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THE ENTOMOLOGICAL HISTORY OF PRESTWICK CARR

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Introduction

Prestwick Carr is an area of lowland wetland, generally about 53m above sea level and approximately 5km^2 in area, between Dinnington and Ponteland in the south of the old Northumberland (Figure 1). Most of the remaining carr, containing the Site of Special Scientific Interest (SSSI) and the Newcastle upon Tyne council nature reserve, is now in Tyne and Wear, with the western areas of the armed forces firing range and the Prestwick Mill Farm still in Northumberland.

Prestwick Carr has long been of entomological interest, especially for beetles. It originally had a considerable amount of open water as well as a number of terrestrial habitat types but was changed by extensive drainage in the mid 1850s. The habitat pattern on the carr was affected by agriculture, with the nature reserve area used as pasture for sheep and cattle and the drier northern area surrounding the SSSI a mixture of pasture and arable land. The northern half of the nature reserve is now the wettest part of the carr, with standing water in the winter on a substrate of peat. The effects of ploughing and reseeding appear to have reduced the peat component in the soil of fields in the south of the nature reserve and the fields in the south-west of the reserve have clay soils. However, Prestwick Carr is still one of the few areas in the region with lowland peat, a substrate that can profoundly affect invertebrate species distributions, especially beetles (Luff, Eyre and Rushton, 1989).

The insect species recorded from Prestwick Carr provide an insight into the types of invertebrate habitat present before changes brought about by more intensive agriculture, especially drainage. They also show temporal change in habitat types and show the effects of

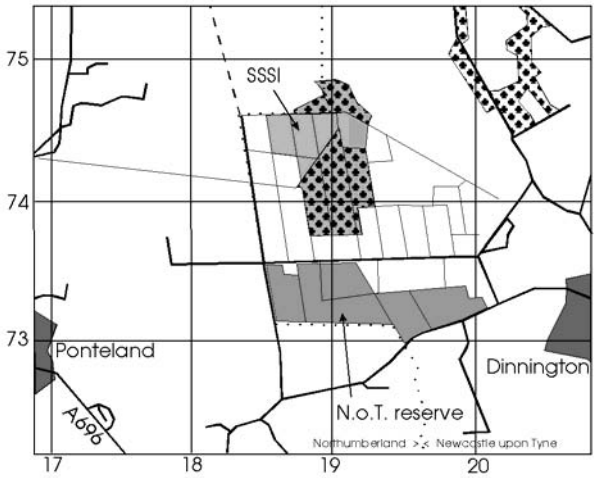

Figure 1 Map showing the location of Prestwick Carr, in the 1km NZ national grid squares, showing the Northumberland/Newcastle upon Tyne border, the Site of Special Scientific Interest (SSSI) (with shading showing woodland) and the Newcastle upon Tyne (N.o.T.) nature reserve.

the continuing agricultural use on the carr. The old and present habitat types and the changes through time are discussed below, as are the nationally rare and scarce species recorded from Prestwick Carr.

History of entomological recording on Prestwick Carr

The first published records of invertebrates appear to be beetle species in the catalogue of Hardy and Bold (1850). These authors collated a number of records generated by George Wailes in the 1820s and some other species records were incorporated into the journals of Thomas John Bold, now held in the Hancock Museum. Bold worked in a corn merchant in central Newcastle in the 1840s and with James Hardy, a school teacher then resident in Gateshead, started the systematic recording of invertebrate species in north-east England. Records in Bold's journals, extracted by D A Sheppard, indicate that he started collecting beetles in Prestwick Carr in 1844 and he appears to have continued work there until 1865, after which he became ill, limiting field work. Bold's journals contain records generated by John Hancock and James Hardy in the years before 1850 but Bold appears to have been the only regular visitor to Prestwick Carr between 1844 and 1865, with James Hardy concentrating on sites to the south of the River Tyne such as Gibside, Boldon Flats and South Shields. Most of the published records from Prestwick Carr appear in the early beetle catalogues of Hardy and Bold (1850, 1854) with some more records in the national entomological press and in Bold's final catalogue (Bold, 1872).

