

## Twenty-five years of biological recording at Croome Park

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01. Croome Park was acquired by the National Trust in 1996 to restore the Grade 1 listed landscape. 07.11.20. Gary Farmer

The National Trust (NT) acquired Croome Park (01) in 1996, the same year as the first publication of the *Worcestershire Record*, with the objective of a 'full and faithful' restoration of the Grade 1 listed landscape designed by Lancelot 'Capability' Brown. The restoration, which in terms of capital works was concentrated during the period 2002-2005 has involved significant land use change. This has included conversion of nearly 160ha (c395 acres) of arable land to permanent grassland, the planting of tens of thousands of trees and shrubs, the dredging of the Croome Lake and River, involving the removal of c4ha of swamp habitat, and the creation of three new wetlands designed both to mitigate for the impacts of the dredging and to intercept nutrients and sediment from the wider catchment before they enter the Lake and River.

The purpose of this article is not to discuss the pros and cons of the parkland restoration for nature conservation as these, together with the significance of Croome's historic landscape, are addressed in Alker & Barker (2016), but to put into the public domain a summary of the biological survey and monitoring which has occurred at Croome under the NT's ownership and to highlight some of the key findings across different taxa. It is based upon the author's experience of recording at the site, which commenced in 1996 and since 2003 has been in the capacity as an employee of the NT, and attempts to bring together data from a range of sources. It does not pretend to be comprehensive, but responsibility for errors and omissions lies with the author.

### Summary of survey and monitoring 1996-2021

The first survey occurred before the NT had completed the purchase of the Croome Park property, when its in-house Biological Survey Team (sadly no longer extant, as a consequence of staff restructuring necessitated by the financial impacts of the Covid-19 pandemic) spent a day at the site in June 1995. The survey provided an overview of the site's vegetation and biological features and identified two areas of particular importance for which more detailed surveys were recommended; the deadwood invertebrate communities associated with the older parkland trees and the flora & fauna associated with wetland habitats, including the Croome River and the various field ponds (Alexander *et al.* 1995). Consequently, in 1996 Dr Derek Lott was contracted to undertake a survey of beetles, focussing on the deadwood fauna with limited sampling of wetland habitats (Lott 1996), whilst Worcestershire Wildlife Consultancy

was contracted for a survey of the flora and fauna of the wetlands (Barker & Goddard 1996). Subsequently, the surveys of deadwood and wetland invertebrates have been repeated at  $\pm$  ten yearly intervals. In 2006 Derek Lott repeated his 1996 survey of saproxylic fauna associated with wood decay habitats in the old parkland trees, extending the survey area to land at Pirton acquired by the NT to protect the setting of Pirton Castle, one of the 'outer eyecatchers' of Brown's 18<sup>th</sup> century landscape design (Lott 1997). In September 2005 and May 2006 Professor Garth Foster sampled aquatic Coleoptera and other invertebrates from a range of wetland / aquatic habitats, including the Lickmoor and Snape wetlands created in 2003 (Foster, G. 2006 & 2006). In 2016 Andy Foster, recently retired from the NT Biological Survey Team, was contracted to repeat the surveys of both the saproxylic and aquatic Coleoptera (Foster, A.P. 2016 a & b). A thorough survey and evaluation of Croome's vegetation and biological features, building on the initial 1995 survey, was undertaken by the NT's Biological Survey Team over several days in August 2007 and April 2008 (Foster, A.P. *et al.* 2009).

Other specialist surveys commissioned over the past quarter of a century include:

- surveys of amphibians in the ten field ponds within the parkland, by Will Watson in 2006 (Watson 2006) and David & Susan Dewsbury in 2011 (Dewsbury 2011).
- invertebrate surveys in 2019 by Andy Foster (primarily sampling beetles & bugs – Foster, A.P. 2019) and Nigel Jones (primarily sampling aculeate Hymenoptera and Diptera – Jones 2019) covering three areas of grassland, all seeded with the same moderately flower-rich mixture but managed under different regimes, i.e. 'holistic' (aka 'mob') grazing by cattle, conventional grazing by sheep & cattle and hay cutting followed by aftermath grazing.
- surveys associated with planned building repairs and proposed development of visitor facilities. Many of these have focussed on bats and / or other protected species, including Badger and Great-crested Newt. They have been undertaken by several consultant ecologists, both sole traders and companies.

