

*Bull. Ir. biogeog. Soc. No. 26 (2002)*

## **AN ANNOTATED LIST OF THE SYRPHIDAE (DIPTERA) OF POLLARDSTOWN FEN, CO. KILDARE, IRELAND**

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### **Introduction**

Pollardstown Fen, in Co. Kildare, may be known as a site of scientific interest, but little has been published on its fauna and flora. This is inevitably particularly true of its invertebrate fauna. The present text provides a list of the species of one family of flies, the Syrphidae, or hoverflies, known from Pollardstown Fen, together with some comment on that list.

The hoverflies collected from Pollardstown Fen total 77 species, as compared with 94 for Co. Kildare in general (Speight, 2000). The Irish list for this fly family now comprises 178 species. Very few of the syrphid records from the fen have been published previously. One exception is the occurrence of *Platycheirus amplus* Curran, which was, at the time, the first published record for this species in Europe (Speight and Vockeroth, 1988).

Detailed information on the Irish syrphid species is available elsewhere, and has been brought together by Speight (2000), so the comments presented here are more concerned with what the hoverfly fauna of the Fen may tell us about the Fen, than with the species themselves. Essentially, the text is focussed on the question of whether the species observed reflect the habitats observed. The potential contribution of Pollardstown Fen habitats to maintenance of syrphid diversity, within the local landscape, is also considered. These processes are mediated by the data coded into the Syrph the Net (StN) database spreadsheets. Examples of the use of the StN database in interpretation of species lists are provided by Speight and Castella (2001a).

### **Methods**

Collection of hoverflies from Pollardstown Fen has been carried out by direct methods i.e. use of a hand net to collect the adult insects from flowers etc, and a sweep net to collect them from low-growing vegetation. These processes have been augmented latterly by use of Malaise traps and, to a minor extent, emergence traps. The records span the period 1975-2001 and

determinations have been carried out by the author. The product of this collecting activity is a list of the syrphid species observed on the Fen, which can be used for comparison with the list of species predicted to occur on the Fen. The nomenclature used follows Speight and Castella (2001b), updated as necessary.

Given that habitat associations of the Irish species are known and the Pollardstown syrphid fauna can be regarded as a subset of the Irish syrphid fauna, the Irish species associated with the habitats present on the Fen together comprise a list of the syrphids that would be predicted to occur on the Fen. This list of predicted species can then be compared with the list of species observed, following the basic procedure described in Speight *et al.* (2000).

Using the methodology employed here, production of a list of the species predicted to occur on a site involves the use of a list of the habitat categories present on that site. And, in order to use the StN database for predicting the fauna, the habitat categories referred to require to be those employed in the database. All habitat categories referred to in the database are defined in its Macrohabitats glossary (see Speight *et al.*, 2001a) and habitat survey of the Fen has been carried out (during 2000 and 2001) using those definitions.

## **Results**

The list of syrphid species observed is given in Appendix 1. The syrphid macro-habitat categories observed are as follows:-

### forest categories:

- *Fraxinus*, overmature/mature/saplings, with springs, drainage ditches, flushes and streams.
- conifer plantation, with drainage ditches.
- isolated mature/sapling *Fraxinus* and *Salix*.
- Atlantic scrub: *Ulex* thickets.

### wetland categories:

- transition mire, with springs and flushes.
- acid fen, with flushes, pools and drainage ditches.
- rich fen, with springs, flushes, streams, pools and drainage ditches.
- reed beds, with springs, flushes, streams and drainage ditches.
- tall sedge beds, with springs, flushes, streams and drainage ditches.

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- tall herb communities.

open ground categories:

- unimproved, humid/flooded oligotrophic *Molinia* grassland, with springs, streams, flushes, temporary pools and drainage ditches, lightly-grazed by horses and cattle.
- improved grassland, grazed by cattle, with drainage ditches.
- intensive grassland.

other categories:

- hedges.

