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The changing fortunes of the Dark Bordered Beauty moth at York, 1894-1997, as recorded by the York and District Field Naturalists' Society

Joyce Payne[1], Tara H. Anderson[2], Joseph W. Merrills[2], Daisy Wales[2], Katylily Westbury-Hawkins[2], and Peter J. Mayhew[2]

[1]15 Broad Lane, Cawood, Selby YO8 3SQ

[2]Department of Biology, University of York, Heslington, York, YO10 5DD
Email: peter.mayhew@york.ac.uk

One of the problems facing conservationists is identifying possible threats to the persistence of a species or population. Data on past population fluctuations over time, and their causes, can be valuable in identifying future threats. In this paper we report data on the changing fortunes

of a rare moth in the York region and assess the implications for its future conservation.

The Dark Bordered Beauty moth *Epione vespertaria* (Lepidoptera, Geometridae) is a Red Data Book species (Shirt, 1987), currently only known from a single English site, Strensall Common, about 10km north of York (Baker, 2012; Baker *et al*., 2016). Publications mention Yorkshire as a locality for Dark Bordered Beauty in the 1820s (Stephens, 1829), York itself is mentioned by the 1860s (Walker, 1860) and specific sites around York are mentioned by the 1870s (Anon, 1878). Initially the most mentioned site was Sandburn (e.g. Porritt, 1883), along the Malton Road (A64) , but later the adjacent site of Strensall (Figure 1), to the west of Sandburn, became better reported (e.g. Hewett, 1900). The moth was also collected at Askham Bog, to the south west of York in 1893 by S. Walker & R. Dutton, and again in 1898, but this fact was generally unrecognized until recently (Mayhew, 2018).

Figure 1. "Strensall Common" taken in 1944 by R.J. Batters, © Richard B. Walker. This view shows three entomologists engaged in daytime field collecting. During the Second World War, blackout regulations restricted night-time collection of Lepidoptera. Reproduced with permission from Richard B. Walker.

Because of its restricted distribution, concerns about the possible extinction of the Dark Bordered Beauty at York have long been expressed (Barker, 1886; Anon, 1897; Turner, 1898), and continue (Baker, 2012; Baker *et al*., 2016). A long term record of its changing fortunes would be a potentially valuable source of information for conservation. In a past review of Yorkshire Lepidoptera, Sutton and Beaumont (1989, p.204) reported that the status of Dark Bordered Beauty (at 'Strensall Common') "has been charted from 1894 to the present by the York and District Field Naturalists' Society [YDFNS] (JP [Joyce Payne] pers. comm.)." To evaluate the content of these records, one of us (PJM) visited the Archives of the Borthwick Institute at the University of York where the records are now kept and located the aforementioned records of Dark Bordered Beauty in the annual reports of the Entomology and Lepidoptera recorders. On mentioning this to his former colleague at the University, Terry Crawford, Terry sent him a copy of a typed but apparently unpublished manuscript written by Joyce Payne in 1983 containing most of the same extracts of text, combined with a small number of other observations and records, written to commemorate the publication of Porritt's list one hundred years beforehand and its mention of Dark Bordered Beauty at York (Porritt, 1883). PJM subsequently contacted JP and they agreed to publish the extracts jointly. The other authors here have been involved

in re-checking the records and in finding the other pertinent background literature reported here.

The York and District Field Naturalists' Society (YDFNS) was founded in 1874 at 13, Holgate Road, York, the house of painter but erstwhile entomologist William Prest (1824-1884). The Society, one of many field clubs in the north of England at the time of its founding (Alberti, 2001) served to organize excursions and exchange of natural history information in the York district, and also act as a forum where enthusiasts could gain the "sympathy of a crowd" (Wale, 2018). The Society was an affiliate of the Yorkshire Naturalists' Union (YNU) and its monthly meeting reports featured prominently in *The Naturalis*t, as well as other journals, in its early years. The Society eventually disbanded in 2002. In 2009 the records of the society were transferred to the Borthwick Institute. The records include several biological recording ledger books, two of which are "Entomology" (reference code: YDFNS/3/1/4) covering the years 1894 to 1943, and "Lepidoptera" (reference code: YDFNS/3/1/5) covering 1943 to 1997. These contain the annual recorders' reports on those subjects, which were handwritten in the former volume but in the latter volume often typed on loose sheet paper and pasted in.