In addition to the commissioned surveys summarised above, a huge amount of voluntary survey and monitoring of species and habitats has been undertaken and is ongoing. These range from structured, repeated surveys, e.g. of butterflies and Odonata, to casual

observations or one-off events, e.g., visits from Worcestershire Botany, Bryophyte & Mammals Groups and a BioBlitz undertaken by staff of the consultancy RSK. Some of this recording occurs under the aegis of the NT, whilst some is undertaken entirely independently and its results may or may not be reported to the NT. A selection of these surveys are referenced under the summary accounts of different taxa which follow.

### Vegetation

The transformation of Croome's vegetation is illustrated by the changes recorded by the 2007-08 NT biological survey (Foster, A.P. *et al.* 2009) compared to the baseline survey (Alexander *et al.* 1995). This showed that 157.9ha of arable land had been reverted to grassland, with 26ha remaining under cultivation (as it does to this day). Conversely, there had been a net loss of 4.1ha of swamp vegetation as a consequence of the de-silting of the Lake and River – albeit new areas of reed-swamp were established in the created

wetlands of Snape and Lickmoor and have established further since the 2007 survey. The areas of arable reversion were seeded with a grass and wildflower mixture specified by the then Rural Development Service (RDS) of Defra (now part of Natural England). It contained a limited palette of wildflowers, namely Red Clover *Trifolium pratense*, Common Bird's-foot-trefoil *Lotus corniculatus*, Meadow Buttercup *Ranunculus acris*, Common Sorrel *Rumex acetosa*, Yarrow *Achillea millefolium* and Oxeye Daisy *Leucanthemum vulgare*. Monitoring by Andrew Perry and others has shown subsequent natural colonisation of herbs within the sown grassland, including locally abundant Knapweed *Centaurea nigra*, Lady's Bedstraw *Galium verum* and Agrimony *Agrimonia eupatoria*. Lady's Bedstraw and Agrimony were present at the site prior to arable reversion, in two small patches of relict grassland which had escaped the plough, and have subsequently spread widely, whereas Knapweed has arrived and dispersed since the introduction of holistic grazing in South Park.



02. South Park July 2016, showing herbs and grasses flowering under holistic grazing regime. Simon Barker.

The easily overlooked annual herb Grass Vetchling *Lathyrus nissolia* can be frequent in South Park and in areas put up for hay (particularly Church Hill), whilst four species of orchid have been recorded in recent years – Pyramidal *Anacamptis pyramidalis* (03), Bee *Ophrys apifera* (04), Common Spotted *Dactylorhiza fuchsii* (05) and Southern Marsh *D. praetermissa*.



03. Close-up of Pyramidal Orchid, Church Hill, Croome, 02.07.15. Simon Barker.



04. Bee Orchid, Croome June 2021. Sarah Dunsgate.



05. Common Spotted Orchid, Croome June 2016. Katherine Alker.

Whilst the botanical diversity of Croome's grasslands has increased over the 20 years since their re-establishment, to date there is little sign of fruiting bodies of grassland fungi, indicating that it will take many more years for the mycota to recover from decades of disturbance from ploughing and fertiliser application.

Croome's established trees were surveyed by academics from Pershore Collage of Horticulture on the NT's acquisition (Coombs & Rose 1996). Whilst many of the trees and woodlands, such as the Cedars *Cedrus libani* which are such a prominent feature of the landscape, are contemporaneous with the 18<sup>th</sup> century design by 'Capability' Brown, some of the English Oaks *Quercus robur* pre-date this (see discussion of saproxylic invertebrates below), as do the Small-leaved Limes *Tilia cordata* of Lickmoor Coppice, an ancient woodland which the NT is restoring following its part planting with conifers in the 1970s. Andy Gordon, the NT's volunteer ancient tree recorder extraordinaire, recorded the details of 199 ancient, veteran and notable trees at Croome in 2011. These are logged on the NT's ancient tree database, which feeds into the Woodland Trust's Ancient Tree Inventory.



06. Ancient Small-leaved Lime stools, Lickmoor Coppice, Croome. Simon Barker.

The aquatic flora and wetland flora was documented in some detail by Barker & Goddard (1996). At this time greater pond-sedge *Carex riparia* and Bulrush or Reedmace *Typha latifolia* were co-dominant in the extensive swamp of the Croome River, although a diversity of species occurred at low frequencies, most notably (in terms of County status) Parsley Water-dropwort *Oenanthe lachenalia*, Round-fruited Rush *Juncus compressus* and Grey Club-rush *Schoenoplectus tabernaemontani*. Parsley Water-dropwort was amongst the swamp vegetation successfully transplanted from the Croome River to the newly created Snape wetland during the first phase of dredging in 2003. Subsequently, in 2005, plugs of Common Reed *Phragmites communis* were planted in Snape

wetland by volunteers. This plant, formerly confined to a single pond at Croome, has now formed a dense reedbed supporting typical fauna of this habitat (see section on birds below).