There was some limited recording on the carr by R S Bagnall in the early years of the twentieth century (Bagnall, 1907). There was more systematic work in aquatic sites in the area by Joyce Omer-Cooper in 1930 who published records from 'Prestwick' (Omer-Cooper, 1931). Woodcock (1954) gives records for Prestwick Carr by the Rev C E Tottenham in 1930 but there are a considerable number of errors in this paper (Eyre and Foster, 1984) and care is needed in interpretation. Eales (1970) listed a number of water bug species records but the most active work on the aquatic habitats about this time was carried out by G N Foster in 1967 and 1970, with some recording of beetles by I.Wallace in 1970, probably as a result of caddisfly recording. Around 1970 pitfall traps were being used to monitor crane fly distribution at Prestwick Whins, to the south of the carr, and the ground beetles trapped were identified by M L Luff. There was recording of water beetles from both permanent pools and ditches in 1981, 1982 and 1985 by M D Eyre and.C A M Reid did some hand collecting of beetles on the carr in 1983 and 1984 and M D Eyre used pitfall traps on some of the marshier areas of the carr in 1985. In 2002, English Nature commissioned work carried by M D Eyre, M L Luff and J C Woodward on the nature reserve, with pitfall trapping, sweep sampling and yellow pan traps used to sample beetles, bugs, spiders and flies.

Invertebrate habitats on Prestwick Carr

Records of invertebrates, mainly beetles, from Prestwick Carr, incorporating T.J.Bold's oldest records and his first work there in 1844 up to our recording in 2002, are shown in the Appendix, listed by habitat type; the nomenclature follows Ball (1997). The oldest records from Prestwick Carr indicate that the area was a mixture of heathland, wet grassland and a number of types of aquatic habitats. The moth species noted in Bold's journal for 1844 (*Phragmatobia fuliginosa*, *Lasiocampa quercus*, *Macrothylacia rubi* and *Pavonia pavonia*), as well as the record for the large heath butterfly (*Coenonympha tullia*) by John Hancock, are all heathland Lepidoptera. These tie in with the records of the ground beetle species *Carabus arvensis* and *C. nitens* and the older record by George

Wailes of the leaf beetle *Calomicrus circumfusus* (Hardy and Bold, 1850), which are also heath species. The two ground beetle species now only occur on moorland in the region (Eyre, Luff and Ball, 1986). The ground beetle *Bradycellus ruficollis* and the weevil *Micrelus ericae* are both associated with heather and were recorded from the carr in the 1840s (Hardy and Bold, 1850, 1854) whilst the heather beetle (*Lochmaea suturalis*) was still on Prestwick Carr in 1905 (Bagnall, 1907). No specific heath and moor species appear to have been recorded from Prestwick Carr since the beginning of the twentieth century.

A number of wet grassland ground beetle species (*Agonum moestum, Bembidion biguttatum, Pterostichus nigrita*) were also recorded by Bold from Prestwick Carr in the 1840s. These species were found again in the 1970s and 1980s in the pitfall trapping and they are still abundant on the carr, as are other species of this habitat such as *Agonum piceum* and *Pterostichus diligens*. Two species thought of as too common by Bold for him to give localities in his catalogues, *Carabus granulatus* and *Pterostichus versicolor*, were found to be abundant on the carr in 1985 and are still present on the wet grassland. However, these are now rare species in the region (Eyre, Luff and Ball, 1986) and they are good examples of species badly affected by the systematic drainage of agricultural land. The effects of drainage and increased use of the carr as pasture for sheep and cattle was reflected in the recording in the 1970s and 1980s of ground beetle species preferring open habitats (*Amara apricaria, A. aulica, A. plebeja, Bembidion guttula, B. lampros*), species which were also found in 2002.

In addition to the species of wet grassland, there are old records (Hardy and Bold, 1850) of ground beetle species with a preference for marshes and the edges of open water (*Agonum marginatum, Blethisa multipunctata, Elaphrus cupreus, E. riparius, Pterotichus anthracinus*). Bold also records weevil species feeding on water plants (*Litodactylus leucogaster, Phytobius comari*) whilst there are also records for aquatic reed beetles (*Donacia bicolora, D. cinerea, D. crassipes*) (Hardy and Bold, 1854; Bold, 1872), indicating emergent vegetation in large, open water bodies. *Pterostichus minor*, a ground beetle of very wet sites including marshes, now appears to be the only species recorded both in the 1980s and in 2002 that is indicative of the presence of marshy areas on the carr. The presence of open water wa also indicated by the presence of the large pond and lake water beetle species *Coelambus novemlineatus, Hygrotus inaequalis, H. quinquelineatus, Hyphydrus ovatus* and *Potamonectes assimilis* (Hardy and Bold, 1850; Bold, 1858, 1866). Open water species (*Haliplus fulvus, H. immaculatus, Laccophilus minutus, Hygrotus inaequalis*) were recorded from the carr in 1970 but these were not recorded in the 1980s or in 2002.