Using the habitat association data coded into the Macrohabitats file of the StN database the number of observed species associated with each of these habitat categories can be totalled. The number of species on the Irish and Co. Kildare lists associated with each of these habitat categories can similarly be totalled. Taking the Co. Kildare list as the species pool from which the Pollardstown Fen syrphid fauna is derived, the number of Kildare species associated with each of the Pollardstown habitats is taken as the number of species predicted to occur with each of those habitats on any fen in the Co. Kildare region. Similarly, taking the Irish syrphid list as the species pool from which the Pollardstown Fen syrphid fauna is derived, the number of Irish species associated with each of the Pollardstown habitats is taken as the number of species predicted to occur with each of those habitats on any fen nationally.

Of the 77 syrphid species recorded from the Fen, the occurrence of only three (i.e. less than 5% of the species) would not be predicted there from their habitat associations. The three exceptions are: *Cheilosia bergenstammi* Becker, *C. variabilis* (Panzer) and *Paragus haemorrhous* Meigen. They are excluded from further analysis of the Pollardstown Fen fauna but are considered briefly in Appendix 2.

Basing prediction on all of the habitats represented there, Pollardstown Fen would be expected to support 85 of the species recorded from Co. Kildare and fully 133 of the species known from Ireland in general. This would mean that 85% of the expected Kildare species are recorded from the Fen (including its periphery), as compared with 55% of the expected Irish species in general. But some of the habitat categories observed on the Fen and at its periphery cannot realistically be regarded as either natural/semi-natural or wetland-related. Conifer plantation, *Ulex* thickets, hedges, improved grassland and intensive grassland would fall into

this category and have, for these reasons, been excluded from further analysis. Suffice it to say that none of the syrphid species recorded from Pollardstown Fen would be predicted to disappear from the Fen if the conifer plantation habitat were lost from the Fen. Similarly, loss of improved grassland and intensive grassland from the Fen's periphery would be predicted to cause loss of only one species, *Eupeodes corollae* (Fabr.), from the existing species list. The contribution of these habitats to maintaining the present fauna of the site could thus be regarded as negligible. Loss of hedges and *Ulex* scrub from the Fen periphery might be expected to cause loss of four species: *Baccha elongata* (Fabr.), *Dasyrphus albostriatus* (Fallén), *Melangyna lasiophthalma* (Zetterstedt) and *Meliscaeva cinctella* (Zetterstedt).

The proportion of the predicted syrphid fauna that has been observed at Pollardstown Fen for habitats other than conifer plantation, improved and intensive grassland, *Ulex* scrub and hedges, is shown in Table 1, at both levels of prediction - regional (i.e. Co. Kildare) and national. The habitats represented by the more-or-less isolated trees of *Fraxinus* and *Salix* found scattered around the Fen are also omitted, since they are predicted to have very few associated species, all of which would be predicted to occur on the Fen in association with other habitats covered by Table 1.

**Table 1.** Number of syrphid species in the observed and predicted lists for Pollardstown Fen, associated with each of various habitats occurring on the fen.

Habitat	number of species			% of predicted spp observed	
	observed	predicted		Kildare	IRL
		Kildare	IRL		
<i>Fraxinus</i> forest	25	28	35	89	71
transition mire	13	14	15	93	87
acid fen	35	38	44	92	79
rich fen	44	48	54	92	82
reed beds	19	22	26	86	73
tall sedge beds	33	36	40	92	83
tall herb communities	16	19	21	84	76
unimproved <i>Molinia</i> grassland	42	48	63	88	67

In Table 2, microhabitat data are summarised, for the observed and predicted syrphid faunas of Pollardstown Fen, using the information coded into the Microsite Features file of the StN database (see Speight *et al.*, 2001b). The species covered are those associated with the habitats covered by Table 1, but taken all together, rather than habitat by habitat. The categories recognised are not true micro-habitats, but physical features of sites (microsite features) that are used as proxies for micro-habitats. The array of categories shown is a selection of those covered by the StN database, in which species associations for more than 80 micro-site feature categories are coded.