Below we report the text from these two volumes relating to Dark Bordered Beauty moth and then discuss its implications. We include the names of the Recorders (i.e. the authors of the annual reports) at the end of each excerpt, where relevant, although some more recent names are withheld to comply with General Data Protection Regulations. The Dark Bordered Beauty is variously referred to in the text either by its usual vernacular name or *E. vespertaria*, *Vespertaria*, *E. parallellaria*, *E. parallelaria* (understandable mis-spellings of the official synonym *E. paralellaria*), 'Red Bordered Beauty' and on one occasion the 'Bordered Beauty' (the vernacular name for a different species, although the context makes it clear that this refers to *E. vespertaria*). Strensall was spelt "Strensal" by Arthur Smith throughout, and Ralph Moore spelt Sandburn "Sanburn", as we have also seen on some specimen labels in museums. We have italicised the scientific names where appropriate although this was generally not indicated in the actual text. Some explanatory text is also inserted in square brackets throughout.

Reports

1894. "*E. vespertaria* (larvae and imagos) Sandburn S.W. [Samuel Walker], W. [William] Hewett"

1895. "Mr Hewett records….*E. vespertaria* not common."

"Noctua. Now I come to a family who love and delight to revel in the dark, and often compels us to keep bad hours, and sometimes have to come rolling home in the morning bogs[?] but to the ardent Entomologist he is always at home amongst his tiny friends whether it be in the bright early sunshine in company with *Vespertaria*, or in the dark midnight hour surrounded by his ever-faithful friends and companions *Polyodon* [Dark Arches] and *Pronuba* [Large Yellow Underwing]." Robert Dutton.

1896. [Evidently R. Dutton] "*Vespertaria* was as usual out in July in fair numbers, in its only habitat [note no mention of Askham Bog], though not so easily captured as formerly owing to the vegetation on the common [presumably Sandburn, though this is not specifically mentioned] becoming more dense."

"*Vespertaria* in the larva state was not difficult to procure."

1897. "Larva of *E. vespertaria* were swept by the 25th [June]." Samuel Walker.

1898. "[May] 19 Mr Dutton gives the hatching of ova of *E. vespertaria*. Mr Hewett on the 25th…..[;] June 5 I have a record giving the larva of *Vespertaria*… as half grown….[;] July 13th

Larvae of *E. vespertaria* described as "full fed" Mr. H. [Hewett]." S. Walker.

1899. [Report not signed but is in the handwriting of William Hewett] "*Epione vespertaria* was taken in the larval and imago state at one of its few British localities Sandburn Common near York by Messrs Hawkins Dutton Walker Ash & Hewett."

1900. "Mr John Hawkins send me the following particulars of captures….July *Epione vespertaria* Sandburn at rest and on the wing."

"Mr R. Dutton reports….larvae of *Epione vespertaria* common at Sandburn Common and says a large percentage were ichneumoned…."

"Mr William Hewett's most interesting captures for the year are as follows….June 21...larvae of *Epione vespertaria* obtained at Sandburn."

"July 15, Mr Thwaytes of Carlisle & I at Sandburn Common in the evening we got *E. vespertaria*…. August 1st L. S. Brady of Sheffield & self at Sandburn we got several *Vespertaria* male and female but they were mostly worn." William Hewett.

1901. No annual report. 1902. No mention.

1903. "July 1 1903 Mr R. Dutton (one of our worthy and much esteemed veterans) obtained larvae of *Epione vespertaria* the Bordered Beauty moth at Sandburn near York, its principal habitat in Britain…." William Hewett.

1904. No mention.

1905. "It is gratifying to note that notwithstanding the large numbers of larvae which are obtained each year by some of the York collectors and their friends, the very local *Epione vespertaria* was in abundance near York on the night of 15th July…" William Hewett.

1906-1907. Reports missing, two blank pages, and the next report is written by a new recorder.

1908. No mention.

1909. "On Jan 25th 1910 a paper on the Entomology of York district for 1909 was delivered to our members by Mr G. Machin, and he gives a full list of 133 different species noted or captured by him during the year. ….among other interesting insects may be noted, on Strensall Common….. *Vespertaria* (scarce)…." Ralph Moore.

1910. [Moore's records] "July 27th… *E. vespertaria* [at Sanburn]…. On the 29th [July] *E. vespertaria*… taken at Sanburn. Sanburn again on July 31st….*E. vespertaria*… Sanburn August 3rd…*E. vespertaria*…. Sanburn August 6th…*E. vespertaria*." Ralph Moore.