Water beetle species usually found in more vegetated aquatic sites were also recorded in the 1850s. These include *Hydroporus melanarius, H. morio, H. obscurus and H. tristis* (Hardy and Bold, 1854; Bold, 1858) now only found in upland mires and mosses in the region (Eyre, Ball and Foster, 1985), where they are usually found in Sphagnum moss. *Agabus unguicularis* was recorded from the carr by Bold (Hardy and Bold, 1850) but Omer-Cooper (1931) found more water beetle species of vegetated ponds and ditches in 1930 (*Agabus sturmii, Hydroporus palustris, Ilybius guttiger*). All these species were found on the carr in the 1970s and 1980s, together with other species of this type of habitat (*Hydroporus angustatus, H. erythrocephalus, H. memnonius*). A number of these species now occur in the large ditches traversing the carr, including the scarce *I. guttiger*.

Specialised water beetle species of temporary water bodies (*Agabus labiatus, A. montanus, A. nebulosus*) were also recorded by Bold in the 1840s (Hardy and Bold, 1850). *A. montanus* was found on the carr in the 1980s, together with other temporary water species

(*Coelambus impressopunctatus, Helophorus aequalis, H.brevipalpis, H.grandis*). The presence of the *Helophorus* species, *A. montanus* and *Hydroporus planus* in a number of water bodies on the carr in 2002 indicated that temporary water was likely to be the main aquatic habitat now present. *Agabus guttatus* and *A. paludosus*, species of slow-flowing vegetated streams, were found by Bold on the carr in the 1840s and another, *A. didymus*, was recorded by Omer-Cooper (1931) in 1930. The ditches on the carr now appear to act as long, thin ponds with no or very slow flow. No species of slow-flowing water have been recorded from the carr since 1930. Omer-Cooper also recorded a number of fast-flowing stream species (*Oreodytes sanmarkii, O.septentrionis, Platambus maculatus, Stictotarsus duodecimpustulatus*) from Prestwick whilst the Rev C E Tottenham is given as the source of a record for *Brychius elevatus* in 1930 by Woodcock (1954). *B. elevatus* is a species usually in fast-flowing rivers and it may be that the River Pont is more likely to provide the habitat for these fast-flowing stream and river species than anything on the carr.

Nationally rare and scarce species on Prestwick Carr

A number of nationally rare and scarce invertebrate species have been recorded from Prestwick Carr, both in the past and in 2002. These species are listed below and the national statuses are given by Kirby (1992) and Hyman and Parsons (1992, 1994) (Red Data Book 2 (Vulnerable), RDB2; Red Data Book Insufficiently Known, RDBI; Nationally Scarce A, Na; Nationally Scarce B, Nb; Nationally Scarce, Ns).

Hemiptera

Capsus wagneri Ns. This is a bug species of long established wetlands (Kirby, 1992), such as those found at Prestwick Carr. It was found at sites all over the carr in 2002 but there are few other local records.

Coleoptera

Carabus nitens Nb and *Calomicrus circumfusus* Na. Both these species were recorded on the carr before 1850 (Hardy and Bold, 1850, 1854) and whilst *C. nitens* is found on the drier moorland in the region, *C. circumfusus* is a southern British species, usually associated with gorse (Hyman and Parsons, 1992).

Blethisa multipunctata and *Pterostichus anthracinus*, both Nb. These are ground beetles of marshy sites, both recorded from Prestwick Carr before 1850 (Hardy and Bold, 1850). *B. multipunctata* is rare in the region but we have recent records from Callerton (NZ1768) in 1991 and near Prestwick Carr at Brenkley (NZ2275) in 2002 whilst *P. anthracinus* is a mainly southern British species (Luff, 1998) and there are no other north-east England records.

Donacia bicolora RDB2, *Donacia crassipes, Litodactylus leucogaster, Phytobius canaliculatus* and *Phytobius comari*, Nb. The *Donacia* reed beetle species were recorded by George Wailes from Prestwick Carr before 1830. *D. bicolora* is associated with bur-reed and now very rare in Britain and confined to southern England whilst *D. crassipes* is found throughout Britain with water lilies as its foodplant. The other species are wetland weevils recorded before 1850 (Hardy and Bold, 1854; Bold, 1872). We have no recent records of these species in the region and they have probably been badly affected by land drainage.

Coelambus novemlineatus, Hygrotus quinquelineatus and *Stictonectes lepidus* Nb. These lake water beetle species were found on the carr before and in the 1850s and 1860s (Hardy and Bold, 1850; Bold, 1858, 1866). There are post-1970 records of *C. novemlineatus* from

two loughs in the west of Northumberland, a record of *H. quinquelineatus* from Big Waters in 1960 and several recent records of *S. lepidus* from quarry ponds in the region (Eyre, Ball and Foster, 1985) .