**Table 2.** Number of syrphid species in the observed and predicted lists for Pollardstown fen, associated with each of various micro-habitats/microsite features.

Microsite feature	Number of species		o/p as %
	observed (o)	predicted (p)	
<i>terrestrial</i>			
timber	2	3	67
overmature trees	4	7	57
tree foliage	14	23	61
understorey trees	5	8	63
shrubs/bushes/saplings	10	16	63
lianas	4	5	80
tall herb-layer plants (on)	20	28	71
low-growing herb-layer plants (on)	11	15	73
within herb-layer plant tissues	8	16	50
ground-surface debris	17	18	94
nests of social insects	2	4	50
grass-root zone	10	13	77
<i>aquatic</i>			
on emergent plants	13	20	65
on submerged plants	4	12	33
submerged sediment/debris	23	33	67
water-sodden plant debris	22	27	82

## **Discussion**

It was earlier suggested that conifer plantation, improved and intensive grassland, *Ulex* scrub and hedges, although present, together play but a minor role in maintenance of the existing Pollardstown Fen syrphid fauna. In addition, it can be observed that improved and intensive grassland, with associated hedges, is a predominant feature of the Kildare landscape in the surround to Pollardstown Fen, so the presence of these habitats on the periphery of the Fen itself cannot be said to add to the uniqueness of the contribution of the Fen to maintenance of the Co. Kildare fauna. Excluding these habitats from consideration results in reduction of the effective Pollardstown syrphid fauna to 71 species, from the gross total of 77 species on the observed list. And this restricted list of habitats has a predicted fauna of 106 Irish species, 78 of which are known from Co. Kildare. The effective total of observed species is further reduced to 68 species by exclusion of the three species observed from, but not predicted to occur on, the Fen.

With conifer plantation, improved/intensive grassland, *Ulex* scrub and hedges excluded from consideration, 64% of the Irish syrphid species predicted to occur in association with the array of habitats occurring on Pollardstown Fen have been observed there. This is not a particularly high proportion of the expected Irish species, even though 86% of the expected Co. Kildare species are represented. Essentially, this would suggest that, in terms of biodiversity maintenance, Pollardstown Fen has considerable regional significance, but, overall, would be of lesser significance nationally. It follows that a closer examination of the fauna is warranted, to see whether particular habitats of those present on the fen might seem to be "underperforming", in comparison to others.

Table 1 shows that, when considered separately, the various habitats present at Pollardstown apparently support a higher proportion of their expected syrphid species than they do when considered together, suggesting there is more sharing of habitats among the species predicted and observed than among the species predicted but absent. This is indeed the case: on average, the species observed are each associated with 3.4 of the habitat categories observed there, while the species predicted but absent are associated with 2.3 of the habitat categories observed. However, Table 1 also shows that more than 75% of the Irish species associated with each of the habitats present on the Fen have been found there, except in the case of the species of

*Fraxinus* forest, reed beds and unimproved, oligotrophic grassland. This makes Pollardstown Fen an exceptional site for the Irish syrphids associated with most of the habitats shown in Table 1.

Once again grouping together the Fen habitats covered by Table 1, as a single entity, allows comparison between the representation of syrphids associated with different fen microhabitats in the observed and predicted lists. This comparison shows that syrphids with four different types of larval micro-habitat are particularly under-represented on the observed list, the microhabitats involved being as follows:

- overmature trees/rotten wood;
- internal tissues of herb-layer plants;
- colonies of social insects;
- submerged, aquatic plants.