1911. No report.

1912. [A. Smith's list of captures for the year]"…, *E. vespertaria*,…".

1913. "My next entry is for July 12 at Sandburn, *E. vespertaria* being the best capture. The home of this species is getting much overgrown, which stunts the growth of the Dwarf sallow, its food plant, making the insect more difficult to get each year." Barry Varey.

1914. "At Strensal on the 11th of July I took 10 male *Vespertaria* & several more on the 18th including 1 female.… At Strensal on Aug 1st I took 4 female *Vespertaria.*" A. Smith.

1915. No mention. 1916. No annual report.

1917. "At Strensal on the 22nd [July] I took a var of the Red Bordered beauty (*Epione vespertaria*) without the network markings in the centre of the wings [probably *ab. fulva* Cockayne, 1934],

& also several females in the daytime." A. Smith.

1918. [Report contains just a single paragraph and was evidently unfinished but in A. Smith's handwriting]. No mention.

1919. "On July 8th at Strensall….*E. vespertaria* was very scarce, the place where I knew it so well being destroyed by fire. A later visit to Sandburn yielded a few males & one female…." A. Smith.

1920. [not signed but in A. Smith's handwriting] "I tried several times in the early part of August for our old friend *E. vespertaria*, but it never turned up." [Probably referring to Sandburn].

1921. "I visited Sandburn early in August to see how the Red Bordered Beauty was faring but was disappointed to find none, I also tried Strensal but in vain, the fire of 1919 seems to have exterminated the species altogether in its old haunt at the Malton Road end of the Common." A. Smith.

1922. "Only once during August I visited Strensal Common to see if *E. vespertaria* was still in existence, but was not successful in seeing it…. The following records have been handed to me by Mr Fabian……Aug 6th he took 1 male *Vespertaria* on the Common [Strensall]." A. Smith.

1923. No mention.

1924. "Early in Aug I visited Strensal & had the pleasure of capturing our old friend *Vespertaria*, 2 males & 1 female, this came as a surprise, we had almost given up hope of seeing it again, the fire in the locality a few years ago practically exterminated it & the felling of timber in the adjoining woods also took its toll." A. Smith.

1925. "At Strensal in late July also three specimens of the Red Bordered Beauty (*E. vespertaria*), these two records are the most cheering as recently we have been afraid of their disappearing from our list altogether." [Handwriting and spelling is A. Smith's.]

1926. "A gardener near Murton…. asked me to name certain insects he had caught & set ["on Strensal Common"], among them being *Vespertaria* & *Strigillaria* [Grass Wave] neither of which I have been able to record myself this year." A. Smith.

1927. "The following day July 24th I had the privilege of seeing our old friend *E. vespertaria* at Strensal, for some years the fate of this species has been in the balance, but this season it seems to have survived the storm, the Dwarf Sallow on which the larvae feed were almost underwater, but one good omen in its favour, was the fact of seeing myself 5 females; this being a good number, even as compared with the old days when the insect was plentiful….. Mr Fabian records….Strensal 7th & 14th Aug a few *Vespertaria*, one female." A. Smith.

1928. "On July 19th at Strensal again, *E. vespertaria* I am pleased to say still survives & doing well, the early swamp had not taken its toll altogether. I found two females, later in the evening….a few male *Vespertaria* but no females."

"Mr Machin records….On the afternoon of July 20 & again on July 23 visited my old *Vespertaria* ground on Strensal Common & found the insect fairly plentiful, but apparently in a very limited area & therefore forebore to take more than 2 or 3."

"Mr Sowden records….last two weeks in July…*Vespertaria* few females, <u>no males</u>." A. Smith.

1929. "At Strensal on June 17th I found several larvae of *E. vespertaria* almost full fed …"

"On June 26th…Coming back by Malton Rd I called at Strensal & picked up a few more *Vespertaria* larvae…" A. Smith.

1930. “June 16th at Strensal I had the pleasure of sweeping half a dozen *E. vespertaria* larvae off the Dwarf Sallows.”

“At Strensal on Aug 1st I made captures of …*E. vespertaria*.” A. Smith.

1931. “Strensal on the 22nd June….on the Dwarf Sallow I swept larvae of *E. vespertaria*…but [compared to other species] *Vespertaria* were rather scarce.”

