

City of Dragons

A 2019 survey of Dragonflies
and Damselflies in Hull

Africa Gómez & Richard Shillaker



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Introduction

Dragonflies and damselflies are fascinating insects that often capture people's imagination. Many children come across their larvae whilst pond dipping, when they are introduced to the concept of life cycles, metamorphosis and aquatic life. Dragonflies and damselflies are superbly adapted predators, highly visual, with adults that are diurnal and not particularly shy. In addition, they are large enough for their behaviour to be observed and many of the aspects of their life cycle, including emergence, territorial behaviour, mating and oviposition can be easily watched. These features and the adults' bright colours make them very attractive. Dragonflies and damselflies can also be used as bioindicators of water quality, as some species are intolerant of pollution or eutrophic water. In addition, the publication of affordable field guides, the availability of relatively cheap digital cameras and the widespread digging of garden ponds are all factors that may be behind the increasing popularity of dragonfly and damselfly recording.

Dragonflies and damselflies belong to the insect Order Odonata. Although the term dragonfly can be used to refer to all Odonata, we think it helpful to distinguish between damselflies and dragonflies. Damselflies are more delicate-looking and smaller insects than dragonflies. A useful means to distinguish them is the fact that most damselflies tend to rest with their wings close over their bodies, while dragonflies and Emerald damselflies rest with their wings spread. Of the 46 species of dragonflies and damselflies in the UK (resident species and regular migrants), 20 (plus two vagrant species) had been recorded in the Hull area up to 2018. However, recording in this area has been relatively patchy and, to our knowledge, there has been no previous extensive survey of the dragonflies and damselflies of the city. We are also not aware of any other published study in a UK city or town with similar aims to ours, although a project has been running since 2016 to map London dragonflies (Sovic Davies, 2018). Elsewhere, the detailed ecological study of Odonata diversity in ponds in the German city of Dortmund is noteworthy (Goertzen & Suhling, 2013).

In the Hull Biodiversity Action Plan (BAP), both freshwater habitats and dragonflies have action plans (Marshall, 2002). The plan acknowledges the lack of available information on the diversity and distribution of dragonflies in the city and has a short term aim to "Determine the species of damselfly and dragonfly present in Hull". In a subsequent report on sites of nature conservation interest in

Hull (Blackshaw, 2008), dragonflies are briefly assessed, and one of the proposed changes to the dragonfly action plan was that “more data may be needed on their distribution in the city”. However, we are not aware that these stated aims have been acted upon. Several dragonfly and damselfly species reported in the wider Hull area are also local priority species in the East Riding BAP strategy: Variable Damselfly, Hairy Dragonfly, Small Red-eyed Damselfly, Black Darter and Common Hawker (East Riding of Yorkshire Council, 2010). A subsequent document providing criteria for the selection of local wildlife sites in the East Riding draws attention to the importance of breeding populations of Variable Damselfly and Small Red-eyed Damselfly (East Riding of Yorkshire Council, 2012).

Despite the lack of structured surveys, published records in the National Biodiversity Network atlas and iRecord websites and reports by the Yorkshire Dragonfly Group amongst others, indicate that the damselfly and dragonfly fauna of Hull have changed considerably since the BAP reports were published (Figure 1). Although increased recording effort will partly explain the increase in species reported in the area, several species have expanded their geographic range and crossed the Humber since the millenium. This was not unexpected as the distribution of 34 out of 37 species of British dragonflies and damselflies analysed by Hickling *et al.* (2005) had shifted northwards in the previous 40 years, likely as a result of the warming climate. In addition, given that 2019 is the last year from which data will be used for the British Dragonfly Society (BDS): State of Dragonflies 2020 report, we believe that an assessment of the distribution and numbers of dragonflies and damselflies in Hull is timely. We hope that our ‘City of Dragons’ project will complement the recent ‘Butterfly City’ initiative of Emma Hardy MP with local environmental stakeholders to increase awareness of urban biodiversity and enhance the image of Hull.