The lack of species associated with overmature trees and rotten wood would seem a reasonable reflection of the condition of the ash woodland and other trees around the edge of the Fen and probably also indicates it is of recent origin. Syrphids that feed internally in the tissues of flowering plants are generally intolerant of flooding, since they nearly all pass the winter free in the soil in an immobile, resting phase (the puparium) of the life history that makes them susceptible to drowning. Those predicted for the Fen would mostly be expected to occur in the peripheral grasslands and may do so, further from the Fen and outside the influence of seasonal high-water levels. Similarly, nests of ants and other social insects would be expected more in the peripheral grasslands than the Fen itself and the under-representation of associated syrphids on the Fen list could be interpreted as a consequence of the susceptibility to flooding of the nests of their hosts. The recently-described syrphid *Microdon myrmicae* Schönrogge *et al.* is an exception to this generalisation, living as it does in nests of the ant *Myrmica scabrinodis* Nylander in large tussocks within the periphery of Fen. It is one of the species observed from Pollardstown. The apparent under-representation of species whose larvae are associated with the submerged parts of aquatic plants (this microhabitat category excludes rotting vegetation on the bottom of a water body) might seem rather odd, until it is realised that areas of (permanent) standing water have been few and far between on the Fen. Similarly, there is very little *Typha* on the Fen, a plant with which many of the syrphids with aquatic larvae are

frequently associated. The situation of the species associated with that larval microhabitat contrasts sharply with the species whose larvae are associated with water-sodden vegetation and peat (i.e. with temporary pools or situations where the ground-water level is more or less coincident with the ground surface). The latter group of species is very well represented on the Fen, highlighting the significance of this micro-habitat there. Some of these species can use cow dung as an alternative larval micro-habitat, at least on wet sites, so the contingent of species associated with cow dung is also well-represented in the Pollardstown list.

Turning to the issue of the conservation status and management of the Pollardstown Fen syrphid fauna, the great majority of the observed species is clearly associated with categories of habitat dependent for their survival upon the wetland status of the site. Change in site hydrology, particularly drainage of the fen or reduction in the water supply to it, would thus be expected to adversely impact upon its existing syrphid fauna. While some of the nationally scarce species that would be predicted to occur at Pollardstown seemingly do not do so, an example being *Eristalis cryptarum* (Fabr.), which may now have been entirely lost from the Irish fauna, others do. The latter group comprises *Lejogaster tarsata* (Meigen), *Microdon myrmicae*, *Platycheirus amplus* Curran and *P. immarginatus* (Zetterstedt). *Orthonevra geniculata* (Meigen) is a borderline case. Some of the Pollardstown Fen syrphids are scarcer elsewhere than Ireland in the Atlantic Region of the EU, examples being *Melanogaster aerosa* (Loew) and *Parhelophilus consimilis* (Malm). But there are no syrphids whose presence in Ireland is apparently confined to Pollardstown Fen. Pollardstown Fen is probably best seen as one of the very few Irish sites where all of these species have been found together. In this regard its "biodiversity maintenance" function has to be regarded as exceptional, supporting as it does 75% and more of the Irish species associated with various categories of wetland habitat.

Pollardstown Fen is today an island of wetland habitats isolated in a sea of farmland. Problems of species dispersal through today's farmland landscape in Ireland have been alluded to by Good (1998) and Speight and Good (2001), and while the Fen may be larger than the average farm, it is debateable for how long it might maintain its present flora and fauna without interchange of wetland species with other sites. That it is an ancient system, with some of its present habitats continuously *in situ* for a time measurable in hundreds of years, rather than decades, is suggested by some of the species present there today, one example being the snail



*Vertigo geyeri* Lindholm. In Ireland this mollusc exhibits a relict distribution pattern (E. Moorkens, pers. comm.). The same could be said for the syrphids *M. myrmicae* and *P. amplus* (see Speight, 2000 and Speight, 2002, this volume). Such data do not prove that species can survive for prolonged periods of time within Pollardstown Fen, without re-inforcement of their populations from elsewhere, but they do suggest it. However, the considerable distances such species would now have to travel in order to re-establish themselves on the Fen, were they once lost there, suggests that, unaided, their re-establishment would be virtually impossible. And there are no current trends in landscape change that would suggest landscape permeability will increase for such species in the foreseeable future. Sadly, both *M. myrmicae* and *P. amplus* may have been lost from the Fen during the last few years. Attempts to relocate them have failed and the parts of the Fen where they were found have changed in character, in one case probably due to cessation of grazing and in the other probably due to eutrophication.