“At Strensal on July 21st I took several *E. vespertaria*. *Vespertaria* I am pleased to report is steadily increasing. I myself found 7 females in two visits, all in daylight, for years past it was nearly impossible to find a female at all, especially in the day-time, it usually comes out about midnight & then has to be carefully searched for.” A. Smith.

1932. No mention.

1933. “On the 23rd of June *E. vespertaria* larvae were found feeding on the Dwarf Sallows in the same habitat as usual, successive fires in the last few years no doubt having diminished the species a good deal, it is pleasing to report its survival. …On July 12th *E. vespertaria* was on the wing….” A. Smith.

1934. “At Strensal on Aug 8th *E. vespertaria* was seen again but very scarce.” A. Smith.

1935. “On July 22nd I visited Strensal again, *E. vespertaria* being the objective, only one specimen of a male was found.”

“Aug 3rd at Strensal again….three specimens of *E. vespertaria*.” A. Smith.

1936. “On July 20th I bred out two *E. vespertaria*, both males.” A. Smith.

1937. ”On June 12th [near an oak tree behind Sandburn]…*E. vespertaria* [larvae] were certainly more plentiful on this part of the common than I had seen elsewhere. These emerged on Aug 5th.” A. Smith.

1938. No mention.

1939. [Insert taped into the book, unsigned but in A. Smith’s hand]. “Records for 1939. On the 6th of June *Epione vespertaria* larvae were found at Strensal, three were duly reared.”

1940 and 1942. No mention. 1941. No annual report.

1943. [Pasted in, before 1942]. “*Epione parallelaria*. While beating larvae from Birch on Strensal Common on July 27th one male *parallelaria* was captured. Further search amongst the Dwarf Sallow revealed many others, including two females one of which laid a number of eggs which I hope to rear next year. This part of the common has been badly mutilated by military manoeuvres recently, but so far this rare local insect fortunately still survives.” [Hand of A. Smith].

1944: “662 [the number of this species in one check list] *E. parallellaria* Schiff Strensal Common. Still surviving after tanks have almost ruined the area. Males were disturbed in fair numbers 25/7.” [Spelling of “Strensal” suggests it was written by A. Smith].

1945-1956. No annual reports.

At the start of the second volume “Lepidoptera” is a numbered species list by Heslop (published 1947) “stuck in this book by the late Arthur Smith of York c. 1949 and the first entries made by him”. Dark Bordered Beauty appears as number 839. Next to this number some records are briefly noted. Most of these repeat some of the records elsewhere in this and the other volume, but the following two do not:

"1946 Strensall". [This is an erroneous record listed in the original manuscript by JP under "K. G. Payne accompanied Arthur Smith on a sugaring expedition to the Towthorpe Lane site and brought one specimen 13/7". We have checked this information against the specimen label, which is of a male, but captured in 1947: "Strensall 13/7/47"].

"1979 reported".

1957. "Strensall Common was visited many times….not forgetting the Dark Bordered Beauty. Strensall is now about the only known locality for this species." [No recorder mentioned, but Eric Richards of Holgate, York, was the recorder 1957-67.]

1958-59. No mention.

1960. "At Strensall I saw….Dark Bordered Beauty…"

1961. "Our local rarity the Dark Bordered Beauty was also present in fair numbers…"

1962. "At Strensall…while our local rarity, the Dark Bordered Beauty was very scarce, the whole area where it occurs having been burned off by an early spring heath fire."

1963. No mention.

1964. "Our local rarity – the Dark Bordered Beauty, occurred in fair numbers at Strensall Common, this was very pleasing for Strensall Common had suffered badly from fires early in the year, it has just been redrained by the Army and I fear that this may make it drier still and thus more prone still to fire, this of course can only result in a further reduction in the insect population." [Figure 2 p111].

1965. "On the 11th August we held a meeting at Strensall Common and a female Dark Bordered Beauty was found. I introduced this moth on to the [Yorkshire Wildlife Trust] Nature Reserve - this makes 2 females which I have released on the Reserve, let's hope they multiply and become a thriving colony." E. Richards.

1966. "The Dark Bordered Beauty, our local rarity was once more fairly common on Strensall Common during August."

1967. [At Strensall]. "The Dark Bordered Beauty was seen in fair numbers, this is now the only known place ti [mis-typed] occurs in the British Isles."