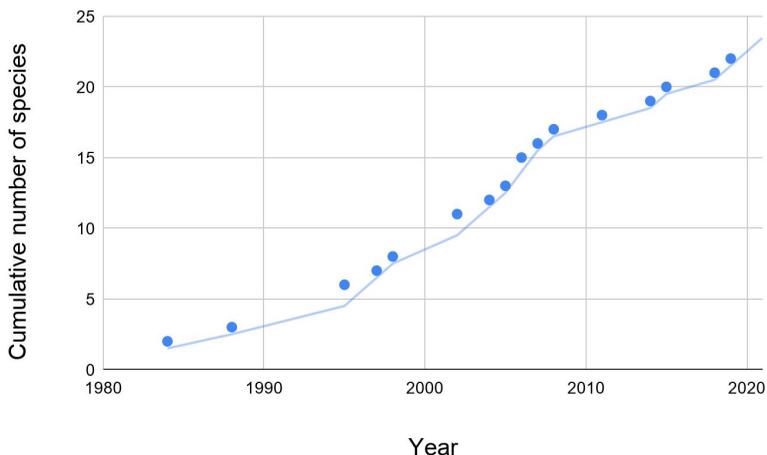


Figure 1. Dragonfly and damselfly species accumulation with time chart for the Hull area. The trendline is a moving average. Note that 19 of the 23 species recorded in Hull have been recorded this year, including the first record of Willow Emerald Damselfly.

Aims and scope of the survey

Our aims were to record dragonflies and damselflies in the city of Hull and the immediate surrounding area (as per The Plants of Hull surveys by Hull Natural History Society), i.e. from the Humber Bridge in the west to Paull Holme Strays in the east, and from the Humber Estuary to the villages of Skidby, Cottingham, Wawne and Bilton, as well as Hedon, for the 2019 season. The recording area was located within (but did not include the whole of) OS grid squares TA 02, 03, 12 and 13. We aimed to document the presence and any evidence of breeding of species in as many accessible sites as possible on a minimum of two dates (early and late season). We concentrated primarily on freshwater habitats (ponds, lakes, streams, drainage ditches and the River Hull) at locations where the public had unrestricted access. This was supplemented by a few sites with more limited access, for example allotments owned by Hull City Council, which were typically only visited once. *Ad hoc* records from some private locations (gardens and an industrial site) were also included.

Evidence of breeding was based primarily on the following criteria, with the strength of evidence for successful breeding increasing in the following ascending order: copulation, ovipositing, exuviae,

emergent individuals, teneral. Note was also taken of males patrolling/defending a territory. We predominantly recorded adult damselflies and dragonflies, with very limited searching for exuviae. No larval sampling was conducted by us.

Citizen science and outreach

We publicised the project in a talk to members of Hull Natural History Society and through articles in *Skimmer* (the magazine of the Yorkshire Dragonfly Group), and in the *Bulletin of The Wolds and Riverbank Countryside Society*, as well as via a series of posts in AG's BugBlog posted through Twitter. Postings on AG's blog included details (with photographs) of what species to look out for in the coming month. We encouraged the use of the #hulldragons hashtag on Twitter to alert us to sightings. We also used Twitter to publicise records from particular site visits. We encouraged submission of records to iRecord. Most of the contributors to the survey either submitted their records through iRecord or sent them to us. We also obtained additional records for 2019 through a data request to the BTO, as some birders submit their dragonfly and damselfly records through BTO's Birdtrack, but these records were eventually sent to iRecord by Birdtrack so we did not deal with them separately. Once submitted to iRecord, records were verified by the VC61 county recorder of the British Dragonfly Society, Martin Roberts.

Historical records

In order to understand the trends in dragonfly and damselfly diversity, we reviewed historical records from the area. We used the online databases iRecord and National Biodiversity Network (NBN), which include verified records from the local county recorder (although we are not sure that all Odonata records on NBN have been verified). We obtained additional records from Hull City Council, the Yorkshire Naturalists' Union and The North and East Yorkshire Ecological Data Centre. In addition, we consulted annual reports from the Hull Valley Wildlife Group and The Yorkshire Dragonfly Group, as well as annual reports on East Riding Dragonflies (Ashton, 2006, 2007). Historical records were assumed to refer predominantly to adults although a few larval records were also obtained (notably Ashworth 2007, Hammond 2008).

