviews in spring and autumn based on visual inspection and photographs.
- Very detailed annual monitoring and mapping of Coralroot populations carried out by volunteers.
- The Rock Management Plan 2016 includes guidance on best practice management of vegetation on the sand rocks to "keep rocks in good condition and visible enough to be enjoyed". This includes photographic monitoring and a 2-5 year rotation of management to control grass, shrubs and trees where appropriate. The different rocks on both Commons are grouped by their prominence, status and priority to help guide management. **It is not clear whether this recommended monitoring has been carried out since 2016.**

4.0 Recommendations

4.1 Data Management & Mapping

The Commons are large sites of high nature conservation value on the urban fringe and their management is complicated by sometimes conflicting, demands from visitors and stakeholders. Existing biological information about the Commons is extensive but patchy and held in several different locations.

Some of the high priority wildlife surveys (identified in section 4.2) recommend mapping the spatial distribution of species and habitats to highlight biodiversity hotspots and to help monitor change over time.

It would be invaluable to create a bespoke, digital system for the Commons that attaches new and existing data to site maps. A map-based Commons database could be developed in association with a partner organisation with suitable expertise in Geographic Information Systems (GIS), such as TWBC, KWT, KHWP or the High Weald Unit.

A GIS database could be used to:

- Store biological survey and monitoring results in one place.
- Capture amphibian data from the annual pond condition reviews.
- Map the distribution of key indicator species (flora) or assemblages (e.g. bees) to help target habitat management, restoration or creation.
- Record the location of INNS.
- Record management actions, help to plan work in advance and set targets.
- Document changes in habitat extent. Habitat maps from previous surveys could be digitised to show changes in extent of different vegetation types over time. This would allow an assessment of progress on habitat area targets.

Aerial and ground level photographic monitoring of the Commons is also highly recommended to build up a record of changes in vegetation structure and habitat extent. Comparing old aerial photographs with new images could help to identify areas where target habitat could be restored most successfully.

4.2 Survey & Monitoring

There are some significant gaps in current biological data for the Commons, which are highlighted in the descriptions of key species and assemblages in section 2.

Filling the data gaps will help to ensure that future habitat management is appropriate and targeted to conserve and enhance populations of scarce and declining species as well as to maximise overall biodiversity. Tables 2 and 3 summarise surveys and other work recommended to fill gaps in the data and form the basis for long-term monitoring of wildlife on the Commons.

The resources that are available will dictate what can be achieved in the short-term but ideally the high priority surveys should be carried out in 2023 so that their results can be used to inform the new management plans. Other recommended surveys and monitoring can be scheduled over the 5 years of the plans and beyond. Further details of a survey and monitoring strategy will be contained in the management plans.

Some of the work recommended is suitable for volunteers (such as Friends of the Commons, Forest School pupils or local conservation groups) but other tasks would be better contracted out to Local Authority stakeholders (TWBC, KCC, KHWP) or ecological consultants. Most biological surveys take time to complete, especially faunal surveys, and may require multiple visits to record as many species as possible.

It is outside the scope of this review to estimate the potential costs of each survey as contractor prices can vary considerably.

Table 2. High Priority Surveys

TYPE OF SURVEY	TIMING
Lower plants survey on sandstone outcrops	Ideally winter, possible at other times
Identify and map key areas for bee & wasp assemblages	No seasonal constraints
Map location and extent of INNS	Survey INNS in April to September
Surveys and mapping of scarce habitat indicator species	Survey in April to September
Update habitat maps from the 1991/2003/2016 surveys	April to September
Hazel Dormouse footprint tunnel survey	April to October
Encourage visitors to submit wildlife sightings via the iRecord and iNaturalist apps/websites	No seasonal constraints

Table 3. Other Survey Recommendations

TYPE OF SURVEY	TIMING
Hedgehog footprint tunnel survey	April to October
Condition surveys & monitoring of acid grassland & heathland areas	April to September
Grassland fungi survey	Autumn
Dragonfly & damselfly surveys of ponds	April to September
Breeding amphibian survey of ponds using eDNA analysis	Sampling 15th April to 30th June
Breeding bird survey	March/April to June/July
Bat surveys (presence and potential roost sites)	Activity surveys April to October Tree roost assessment in winter
Butterfly transects	April to September
Moth trapping	March to November
Reptile survey	March to October

There are important considerations when surveying wildlife on land with high levels of public access. Equipment such as footprint tunnels, moth traps or reptile refugia need to be left in place for a period of time and these items can arouse public curiosity or be subject to unwanted interference if they are in plain view. The benefits and risks of different surveys methods will need to be carefully assessed in the context of public access across the Commons.

4.3 Access & Community Engagement

In addition to the biological surveys and monitoring recommendations there is scope to review access across the Commons and to strengthen community engagement.

Recommendations for action on these aspects of management on the Commons will be included in the new management plans but are likely to include:

- An assessment of the existing, extensive path network across the Commons, its use, maintenance and impact on different habitats.
- Aspects of wildlife survey, monitoring and habitat management that are suitable for volunteers and visitors to promote community engagement.

Appendix

References & Data Sources

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