Submerged aquatic vegetation was conspicuous by its absence in the 1996 survey of the Lake and River by Barker & Goddard, although Ann Fells did record a hornwort, which she ascribed to *Ceratophyllum demersum*, in 2002 (Fell 2003). The Lake was desilted in 2003 and the following year extensive beds of the stonewort *Chara hispida*, very rare in the county (Day 2001), appeared within it (identification confirmed by the late A.W. Reid). By 2008 the *Chara* had been displaced by abundant growth of a water-milfoil *Myriophyllum* sp., which continues to be present, albeit in smaller quantities, along with some hornwort. Swamp vegetation has re-established along the margins of the Croome River, but is maintained by cyclical removal on a 'little but often' basis.

There are ten more or less permanent ponds at Croome. Several have extensive emergent vegetation, which periodic management aims to keep in check to retain areas of open water. Species are similar to those found along the Croome River, although the 'ice-house pond' has supported the locally distributed Fine-leaved Water-dropwort *Oenanthe aquatica*. Submerged aquatic flora is limited, but a field pond adjacent to Lickmoor wetland supports the locally rare Soft Hornwort *C. demersum* which was recorded from the Lake and River historically (Barker & Goddard 1996, Foster, A.P. *et al.* 2009).

#### Saproxylic invertebrates

Of all the groups recorded at Croome over the past quarter of a century, pride of place lies with the invertebrates (principally beetles) associated with wood-decay habitats in all their diversity.

The brief reconnaissance survey of 1995 found species of sufficient quality to indicate that "*the property is certainly of county importance*" for this group and suggested that further surveys would reveal the parkland to be of regional importance, on the basis of recording species including the beetle *Phloiortrya vaudoueri*, the ant *Lasius brunneus* and the cranefly *Dictenidia bimaculata* (Alexander *et al.* 1995). Dr Derek Lott's survey of 1996, consisting of four visits during May and June, did indeed elevate Croome to ranking as of regional importance for its 'old growth' beetle fauna – and more. Of the 118 deadwood-associate species of beetle recorded by Dr Lott, 31% had a national conservation status (11 RDB species, 25 Nationally Scarce species). Together with the records from the Alexander *et al.* survey of 1995 and records made by Dr Tony Drane during a visit in August 1996, which included the Lime Bark Beetle *Ernoporus caucasicus*, this gave Croome an Index of Ecological Continuity (IEC - Alexander 2004) of 64, ranking it as the twelfth most important site in Britain according to this measure. Dr Lott commented that "*comparison of the Croome list with those from other known sites of national importance is misleading, because they have received far greater attention from entomologists. Further survey work at Croome will undoubtedly increase the value of its IEC.*" (Lott, 1996, p5).

When Dr Lott repeated his survey in 2006, this time making five visits between May – October, he recorded eleven additional Nationally Scarce species, but the total of 82 saproxylic beetles was lower than the 118 recorded in 1996. Nonetheless, a review by Andy Foster in 2008, incorporating the results of some additional recording undertaken by himself in 2007 showed Croome to have an IEC score of 70 (a score of 25-79 considered nationally important) and a Saproxylic Quality Index (SQI – Fowles *et al.* 1999) of 635 (a score of 500 and more is considered nationally important), ranking it second only to Bredon Hill in the Midlands (Foster, A.P. *et al.* 2009).

Andy Foster's more in-depth survey of 2016, based on six principal survey visits and using interception traps (not employed in Dr Lott's surveys), raised the bar in terms of Croome's significance for wood-decay invertebrates. The survey added 23 significant species of saproxylic beetle to the Croome list (six with RBD status, the remainder having nationally Notable/Scarce status), including the

RDB endangered Windsor weevil *Dryophthorus corticalis* at its fourth recorded UK locality and the first outside south-east England. Other significant finds included the click beetle *Ampedus elongatulus*, which has Nationally Notable and European Red List Near Threatened status, in the same tree as the Windsor weevil (both species being red-rot specialists) and the rediscovery of the RDB rare and European Red List Near Threatened click beetle *Ampedus cardinalis*, recorded by Derek Lott in 1996 but not in 2006.