It is not known if any local Odonata specimens were included in the natural history collection at Hull Municipal Museum which was

destroyed when the museum was bombed in June 1943. It is relevant to note that a few years earlier the museum had been given the extensive insect collection of the East Riding naturalist, W. J. Fordham (Sheppard, 1939). However, a visit to the museum facilitated by curator Paula Gentil, to inspect the collections revealed that just a few Odonata specimens are held by the museum, of which two were collected just outside the recording area (Figham Common, 1981) and are mentioned in the report.

Summary of results

In general, the summer of 2019 was dry and mild, with many wetlands either not flooding, particularly in Snuff Mill Lane and Priory fields or with low water levels later in the year (Thwaite Lake). The summer was not as hot as 2018, but it was a good year for recording adult damselflies and dragonflies with plenty of sunny days. There was a very wet period from the end of September, ie at the end of the adult Odonata season.

Here we give an overview of the survey and results obtained. A total of 618 Odonata records were submitted and verified by the VC61 county recorder in the iRecord platform from the recording area during the 2019 season. These records were submitted by 24 observers and covered 71 km² grid squares. Out of the total km² grid squares containing records, 33 were located, at least partly, within the Hull city boundary. Overall, the survey's records were almost 4-fold greater than the number of records submitted in 2018, when a total of 163 records were submitted to iRecord (Figure 2). Analysis of previous records per year underscores the recent increase in Odonata recording in the area (Figure 2). The number of records on iRecord for the whole of VC61 is shown for comparison (note that although iRecord was introduced in 2012 records for previous years can be submitted).

The first record for the area this year was obtained on the 13th of May and the last ones on the 27th of October. We compiled all records submitted and verified until the 31st of January 2019.

We obtained records for 19 dragonfly and damselfly species in 2019 (see Table 1; for individual species results see the detailed 'Species Accounts' section). Three species recorded in the area in recent years were not recorded in 2019: Large Red Damselfly, Vagrant Emperor and Common Hawker. Large Red Damselfly has only rarely been recorded in the area, with single individuals recorded in

previous years. Common Hawker and Vagrant Emperor have a single previous record each. We discuss these species in the Rare Species section at the end of the report.

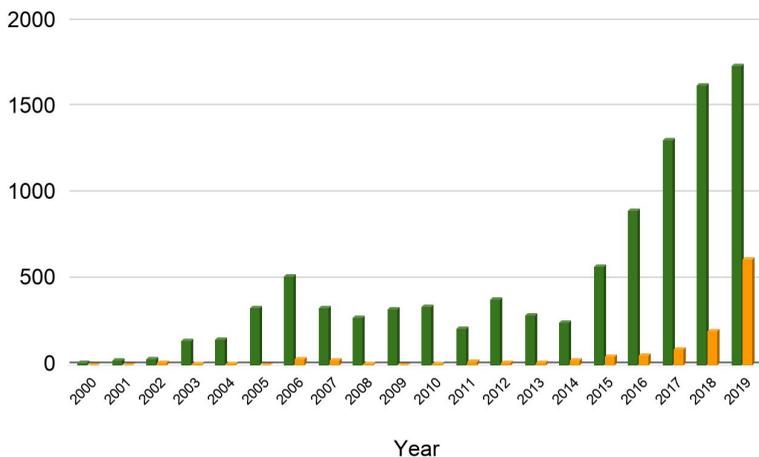


Figure 2. Number of records held by iRecord for South East Yorkshire, VC61 (green bar) compared to records for the Hull area (orange). Note that records do not mean the number of individuals seen, but reports of a species seen on a site and date. Historical records can be submitted at any time, so the data as reported from iRecord searches was accurate at the time of compilation of this report.