It was stated earlier that habitats peripheral to the Fen (hedges, *Ulex* scrub, improved and intensive grassland) support very few species additional to those associated with wetland habitats on the Fen. But there are other faunistic relationships potential to the interaction between the Fen and its surround than that described by considering simply what species may be added to the Pollardstown Fen list from its surround. In particular, species that can be shared by the Fen and surrounding habitats would be expected to survive on the Fen when affected adversely in its hinterland. Similarly, were any of these species to be lost from the Fen it would be expected that they could re-establish themselves there from adjacent populations when conditions were once more favourable.

Of the fen-habitat (i.e. the habitats covered in Table 1) syrphids observed on the Fen, 23 species would be expected to occur in association with improved/intensive grassland and or hedges and *Ulex* scrub in its surround. To those species, then, the surrounding landscape may remain permeable. But for the rest of the species associated with fen habitats on Pollardstown Fen - by far the majority of the syrphids recorded there - the converse would seem more true. For the 45 species in the latter group loss of the population inhabiting the Fen could well mean more-or-less permanent loss of the species from the area, due to lack of other local populations from which to repopulate the Fen. This group also represents almost half of the syrphid species on the Co. Kildare list (which totals 94 species). While it would be unjustified to extrapolate

this statistic to other taxonomic groups, it would none-the-less seem possible that, at least for Syrphidae, Pollardstown Fen is responsible for maintaining the presence of nearly 50% of the diversity of the Kildare fauna within its local landscape. By contrast, the species for which it shares maintenance with the surrounding farmland amount to approximately 25% of the Kildare syrphid fauna, while the farmland by itself is able to support only an additional 5%.

### **Acknowledgements**

I am most grateful to Jervis Good for constructive comment on an earlier draft of this text and for the opportunity to include records of syrphid species collected by himself from Pollardstown Fen. Evelyn Moorkens kindly provided information on *Vertigo geyeri*.

### **References**

- Good, J. A. (1998) The potential role of ecological corridors for habitat conservation in Ireland: a review. *Irish Wildlife Manuals*. 2. 72 pp. Duchas, Dublin.
- Speight, M. C. D. (2000) Irish Syrphidae (Diptera), Part 1: species accounts and distribution maps. pp. 1-215. In Speight, M. C. D., Castella, E., Obrdlik, P. and Ball, S. (eds) *Syrph the Net, the database of European Syrphidae*. 18. Syrph the Net publications, Dublin.
- Speight, M. C. D. (2001) Species accounts of European Syrphidae (Diptera), 2001. pp. 1-281. In Speight, M. C. D., Castella, E., Obrdlik, P. and Ball, S. (eds) *Syrph the Net, the database of European Syrphidae*. 27. Syrph the Net publications, Dublin.
- Speight, M. C. D. (2002) Two controversial additions to the Irish insect list: *Microdon myrmicae* Schönrogge *et al.* and *Pipiza festiva* Meigen (Diptera: Syrphidae). *Bull. Ir. biogeog. Soc.* 26: 143-153.
- Speight, M. C. D. and Castella, E. (2001a) An approach to interpretation of lists of insects using digitised biological information about the species. *J. Insect Conservation* 5: 131-139.
- Speight, M. C. D. and Castella, E. (2001b) Range and status data for European Syrphidae (Diptera), 2001. pp. 1-215. In Speight, M. C. D., Castella, E., Obrdlik, P. and Ball, S. (eds) *Syrph the Net, the database of European Syrphidae*. 30. Syrph the Net publications, Dublin.
- Speight, M. C. D. and Good, J. A. (2001) Farms as biogeographical units: 4, concept and

reality. *Bull. Ir. biogeog. Soc.* **25**: 292-308.