07. *Ampedus elongatulus* reared from larva. Croome, June 2016. Andy Foster.



08. *Ampedus cardinalis*. Croome May 2016. Andy Foster.

When combined with the results of previous surveys, Foster's findings elevated Croome's IEC score to 109, classifying it as of European significance for saproxylic beetles (threshold score of  $\geq 80$ ), and its SQI to 669.7, ranking it as 7<sup>th</sup> in the national table of saproxylic sites according to this classification (Foster, A.P. 2016a).

Significant saproxylic interest is represented in other invertebrate groups, with Nationally Notable species including the hoverfly *Rhingia rostrata*, the soldierfly *Eupachygaster tibialis*, the solitary wasp *Monosapyga clavicornis* and the pseudoscorpion *Dendrochernes cyrneus* (RDB – Rare) (Foster, A.P. 2016a).

A rich wood-decay fauna is considered to indicate a long history and continuity of old, open-grown trees, with many of the best sites have antecedence as Medieval deer parks or hunting forests. Croome is not typical in this respect, as it has no known history of early emparkment (Lott 1996) and does not possess a rich resource of ancient trees. Some of the oaks pre-date the 18<sup>th</sup> century landscaping, perhaps as hedgerow trees which were incorporated into 'Capability' Brown's design, with the oldest tree - a fine specimen with a girth of over 6m (09)- having claim to Medieval origins, but there are not so many as would be suggested by the richness of the saproxylic fauna.

There may be a climatic influence, in that this area of the Severn & Avon Vales is the warmest and driest part of the West Midlands with a climate more akin to the Thames basin - where several of the best

sites for saproxylic fauna are located, most notably Windsor Great Park. Perhaps more significantly, surveys of in-field and hedgerow trees on the wider Croome Estate (not in NT ownership) have shown that the density of old oaks is no less than in the parkland itself (unpublished data) with the oldest tree (which sadly has succumbed within the past ten years) having a girth of >10m. Thus, Croome's parkland sits within a wider landscape of old, open-grown trees, perhaps extending to the internationally important site of Bredon Hill 6km to the south-east, and its rich saproxylic fauna may reflect this larger resource (Lott 1996). There are differences between the faunas recorded at Croome, where oak is the most prominent tree, and Bredon Hill, where Ash is more important, with some of the key oak red rot species recorded at Croome not being known from Bredon Hill (Foster, A.P. 2016a).



09. The largest oak at Croome, South Park, June 2016. Andy Foster.

#### Lepidoptera

The late Owen Tudor recorded butterflies at Croome (and other NT sites in the West Midlands) regularly from 2001-2014, not via a formal 'transect' but in a semi-structured way which allowed some analysis of trends. His 'Index of Diversity' showed a decline over the years, reversed to a certain extent from 2010, perhaps reflecting intensive grassland management in some areas of the park. Sadly he didn't live to see the introduction of holistic grazing in South Park from 2015, which has resulted in much better habitat for butterflies and other grassland insects (see below). Besides large numbers of common grassland species, particularly Meadow Brown *Maniola jurtina*, Owen recorded some rarer species, including occasional White-letter Hairstreak *Satyrium w-album*, Brown Argus *Aricia agestis*, Silver-washed Fritillary *Argynnis paphia* and Clouded Yellow *Colias croceus*. He also recorded solitary sightings of Green Hairstreak *Callophrys rubi*, Small Blue *Cupido minimus* (possibly a wanderer from the Cotswolds, or a release?), Dingy Skipper *Erynnis tages* and twice (in 2002 and 2006) Grizzled Skipper *Pyrgus malvae*.



10. Grizzled Skipper at Old Wood, Croome 17.05.2022. Simon Barker.

Owen Tudor's records of Grizzled Skipper were from the same area of South Park where the butterfly was recorded in 1995 (Alexander *et al.* 1995) and 1996 (Barker & Goddard 1996), around a small area of calcareous grassland which had formed over crushed concrete - a legacy of the wartime airfield of RAF Defford. There have been no further sightings reported from this area, but on 17<sup>th</sup> May 2022 the author saw an individual at SO895441 in Old Wood elsewhere within the old Defford airfield site. The inaptly named Old Wood was part of the designed landscape until swept aside for the development of the airfield in World War II and was replanted by the NT in 2011. The site is still largely open, with locally abundant Creeping Cinquefoil *Potentilla reptans* growing over concrete sections of old runway providing good breeding habitat for Grizzled Skippers. It seems probable that this classic species of 'brownfield' sites has maintained a population within the old Defford airfield for some time, as speculated by Barker (1999), with the occasional sightings in a small patch of marginal habitat within Croome's parkland being wanderers from an airfield colony.