1968-1979. No annual reports.

The following record is mentioned in the original manuscript by JP "1971---…observed *E. vespertaria* at Strensall Common 18/7", but this is not in the annual reports, which are missing.

The next line says "1978--- 2 female and 1 male Dark Bordered Beauty were observed on pine trunks on Strensall Common one evening".

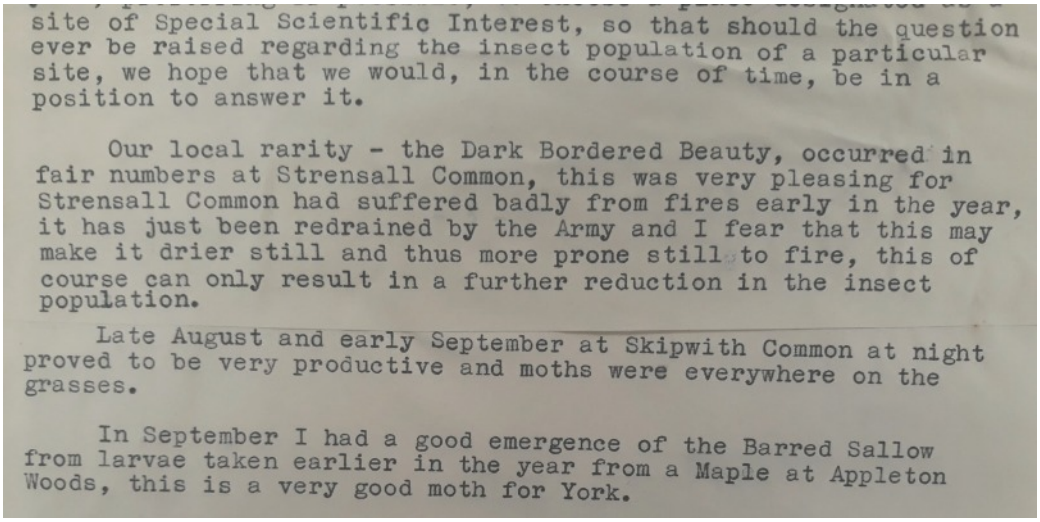
1980-1982. No mention.

1983. "Among the Strensall specialities found….also the Dark Bordered Beauty".

1984-1992. No mention.

1993. "…has again sent me a good list….mostly from VC61-62….the most notable are ….Dark Bordered Beauty…."

1994-1996. No mention.



site of Special Scientific Interest, so that should the question ever be raised regarding the insect population of a particular site, we hope that we would, in the course of time, be in a position to answer it.

Our local rarity - the Dark Bordered Beauty, occurred in fair numbers at Strensall Common, this was very pleasing for Strensall Common had suffered badly from fires early in the year, it has just been redrained by the Army and I fear that this may make it drier still and thus more prone still to fire, this of course can only result in a further reduction in the insect population.

Late August and early September at Skipwith Common at night proved to be very productive and moths were everywhere on the grasses.

In September I had a good emergence of the Barred Sallow from larvae taken earlier in the year from a Maple at Appleton Woods, this is a very good moth for York.

Figure 2. A page from the "Lepidoptera" recorder's annual report book of the York and District Field Naturalists' Society, showing the 1964 report typed by Eric Richards. This report expresses concern at the effect of heath fires on the Dark Bordered Beauty population at Strensall. Reproduced from an original in the Borthwick Institute, University of York (YDFNS/3/1/5).

For "1997 >" there is a Bradley & Fletcher species check-list written out in numbered order, with just two records for 1997 against two butterflies; Holly Blue and Peacock, and there is no entry for Dark Bordered Beauty.

Discussion

The above text contains many previously unpublished records of Dark Bordered Beauty from the York area. The records document interesting biology, potential population fluctuations, including the disappearance of the moth from Sandburn, along with several potential causes of these fluctuations.

One of the most striking changes in the records is how their location changes from Sandburn in the early records to Strensall in the later records. Sandburn is first mentioned in 1894 and last mentioned in 1937. However, this last mention is ambiguous as it refers to a location "behind Sandburn". The previous unambiguous record from Sandburn is from 1919. This was followed by two years in which the moth was not recorded from either Sandburn or Strensall. The record books indicate that Arthur Smith went to Sandburn many times each year for many years afterwards and, given the absence of further records, it seems likely that the Dark Bordered Beauty effectively went extinct there around 1919. In contrast, Strensall records range from 1909 to 1983 and the moth is still extant there. The absence of earlier records from Strensall probably does not indicate that it was formerly absent there, but rather that Sandburn was a more profitable and accessible (and well-published) site in the days before motor transport, being a short walk along the Malton Road from Warthill Station, and access was not limited by military training. Records from museum specimens and published works may further confirm when extinction of Dark Bordered Beauty at Sandburn occurred, and these are currently being assembled.