- Speight, M. C. D., Castella, E. and Obrdlik, P. (2000) Use of the Syrph the Net database 2000. pp. 1-99. *In* Speight, M. C. D., Castella, E., Obrdlik, P. and Ball, S. (eds) *Syrph the Net, the database of European Syrphidae*. **25**. Syrph the Net publications, Dublin.
- Speight, M. C. D., Castella, E. and Obrdlik, P. (2001a) Macrohabitat preferences of European Syrphidae (Diptera), 2001. pp. 1-565. *In* Speight, M. C. D., Castella, E., Obrdlik, P. and Ball, S. (eds) *Syrph the Net, the database of European Syrphidae*. **28**. Syrph the Net publications, Dublin.
- Speight, M. C. D., Castella, E. and Obrdlik, P. (2001b) Microsite features used by European Syrphidae (Diptera), 2001. pp. 1-240. *In* Speight, M. C. D., Castella, E., Obrdlik, P. and Ball, S. (eds) *Syrph the Net, the database of European Syrphidae*. **29**. Syrph the Net publications, Dublin.
- Speight, M. C. D. and Vockeroth, J. R. (1988) *Platycheirus amplus*: an insect new to Ireland not previously recorded from Europe (Dipt.: Syrphidae). *Ir. Nat. J.* **22**: 518-521.

**APPENDIX 1.** List of the Syrphidae (Diptera) recorded from Pollardstown Fen. Nomenclature used follows Speight (2001) updated as necessary.

\* = threatened species (IRL)

- Anasimyia lineata* (Fabricius, 1787)  
*Baccha elongata* (Fabricius, 1775)  
*Cheilosia bergenstammi* Becker, 1894  
*Cheilosia illustrata* (Harris, 1780)  
*Cheilosia impressa* Loew, 1840  
*Cheilosia nebulosa* (Verrall, 1871)  
*Cheilosia pagana* (Meigen, 1822)  
*Cheilosia variabilis* (Panzer, 1798)  
*Cheilosia vernalis* (Fallén, 1817)  
*Chrysogaster coemeteriorum* (Linnaeus, 1758)  
*Chrysogaster solstitialis* (Fallén, 1817)  
*Chrysotoxum bicinctum* (Linnaeus, 1758)  
*Chrysotoxum fasciatum* (Müller, 1764)  
*Dasysyrphus albostrigatus* (Fallén, 1817)  
*Episyrphus balteatus* (DeGeer, 1776)  
*Eristalinus sepulchralis* (Linnaeus, 1758)  
*Eristalis abusiva* Collin, 1931  
*Eristalis arbustorum* (Linnaeus, 1758)  
*Eristalis interrupta* (Poda, 1761)  
*Eristalis intricaria* (Linnaeus, 1758)  
*Eristalis lineata* (Harris, 1776)  
*Eristalis pertinax* (Scopoli, 1763)  
*Eristalis tenax* (Linnaeus, 1758)  
*Eumerus strigatus* (Fallén, 1817)  
*Eupeodes bucculatus* (Rondani, 1857)  
*Eupeodes corollae* (Fabricius, 1794)

APPENDIX 1 (continued)