Since 2018 two butterfly transect routes have been established which are walked at least monthly from April to September by volunteers or ranger staff. Meadow Brown remains the most abundant species but other grassland species recorded regularly during their flight periods include Marbled White *Melanargia galathea* and Common Blue *Polyommatus icarus*, with Brown Argus *Aricia agestis* only occasionally recorded.

Moths have not been well recorded at Croome, with most records relating to day-flying species including Burnet Companion *Euclidia glyphica* (*pers. obs.*) and both Six-spot Burnet *Zygaena filipendulae* and Narrow-bordered Five-spot Burnet *Z. loniceræ*. The only targeted surveys have been for the Nationally Scarce Mistletoe Marble *Celypha woodiana*. In 2009 mines of this species were recorded by Mark Parsons, then of Butterfly Conservation, in Mistletoe *Viscum album* growing on two apple trees at the site (McGill 2009). Encouragingly, in May 2021 George Tordoff of Butterfly Conservation, accompanied by NT rangers, found a total of 15 larval mines on Mistletoe growing on 10 different apple trees (*pers. comm.*).

#### Other terrestrial invertebrates

In 2019 the NT commissioned two surveys of grassland invertebrates, to investigate differences in fauna associated with three distinct types of grassland management: a late (post mid-July) hay cut with grazing of the aftermath, as on Church Hill; holistic or 'mob' grazing, whereby stock are regularly rotated around small compartments so that at any one time only a small proportion of a site is being grazed, as practiced in South Park; and conventional close grazing, as practiced in West Field. Andy Foster vacuum sampled 20 randomly located 1m<sup>2</sup> quadrats in each of the three grassland management types during the second half of June. His samples included representatives of a range of invertebrate groups, including Araneae, Coleoptera, Dermaptera, Diptera, Hemiptera, Hymenoptera, Isopoda, Lepidoptera, Orthoptera, and Mollusca with most of those identified to species level being from the Coleoptera and Hemiptera. A total of 243 species were identified across all samples, of which 153 were associated with the holistically grazed area, 146 with the hay meadow area and 93 with the conventionally grazed area. Twelve grassland species with national conservation status were recorded, of which eleven were in the hay meadow, seven in the holistically grazed area and none in the conventionally grazed area. They included an Opomyzid fly *Geomyza subnigra*, a lace bug *Catoplatus fabricii*, the Bombardier Beetle *Brachinus crepitans*, a tumbling flower beetle *Mordellistana pseudoparvula* and eight plant-feeding weevils, four of which have associations with Oxeye Daisy (Foster, A.P. 2019). Nigel Jones sampled pollinating insects (aculeate Hymenoptera and Diptera) across the three grassland management regimes, via transects and timed sweep net sampling during three visits in May, June and August 2019. Analysis of the sample data via Pantheon indicated that, taken together, the three areas had a "rich flower resource" of insects, with the holistically grazed South Park having the most abundant and diverse resource of pollinators. Four species with national

conservation status were recorded: the bees *Sphecodes rubicundus* (Notable A) and *Lasioglossum xanthopus* (Notable B) and the flies *Villa cingulata* (Nationally Rare) and *Eggisops pecholi* (Nationally Scarce) (Jones 2019).

Two BeeWalks, as promoted by the Bumblebee Conservation Trust (BBCT) have been established since 2019. One route, of 2km covers South Park, whilst the second, of 1.5km, takes in Church Hill and part of West Field. All of the 'big seven' widespread species (BBCT website) have been recorded, and during a training event run by Dr Richard Comont of the BBCT in 2019, Caroline Uff recorded the rare Brown-banded Carder Bee *Bombus humilis* which strongly favours flower-rich meadows (Gammans *et al.* 2018).