Agabus labiatus Nb. A temporary water beetle found on the carr in 1844 and 1846 by Bold (Hardy & Bold, 1850). It was not found in a survey of temporary water bodies in the late 1980s in the south of Northumberland (Eyre *et al*., 1992) and there are no recent records in north-east England.

Agabus unguicularis and *Ilybius guttiger*, both Nb. *A. unguicularis* was recorded by Bold on the carr in 1846 (Hardy and Bold, 1850) and found by in the old peat cutting in the middle of the carr in 1982 and 1985. It was not found in 2002 when there was no standing water other than that in the ditches. It is not uncommon in the region. *I. guttiger* was first recorded from Prestwick by Omer-Cooper (1931) in 1930 and in the old peat cutting to the east of the north of the nature reserve in the 1980s. This cutting now appears to have no standing water but it was found in the ditch to the west of the nature reserve and the west-east ditch in 2002. It is a species of lowland vegetated sites with permanent water and we have a number of other recent records for this species in north-east England.

Oxystoma cerdo and *Mantura rustica*, both Nb. *O. cerdo* is a seed weevil species of rough grassland that has been taken a number of times in the region (Luff, Eyre and Jessop, 1996) whilst *M. rustica* is a leaf beetle associated with *Rumex*, usually on sites with sandy soils (Hyman and Parsons, 1992) and recorded from a sediment by the River Tyne (Eyre, Luff and Lott, 2000).

Cercyon lugubris Ns. A species found in dung of various kinds (Hyman and Parsons, 1992), it is a widespread but local species. It was found in a pasture to the south of the carr used by both sheep and cattle.

Cercyon tristis Nb. This is a water beetle and was found in the west-east ditch between the SSSI and the nature reserve in 2002. It is a species of vegetated ponds and ditches and we have six post-1970 records for County Durham and one for Northumberland.

Bryoporus crassicornis RDBI. This is a very rare rove beetle species, taken from a yellow pan trap near the south-western corner of the nature reserve in 2002. The four post-1970 records in Britain for this species are all from the region, including this one, and all recorded by M L Luff and M D Eyre. One was taken in a net on a vehicle-mounted net near Riding Mill in 1976, one in a pitfall trap in conifer plantation at Allerwash by the River Tyne in 1991 (Luff, Eyre and Jessop, 1996) and another on the chalk heaps at Prudhoe in 1995 (Eyre, Luff and Woodward, 2002). There appears to be no obvious habitat preference for this species.

Gabrius bishopi Nb. A rove beetle species that has been taken recently in a number of pitfall trap surveys (Eyre, Luff and Lott, 1998, 2000), it is unlikely that it is as uncommon as Hyman and Parsons (1994) thought. It was taken in a number of pitfall sites in 2002 and when sampling temporary water in November 2002.

Stenus nigritulus and *Stenus niveus*, both Nb. These are wetland rove beetle species, with *S. nigritulus* found in the pitfall trap catches at the south-west corner of the nature reserve in 2002 and *S. niveus* in aquatic samples in two ditch sites in 2002, one to the west of the nature reserve and the other in the ditch running west-east. These species are indicative of long-term wetland conditions.

The present position and future management

The northern half of Prestwick Carr, with the SSSI, has had only a limited amount of

invertebrate survey work since the early twentieth century, mainly because it is used as a rifle range for the armed forces. The SSSI has areas of raised ground, now mainly birch woodland, and these may still have relict invertebrate species present. However, if the situation is similar to that on the nature reserve and adjacent pasture, it would be likely to lack the historical habitat diversity and the major problem with the nature reserve is the lack of both terrestrial and aquatic invertebrate habitats. The terrestrial habitats on the nature reserve are a mixture of a number of types of wet grassland whilst the aquatic sites appear to be restricted to temporary water. A number of scarce wetland species were recorded in 2002, indicating continuing importance of the carr as a refugia for these invertebrates in a landscape with few old wetlands. There were also scarce dung-associated species recorded with the continuing use of most of the carr as pasture.

Any future management procedures designed to improve the nature reserve for invertebrates must concentrate on providing as much variety as possible. The damp grassland habitats present on the carr are too uniform with poor vegetation structure and the rank vegetation on various parts of the nature reserve is poor invertebrate habitat. Management procedures, such as cutting and removal, providing vegetation structure complexity would be worthwhile. The provision of open water would improve aquatic habitat diversity. Some ditches on the carr not on the nature reserve have been cleared recently and have standing water. This water does not appear to be draining off the carr and similar management could be carried out on the reserve, providing long, thin ponds with open water. The provision of any sort of running water would also increase aquatic habitat diversity.

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