- Eupeodes latifasciatus* (Macquart, 1829)  
*Eupeodes luniger* (Meigen, 1822)  
*Ferdinandea cuprea* (Scopoli, 1763)  
*Helophilus hybridus* Loew, 1846  
*Helophilus pendulus* (Linnaeus, 1758)  
*Lejogaster metallina* (Fabricius, 1781)  
*Lejogaster tarsata* (Meigen, 1822)\*  
*Leucozona laternaria* (Müller, 1776)  
*Leucozona lucorum* (Linnaeus, 1758)  
*Melangyna lasiophthalma* (Zetterstedt, 1843)  
*Melangyna umbellatarum* (Fabricius, 1794)  
*Melanogaster aerosa* (Loew, 1843)  
*Melanogaster hirtella* (Loew, 1843)  
*Melanostoma mellinum* (Linnaeus, 1758)  
*Melanostoma scalare* (Fabricius, 1794)  
*Meliscaeva cinctella* (Zetterstedt, 1843)  
*Microdon myrmicae* Schönrogge *et al.*, 2002\*  
*Neoascia geniculata* (Meigen, 1822)  
*Neoascia podagrica* (Fabricius, 1775)  
*Neoascia tenur* (Harris, 1780)  
*Orthonevra geniculata* (Meigen, 1830)  
*Paragus haemorrhous* Meigen, 1822  
*Parhelophilus consimilis* (Malm, 1863)  
*Pipiza noctiluca* (L., 1758)  
*Platycheirus albimanus* (Fabricius, 1781)  
*Platycheirus amplus* Curran, 1927\*  
*Platycheirus angustatus* (Zetterstedt, 1843)  
*Platycheirus clypeatus* (Meigen, 1822)

**APPENDIX 1** (continued)

- Platycheirus fulviventris* (Macquart, 1829)  
*Platycheirus granditarsus* (Forster, 1771)  
*Platycheirus immarginatus* (Zetterstedt, 1849)\*  
*Platycheirus manicatus* (Meigen, 1822)  
*Platycheirus occultus* Goeldlin, Maibach and Speight, 1990  
*Platycheirus rosarum* (Fabricius, 1787)  
*Platycheirus scambus* (Staeger, 1843)  
*Platycheirus scutatus* (Meigen, 1822)  
*Rhingia campestris* Meigen, 1822  
*Riponnensia splendens* (Meigen, 1822)  
*Scaeva pyrastris* (Linnaeus, 1758)  
*Sericomyia silentis* (Harris, 1776)  
*Sphaerophoria interrupta* (Fabricius, 1805)  
*Sphaerophoria philantha* (Meigen, 1822)  
*Sphegina clunipes* (Fallén, 1816)  
*Sphegina elegans* Schummel, 1843  
*Syritta pipiens* (Linnaeus, 1758)  
*Syrphus ribesii* (Linnaeus, 1758)  
*Syrphus vitripennis* Meigen, 1822  
*Trichopsomyia flavitarsis* (Meigen, 1822)  
*Tropidia scita* (Harris, 1780)  
*Volucella bombylans* (Linnaeus, 1758)  
*Xylota segnis* (Linnaeus, 1758)

**APPENDIX 2.** The syrphids recorded from Pollardstown Fen but whose presence would not be predicted on the basis of known habitat associations.

*Cheilosia bergenstammi*

*C. bergenstammi* is associated with ragwort (*Senecio jacobaea*), its larvae feeding internally on the tissues of this plant. This hoverfly was common and widely distributed in Ireland until recently, but has become scarcer since ragwort control measures have been more rigorously enforced (the plant is toxic to both cows and horses). There is less need to control ragwort on sheep-grazed pasture. The predictive procedure would not predict *C. bergenstammi* from cattle-grazed, improved grassland, but would predict the species for sheep-grazed grassland. The records of *C. bergenstammi* from the Fen date from when sheep were present. It is not known whether this syrphid still occurs there, but its presence would be expected in the vicinity, given the propensity of ragwort to occur along the hedge margins of minor roads.

*Cheilosia variabilis*

*C. variabilis* also has larvae that feed internally in plant tissues, in this instance in *Scrophularia* spp., which is not found on the Fen and would be expected only at its margins. *C. variabilis* was collected from the edge of the fen, but the record remains anomalous.

*Paragus haemorrhous*

*P. haemorrhous* was recorded from a part of the periphery of the fen that has since changed in character. It was then (some 15 years ago) grazed and burned *Molinia* grassland, whereas today this area is fenced from grazing and no longer burned. Since these changes took place there have been no records of *P. haemorrhous* from the Fen.