#### Odonata

Earlier surveys contain incidental records of dragonflies and damselflies (e.g. Barker & Goddard 1996, Foster, A.P. *et al.* 2007), but knowledge and awareness of the site's significance for this group has been transformed since 2012 when Mike Averill commenced regular transect surveys of the Lake and River. Results have fluctuated over the years, in response to weather conditions and the variable impacts of the management of riparian vegetation, but up to and including 2021 Mike recorded 22 species, 21 around the Lake and 21 along the River (Beautiful Demoiselle *Calopteryx virgo* seen at the Lake but not the River; Common Club-tail *Gomphus vulgatissimus* was recorded once at the River but not at the Lake). 17 species occur regularly, of which 16 breed regularly. Hairy Dragonfly *Brachytron pratense* was confirmed as the seventeenth breeding species in 2022 (Averill 2022). Small Red-eyed Damselfly *Erythromma viridulum*, which colonised Worcestershire as recently as 2006, can occur in large numbers at Croome with maximum counts of 300 on the River and 200 at the Lake, although in terms of abundance it is eclipsed by the Common Blue Damselfly *Enallagma cyathigerum* which has peak counts of 500 along the River (Averill 2022). Key species include Four-spotted Chaser *Libellula quadrimaculata*, a long-established breeder with maximum counts of 25 along the River, and Scarce Chaser *L. fulva*, which has become established as a breeder also with maximum counts of 25 along the River. The presence of these species, together with the large number of different breeding species, means that "Croome is now one of the top two sites for Dragonflies in the Worcestershire and of National Importance" (Averill 2022).



11. Hairy Dragonfly was confirmed as the seventeenth breeding species at Croome in 2022. Croome River 07.06.22. Jill Orme.

#### Other wetland invertebrates

Alexander *et al.* (1995) recorded the (then) Nationally Scarce water beetle *Berosus signaticollis* in the largest field pond at Croome (which lies within one of the two fields which remain under arable cultivation to this day). At the time this was a first for Worcestershire and the West Midlands region, prompting the comment "... its presence at Croome is remarkable and must reflect

a survival from the marshes drained prior to the 18<sup>th</sup> century landscaping” (Alexander et al. 1995, p15). A memorial to Capability Brown within the grounds references his achievement in creating the landscape from a ‘morass’, although judging from the present day locations of older trees (which pre-date the second half of the 18<sup>th</sup> century) the lake and river are the features most likely to have been created from this ‘morass’.

Dr Don Goddard did not record *Berosus signaticollis* during his 1996 survey, but he did record 19 beetles (nine associated with aquatic habitats and ten riparian species) and eight bugs (six aquatic, two riparian) which were firsts for the county. The southern end of the Croome River, at the time the main area of open water at the site, was the most productive area sampled. The field pond where Alexander et al. recorded *Berosus signaticollis* also contained a rich fauna, as did the pond with soft hornwort (see section on Vegetation above). By the time of the next commissioned survey of wetland invertebrates, by Dr Garth Foster in 2005-06, the status of wetland habitats at Croome had changed significantly. The Croome Lake & River had been de-silted, resulting in the loss of >4ha of swamp habitat with a concomitant increase in open water, whilst new wetlands had been created at Snape and Lickmoor and an existing ditch re-engineered to create Menagerie swale. In 2005 the new wetlands, created in 2003, were still in their infancy, with areas of bare substrate adjoining open water, so it should not be surprising that some of the more notable records were of ‘pioneer’ species. These included the beetles *Hygrotus nigrolineatus*, the first

Worcestershire record of this Notable A species, *Hydroglyphus geminus*, *Scarodytes halensis* (Notable B) and *Rhantus suturalis* (Foster, G. 2005). Dr Foster returned to Croome in May 2006, when his sampling focussed on the field ponds, most of which had been dry following a hot summer when he surveyed in September 2005. He re-found *Berosus signaticollis*, now classified Notable B, not in its original location but in a pond at the southern end of the site which had been overlooked in previous surveys. His records from this survey, combined with those from previous surveys, brought the inventory for water beetles from the site to 90 species, including 38 diving beetles (Dytiscidae) (Foster, G. 2006).

Ten years elapsed before the next commissioned survey of aquatic invertebrates was undertaken, by Andy Foster in 2016. During the intervening period the created wetlands had matured, so that their margins now supported dense growth of common reed and other swamp vegetation, and this was reflected in changes in the invertebrate fauna. For instance, *Hygrotus nigrolineatus* and *Scarodytes halensis*, both species of open water, appeared to have been lost from Snape wetland, but had been replaced by other notable species, such as the Nationally Scarce whirligig *Gyrinus paykulli*, that are associated with the vegetated margins of water bodies. Foster concluded that whilst there were differences in the species composition between his survey and those of his namesake in 2005-06, the overall conservation value of the wetlands, based on water beetles, was broadly the same across the two surveys (Foster, A.P. 2016).



11. Snape wetland. August 2004. Martin Barnett and August 2001 for comparison of vegetation development over time. Simon Barker.