The most frequently recorded species were: Migrant Hawker (153 records), Common Darter (104 records), Blue-tailed Damselfly (80 records) and Common Blue Damselfly (68 records). These species were also widely distributed, being found in 21 to 40 km² grid squares. Evidence of breeding was obtained for 14 of the species recorded. To our knowledge, this is the first time that Broad-bodied Chaser, Hairy Dragonfly and Migrant Hawker have been reported breeding in the Hull area.

Overall these were the project highlights:

- First record of Willow Emerald Damselfly for South East Yorkshire (VC61).
- Documentation of range expansion of the Small Red-eyed Damselfly and Banded Demoiselle.
- A notable emergence of Broad-bodied Chasers at the Wildlife Garden in Pearson Park.

- Red-eyed Damselfly at East Park.
- The large number of Migrant Hawkers at Pickering Park lake on 14th September. We estimated 60-100 males and about six females were seen, with plenty of evidence of breeding.
- The limited records (historical and current) for Large Red Damselfly and Brown Hawker, two species that are considered to be common and widespread over much of lowland England.

Our results document the importance of lakes in public parks for dragonfly and damselfly diversity in the area. This provides opportunities for increasing the appreciation of a local asset by members of the public (e.g. information panels, dragonfly walks or pond dipping events).

Given the scarcity of previous records in the area, our results contribute to the body of data documenting the northwards range expansion of species, both as a result of natural colonisation and in response to climate change. For example, Platts *et al.* (2019) concluded that most generalist species, which have higher habitat availability and more connected habitats, are able to respond more strongly to warming climate. The study investigated 9 Odonata species and found that the generalist species expanded at faster rates (e.g. Emperor Dragonfly at a rate of 10 km/year, Black-tailed Skimmer at 8 km/year, Migrant Hawker and Ruddy Darter at 6 km/year). In sharp contrast, specialist species moved at a slower pace (Hairy Dragonfly and Red-eyed Damselfly under 1 km/yr). This approach could be used to predict which species are likely to colonise a particular area next (see section Potential Colonists) and to focus effort on improving habitat availability for specialist species to mitigate any negative impact of climate change. On the other hand, habitat availability will also favour the local establishment of colonising species, which are still to reach an equilibrium distribution. For example, Small Red-eyed and Willow Emerald expansion in the UK, (following colonisation by weak flying damselflies from the continent) responds to different drivers than northwards expansion of a previously established UK species. Willow Emerald and Small Red-eyed, have generally wide habitat requirements (Smallshire & Swash, 2018), and are still expanding their ranges rapidly in the UK. The Small Red-eyed damselfly is expanding in the UK at an average of 36.5 km/yr (Trippier *et al.*, 2015) as, the authors suggest, it fills sites within its climatic niche in Britain.

Table 1. Summary of survey results per species for 2019 including the strongest evidence for breeding (strength of evidence for breeding increases in the following ascending order: Cop., copulation Ov., ovipositing; Ex. exuviae; Em. emergent individuals; Ten: teneral).

Species	Records	Km ²	Evidence of breeding
Willow Emerald Damselfly	2	1	-
Emerald Damselfly	5	5	Cop.
Banded Demoiselle	18	9	-
Azure Damselfly	32	17	Em.
Common Blue Damselfly	68	20	Ten.
Red-eyed Damselfly	8	5	-
Small Red-eyed Damselfly	19	8	Ov.
Blue-tailed Damselfly	80	25	Ov.
Southern Hawker	35	18	Ex.
Brown Hawker	9	7	-
Migrant Hawker	153	40	Ov.
Emperor Dragonfly	29	16	Ov.
Hairy Dragonfly	1	1	Em.
Broad-bodied Chaser	10	5	Ten.
Four-spotted Chaser	15	10	Ten.
Black-tailed Skimmer	11	8	Ov.
Black Darter	1	1	-
Ruddy Darter	18	13	Ten.
Common Darter	104	37	Ten.
Totals	618		