Some potential causes of the Sandburn extinction are mentioned in the records: in 1896 Dutton mentions the vegetation becoming dense. In 1913 Varey mentions the vegetation becoming overgrown and unsuitable for the host-plant, Creeping Willow *Salix repens*, and indicating a decline in the population of Dark Bordered Beauty. In the following few years the records are mainly from Strensall, perhaps indicating that it was becoming a more profitable site to visit. In 1919 a fire is mentioned as destroying a site where the moth occurred on Strensall Common but in 1921 this fire is indicated to have been at the Malton Road end (i.e. eastern side) of the Common (perhaps Worlds End). Timber felling is also mentioned as a contributor in 1924, presumably because of the effects on other vegetation. It seems therefore that Dark Bordered Beauty declined at the eastern end of its York range simultaneously, and from more than one cause. The population at Strensall evidently recovered, but not that at Sandburn, which was subject to a more systemic deterioration in habitat quality. The 1854 OS six-inch map shows that much of Sandburn was already forested, though possibly of quite an open nature, and the area behind the Windmill Inn (now the Four Alls pub) known as 'The Kings Moors' contained heathy areas, some extending north-west to Worlds End and Wild Goose Carr. The 1912 map shows the heathy area at Kings Moor much reduced by afforestation. Sandburn and Kings Moor today contain mature conifers and some more mixed woodland areas, with a sometimes-dense understorey of Rhododendron. Both "Kings Moor Plantation and Sandburn Wood" were listed in the draft City of York Biodiversity Action Plan (City of York Council, 2013) under the category of "Sites of Local Interest for Lowland Heath and Acid Grassland" as an "Area of conifer woodland with relict heath and acid grassland on ridesides and beneath woodland." Given the success of heathland restoration projects nationwide (https://www.forestry.gov.uk/forestry/infd-6tt9qt), including at Worlds End and other Yorkshire sites, habitat restoration of Sandburn would still seem possible.

The above mention of fire is not the only one; fires are also mentioned as destructive in 1933, 1962 and 1964. In 1964 drainage is mentioned as a potential contributor to future fires. The damaging effects of fire were experienced again in 2009-10 by the destruction of a part of the best breeding habitat for Dark Bordered Beauty (Baker, 2012; Crawford, 2012; Baker *et al*., 2016). Creeping Willow can survive fire in its subterranean parts but the overall density and size of patches can be badly affected (Baker *et al*., 2016). In contrast, floods are mentioned as a concern in 1927-28, although no ill effects were detected. Floods during winter might not be damaging to dormant eggs, although there is no firm data on this. Larvae might be more affected but could potentially relocate, and flooding is probably less common in May or June (when larvae are present) than in winter (when eggs are).

Other threats mentioned include damage by military activities in 1943-1944, although the moth again survived; and potential damage by collectors at Sandburn in 1905. Damage from military activities has been much reduced since 1945 and may reduce further with the closure of the Strensall barracks, though that may bring other new challenges. The absence of, or presence of short or unfinished, reports during times of war (1914-1918, 1939-1945) reminds us that biological recording becomes something of a low priority during wartime. In addition, blackout regulations in both world wars must have restricted night-time recording of moths. Recording may have become especially difficult in the case of Dark Bordered Beauty because Strensall Common is a military training area, with presumably more restricted access.