### Amphibians & Reptiles

Great Crested Newts *Triturus cristatus* have been recorded from three ponds at Croome consistently across the structured surveys of ponds, by Barker & Goddard (1996), Watson (2006) and Dewsbury & Dewsbury (2011), always in association with Smooth Newts *Lissotriton vulgaris*. Smooth Newts have been recorded from a further two ponds and from the Snape wetland (Dewsbury & Dewsbury 2011). The largest populations of Great Crested Newts have been recorded from the ice house pond, created to supply ice to be stored in the ice house which was constructed nearby, and eDNA analysis confirmed their continued presence here in 2022. Populations of newts at Croome are constrained by the presence of sticklebacks, both Three-spined Stickleback *Gasterosteus aculeatus* and the more local Ten-spined Stickleback *Pygosteus pungitius*, in the watercourses and several of the ponds. However, Common Toad *Bufo bufo* tadpoles appear to be distasteful to fish and toads may select breeding ponds which contain fish rather than newts. The southernmost pond at Croome, which supports both species of stickleback, has a large breeding colony of Toads (Dewsbury & Dewsbury 2011). Grass Snake *Natrix helvetica* was recorded in the first wetland survey (Barker & Goddard 1996) and continues to be seen on a regular basis, often in the vicinity of the Croome River. In 2013 Slow-worms *Anguis fragilis* and Common Lizards *Lacerta viparia* were translocated to the terrestrial habitat surrounding Snape wetland from a development site at Pershore (Rodway 2013). The receptor site was considered to provide suitable vacant habitat for these species, as it consisted of a scrub-grassland mosaic which had developed naturally on a former arable field which was grossly disturbed during the construction of the wetland in 2003. Subsequent monitoring, supported by habitat management, by NT staff has confirmed the continued presence of both species at this

site. Slow-worms are seen occasionally at other locations on the property.

### Bats

Bats are a well recorded group at Croome, primarily as a consequence of surveys being commissioned in advance of works to restore buildings (e.g. Collins 2015), in order to ensure compliance with protected species legislation, but also through roost counts undertaken as part of the Bat Conservation Trust’s National Bat Monitoring Programme.

There are three known roosts of Lesser Horseshoe Bat *Rhinolophus hipposideros*, the largest being a breeding roost in the restored Temple Greenhouse. A roost in the water tower in the former RAF buildings can be viewed by visitors via a ‘batcam’. Other species recorded include Common Pipistrelle *Pipistrellus pipistrellus*, Soprano Pipistrelle *P. pygmaeus*, Noctule *Nyctalus noctula*, Whiskered *Myotis mystacinus*, Daubenton’s *M. daubentonii*, Natterer’s *M. nattereri*, Serotine *Eptesicus serotinus* and Brown Long-eared *Plecotus auritus*.

### Other Mammals

Brown Hare *Lepus europaeus* was recorded incidentally during the 1996 wetland survey (Barker & Goddard 1996) and continues to be seen at Croome. Signs of Otter *Lutra lutra* were not found in 1996 or subsequent wetland surveys, but in more recent years there have been several sightings of animals in the Croome River - some supported by photographic evidence. Badger *Meles meles* is resident, as are Red Fox *Vulpes vulpes*, Mole *Talpa europaea*, Roe Deer *Capreolus capreolus* and Reeves’s Muntjac *Muntiacus reevesi*.

The only focussed survey of mammals other than bats was undertaken in 2016, when the Worcestershire Mammal Group ran a training session on the Harvest Mouse *Micromys minutus* and found six nests around the Snape wetland (P Morris, *pers. comm.*). Other small mammals recorded, e.g. during the RSK BioBlitz in July 2018, include Bank Vole *Clethrionomys glareolus*, Common Shrew *Sorex araneus*, Pygmy Shrew *S. etruscus*, Wood Mouse *Apodemus sylvaticus* and Yellow-necked Mouse *A. flavicollis*.