Public Engagement

The project was well received in social media with several #hulldragons posts attracting over 3,000 engagements (total number of times a user interacted with a tweet, including views, retweets or clicks to enlarge). Due to the project activities, including social media, we were sent 64 records from 10 members of the public which we subsequently submitted to iRecord. It is likely that these records would not have been submitted otherwise to databases. These included valuable records, notably breeding evidence for Hairy Dragonfly and Southern Hawker. This observation suggests that even interested members of the public and/or naturalists may regularly fail to submit their records to iRecord or other databases. On occasion this may stem from a lack of confidence in identifying Odonata species. Although the submission of records by members of the public was a welcome positive outcome, the number providing records was relatively small given the high level of engagement on social media.

Management suggestions

Managing urban and suburban sites for dragonflies and damselflies is not particularly complex. As adult dragonflies are such large and colourful insects they provide a means to engage people with nature, i.e. they are flagship species for wetland conservation, particularly ponds. However when managing ponds to encourage dragonflies the presence of other pond-living species should not be forgotten. The number of species of Odonata in ponds is much fewer than the number of species for some other invertebrate groups, notably water bugs and water beetles, which include a considerable number of nationally scarce or Red Data Book species (Williams *et al.*, 2018).

We provide below suggestions for management of some of the sites we visited.

East Park, in comparison with Pickering Park, has far less marginal vegetation. There is evidence of trampling by geese and ducks along sections of the lake margin, which are exposed and subject to erosion. We suggest increasing the amount of marginal vegetation in East Park lake by planting or by facilitating natural colonisation. The main lake is used for recreation and pedalos in the summer and the rowing club on weekends year round. The presence of floating booms to restrict boating to the central area is a good strategy to

reduce disturbance of species that utilise open water and floating vegetation away from the shoreline. A simple way to increase perching sites above the water for territorial species would be to add dead branches, especially around some of the bare concrete edges. Another advantage is that perching 'dragons' will be easily observed by the public. In addition, some hawkers lay their eggs into partially submerged logs.

At Oak Road Lake, we noted the absence of floating vegetation this year. This appears to have affected the abundance of Small Red-eyed and Red-eyed Damselflies, which were found in very low numbers. The reason behind this is unclear (maybe dredging by emergency services?), but this should be looked into. Whilst extensive floating algal mats indicate poor water quality, less extensive algal patches can be beneficial by providing perching sites away from the shoreline for Red-eyed Damselfly species.

Several aquatic habitats at Noddle Hill NR and Midmeredales are becoming overgrown with bullrushes or reeds resulting in little open water. Management to open up some areas of these habitats would be desirable. Leaving some more marshy areas with marginal vegetation would be advisable to increase habitat heterogeneity and reduce the impact of any fish present. Whilst bullrushes can be seen as a nuisance species because they can take over a pond they should not be totally removed because they contribute to vegetational diversity which can benefit other species; it is reported that the larvae of Ruddy Darters can be found amongst their roots (Brooks & Cham, 2014). The presence of a variety of microhabitats in a particular water body will increase the diversity of Odonata species, e.g. shallow habitats with emergent vegetation, floating vegetation (e.g. water lilies, broad-leaved pondweed), millfoils, and open water habitats. Diversity of vegetation (aquatic and terrestrial) was found to be a major determinant for Odonata diversity in urban ponds in Dortmund (Goertzen and Suhling, 2013).

Some Odonata species are able to withstand temporary water bodies that become dry, for example, at the end of the summer (as eggs can be dormant during winter). There are also known examples of dragonfly larvae that have been found alive during or after a pond has been without surface water for several weeks (Williams *et al.*, 2018). The Southern Hawker will sometimes lay eggs in the damp margins of a pond. These habitats exclude fish,

which will predate Odonata larvae, and can harbour different aquatic organisms.