Damage to rare insect populations from collectors was a very pressing concern in the 19th Century. The severity is mentioned by Morris (1871) who notes over 200 being taken by one collector, and Turner (1898) relates how some collectors took that many in a single day, and

returned every day for a fortnight. This may explain why the presence of Dark Bordered Beauty at Askham Bog was apparently unpublished by the collectors themselves (Mayhew, 2018). It is telling that one of these collectors, Robert Dutton, mentions Sandburn as "its only habitat" in 1896 above, despite collecting it at Askham in 1893. William Hewett, who expressed concern at the effects of collecting in 1905 above, also wrote a paper (Hewett, 1900) adding to the Dark Bordered Beauty sites mentioned by Porritt in 1883 but does not mention Askham Bog. Hewett was a very close friend of Dutton and Walker, who collected Dark Bordered Beauty at Askham, and must certainly have known about it, but he omits mention of it here. It seems likely therefore that the Askham population was kept secret for fear of attracting collectors to it. Collecting during the 19th and early 20th Centuries would have been concentrated at Sandburn and may have contributed to the loss of the Dark Bordered Beauty there. Almost all amateur lepidopterists today take photographs where possible rather than specimens, so the risk today is much lower, if still tangible.

One interesting record is of a female (the second of two) being released onto the Yorkshire Wildlife Trust (YWT) reserve in 1965 by Eric Richards. The YWT reserve was subsequently and for many years a favoured place for the public to find the insect and was noted as a 'hotspot' by Robertson (2005), although the moth did become extinct in the reserve area covered by the monitoring transect in 2011 and has still not recolonized it (Baker *et al*., 2016). Translocations of females might be a simple way of spreading the population onto new locations on the Common, as well as to other sites in future, given that it seems to have worked in the past. However, Anon (1886) mentions Carrington and Prest having attempted several unsuccessful introductions to other sites.

Another feature of the records above is how often the population seemed to fluctuate from common to scarce: in sequence the comments indicate: 1895 "not common", 1896 "fair numbers", 1905 "in abundance", 1909 "scarce", 1913 "more difficult to get each year", 1919 "very scarce", 1920 "it never turned up", 1921 "I tried in… vain", 1922 "was not successful", 1924-25 small numbers found, 1927 "a good number", 1928 "doing well" "fairly plentiful but… in a limited area", 1931 "steadily increasing", 1934 "very scarce", 1935 "only one", 1943 "many", 1944 "fair numbers", 1961 "fair numbers", 1962 "very scarce", 1964 "fair numbers", 1966 "fairly common", 1967 "fair numbers". The lack of records in later years is apparently because Strensall was less commonly visited and monitored, with moth records being dominated by those from garden light trapping. Caution should be applied to these anecdotal observations, as standard monitoring has shown that the flight season of Dark Bordered Beauty can vary by around two weeks annually and can be only 2-3 weeks in duration, so absence or scarcity on a particular day does not mean that the population was low that year. In addition, numbers at a particular locality might not represent the population more generally, for concentrations can occur in very limited areas (Robertson, 2005). These misgivings accepted, the observations are consistent with the more recent changes in numbers experienced since the monitoring transect was set up (Baker *et al*., 2016). It is therefore likely that the Sandburn-Strensall population has gone through successive bottle-necks and, combined with the general loss of range, this implies that the population is particularly at risk both genetically and demographically. It is remarkable that it has survived to this day given the threats and fluctuations implied in the records. It is important that this 'survival' history does not lead to complacency about its future, as has occurred in the past (Baker *et al*., 2016).

The mention of the specimen collected at Towthorpe Lane (the southern end of the Strensall Common SSSI) in 1947 is interesting, as this is a less commonly surveyed locality in the live

firing zone of the army training range. The last record in the Yorkshire moth database from this most southern part of the Common is from 1960 (www.yorkshiremoths.info), although there is a record from a little further north from 2004. Surveys on single days in July 2013 and 2018 failed to locate it there, despite the presence of Creeping Willow. It may be that the Dark Bordered Beauty has disappeared from this end of the Common.

A final interesting observation is the comment in 1900 by Dutton that a large percentage of larvae had been "ichneumoned". Further studies of parasitoid-induced mortality might be interesting given that this can sometimes drive host insect fluctuations, and might be implicated in the declines of some other Lepidoptera (e.g. Gripenberg *et al*., 2011). The presence of specialist parasitoids would add an extra incentive to conservation action for both the moth and its parasitoids.

Overall, the YDFNS annual recorders reports provide remarkable and very personal insights into the changing fortunes of one of Britain's rarest Lepidoptera species, as seen through the eyes of the locals who knew it best. It is possible that examination of specimen labels in museums and of the published literature will similarly reveal evidence for some of the changes suggested above, and this work is in progress. The records might contain many other insights into the past biology of other Lepidoptera in the York district, and also contain a rich social history of a local group of enthusiasts. This legacy is one which the YNU has done much to encourage through the years.

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