### Birds

Birds are perhaps the best recorded taxa at Croome, through both structured surveys and casual recording, but relatively few of the data generated by this recording reach the NT directly - which is not to say that they go unreported, e.g. via BirdTrack where National Trust Croome Park is available as a 'Popular Place'. Prior to the desilting in 2003-05, the Croome River was locally important for breeding Reed Warbler *Acrocephalus scirpaceus*, Sedge Warbler *A. schoenobaenus* (at least 15 singing males of each species recorded by Barker & Goddard in 1996) and Reed Bunting *Emberiza schoeniclus* (at least six singing males recorded by Barker & Goddard in 1996). All three species are still present at Croome, but the main breeding area is now the Snape wetland with smaller numbers found along the River and around some of the other wetland areas. The arable reversion areas, particularly South Park

(east of Croome River) briefly provided good breeding habitat for Lapwing *Vanellus vanellus* until the new grassland swards became well established. Breeding persisted in the vicinity of Lickmoor wetland for several years but has now ceased. In its early days Lickmoor wetland also attracted breeding Shelduck *Tadorna tadorna*, which nested in cavities in pollarded willows, and Redshank *Tringa totanus*. In 2005 a duck and up to three drake pintails *Anas acuta* were present during May, causing some excitement at the prospect of a first breeding record for the Midlands, but the birds had disappeared by mid-June and it was concluded that they had not bred (J.R. Hodson, *pers. comm.*). Passage birds have included Common Sandpiper *Actitis hypoleucos*, Green Sandpiper *T. ochropus*, Greenshank *T. nebularia* and, on one occasion, an Osprey *Pandion haliaetus*. Now that it is more densely vegetated, Lickmoor is less attractive to waders but continues to support wintering Teal *Anas crecca* and occasionally Gadwall *Mareca strepera*, which bred successfully on the Croome River in 2004 following the first phase of dredging (*pers. obs.*). The southern end of the Croome River attracts wintering Wigeon *M. penelope* amongst other wildfowl including large numbers of Canada Geese *Brania canadensis*. Grey Heron *Ardea cinerea* and Little Egret *Egretta garzetta* feed along the River, from where there are recent records of Great White Egret *E. alba*.



12. Croome River attracts wintering Wigeon amongst other wildfowl. 07.11.20. Gary Farmer.

Hawfinches *Coccothraustes coccothraustes* have wintered on several occasions, typically recorded feeding on yew *Taxus baccata* berries close to the Lake, and once a Great Grey Shrike *Lanius excubitor* was seen (*pers. obs.*). Lesser Spotted Woodpecker *Dendrocopos minor* is recorded occasionally, but confirmation of breeding is elusive. Croome Court itself supports a large colony of breeding House Martins *Delichon urbica*, which, together with the dragonflies along the River attract the attention of feeding Hobbies *Falco subbuteo* during the summer. Kestrels *F. tinnunculus* are resident and have increased in number since the holistic grazing regime was established in South Park.

The preceding is a very partial account of the birds of Croome, but the last word should go to the species for which the site is best known – the Nightingale *Luscinia megarhynchos*. Croome has long been known as a stronghold in the county for the species, with the shelterbelts along the southern margin of the site being a particularly favoured location. However, when no birds were heard in 2007 or 2008 (or at least none were heard by NT staff or volunteers and no reports of singing birds were received by the NT) it was feared that the species had been lost from this site which lies on the north-western periphery of its contracting English breeding range. Fortunately, these fears have proved misplaced and in recent years around half a dozen singing males have been present. A survey commissioned in 2016, prompted by a proposal -subsequently

withdrawn- to create a multi-use path around the site, found seven singing males and made recommendations for habitat management to benefit Nightingales which continue to be implemented (Shepherd 2016).

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### Images

01. Croome Park was acquired by the National Trust in 1996 to restore the Grade 1 listed landscape. 07.11.20. Gary Farmer.
02. South Park July 2016, showing herbs and grasses flowering under holistic grazing regime. Simon Barker.
03. Close-up of Pyramidal Orchid, Church Hill, Croome, 02.07.15. Simon Barker.
04. Bee Orchid, Croome June 2021. Sarah Dunsgate.
05. Common Spotted Orchid, Croome June 2016. Katherine Alker.
06. Ancient Small-leaved Lime stools, Lickmoor Coppice, Croome. Simon Barker.
07. *Ampedus elongatulus* reared from larva. Croome, June 2016. Andy Foster.
08. *Ampedus cardinalis*. Croome May 2016. Andy Foster.
09. The largest oak at Croome, South Park, June 2016. Andy Foster.
10. Grizzled Skipper at Old Wood, Croome 17.05.2022. Simon Barker.
11. Hairy Dragonfly was confirmed as the "seventeenth breeding species" in 2022. Croome River 07.06.22. Jill Orme.
12. Snape wetland. August 2004. Martin Barnett and August 2001 for comparison of vegetation development over time. Simon Barker.
13. Croome River attracts wintering Wigeon amongst other wildfowl. 07.11.20. Gary Farmer.