Cutting back vegetation along river and drain banks, and dredging, should be done sensitively to limit effects on the fauna. Ideally, only short sections should be done at a time, possibly not doing both sides of the water course during the same year to allow for recolonisation. At Pickering Park, we noticed in November that the marginal vegetation had been cut down to water level around much of the lake. This is likely to remove most of the eggs of Migrant Hawker, which are inserted into plant leaves well above the water, and don't hatch until spring. We suggest only cutting back short stretches of marginal vegetation.

The three ponds at Humber Bridge Country Park, a local nature reserve, were disappointing for observing damselflies and dragonflies with only a few sightings recorded. This was attributed to the ponds not providing an ideal habitat for Odonata. In particular, the largest pond which held water throughout the summer lacked any significant emergent aquatic vegetation, and no floating or submerged vegetation was noted. Only a few late summer Darters and Hawkers were recorded (some breeding behaviour was noted). The adjacent pond dried up later in the summer, although when dry the logs present were favoured as perching sites by Common Darters. The small woodland pond, which had a lot of logs, appeared to have water of poor quality and also dried up later in the summer (an occasional Hawker was seen flying around the surrounding glade). We recommend that the East Riding of Yorkshire's Countryside Access Team draws up a plan for improving these ponds.

As we have mentioned earlier, dragonflies can be used as flagship species to engage with the public, and this in the long term is an important management tool as it will result in people caring for aquatic environments. Pond dipping sessions in the main parks, allowing children and adults alike to encounter dragonfly larvae and other aquatic organisms could be an option. In addition, attractive information boards could introduce the public to the main species to be seen. Boards could also be used to discourage people from discarding unwanted garden pond/aquarium fish and plants into water bodies as this can lead to the spread of invasive non-native species. We noted during our surveys the presence of Red-eared Terrapins in many of the aquatic environments in Hull, the result of discarding unwanted pets. Some maintenance of ponds and water

bodies should include regular litter picking, possibly communal organised litter picking events, to enhance the visual value of the sites and engage local communities.

Dragonfly habitats in Hull

Hull sits in a low lying area bounded in the south by the Humber Estuary, to the west by the start of the Yorkshire Wolds and to the east by the plains of Holderness. Geographically Hull is situated on a very flat valley cut through glacial tills. Our recording area encompasses urban, suburban and green belt landscapes that include a range of water habitats. The River Hull, one of the few habitats of natural origin in the area, meanders right through the centre of the city. Due to the low-lying nature of the land and the need for drainage, the area is criss-crossed by drains and ditches which act as green corridors. Some of these are quite long and wide, like the Beverley and Barmston Drain and the Holderness Drain, others are shorter and narrower. There are some streams of natural origin (e.g. Mill Beck). Some drainage ditches were probably originally natural streams that were highly managed to improve draining (e.g. Old Fleet, Fleet Drain). Notable botanical features of the River Hull, the two main drains and the smaller land drains are described by Middleton (2001).

There are several fishing lakes, some of them within public parks, and ponds in public areas, including shallow, temporary ponds and scrapes, but also ornamental ponds with hard edges. As a preliminary to the survey, we compiled a [Habitat database](#). Although several lakes (in Pickering Park, East Park and Thwaite Gardens) are over a century old, there has been a lot of recent wetland creation, some for temporary water storage (in lagoons, swales and aqua greens) to reduce urban flooding e.g. following the 2007 floods or as part of larger schemes of managed realignment in the Humber estuary (Paull Holme Strays).

Three of the sites from which records were obtained, Paull Holme Strays, Noddle Hill Nature Reserve and Oak Road Lake are recognised by the Yorkshire Dragonfly Group as being good places to see dragonflies and damselflies. As a result of the survey, we have identified additional publicly accessible sites that allow anyone to observe all the dragonfly and damselfly species present in Hull. We briefly describe each site and list its features and which species they are currently supporting. In brackets, we report the strongest evidence of breeding for each species.

We hope that data collected in this report can be used to inform Hull City Council, and East Riding of Yorkshire Council, when considering sites with wetland areas/ponds as potential local nature

reserves and when implementing other biodiversity/land-use initiatives.

Best sites to watch Dragonflies in Hull

The British Dragonfly Society (BDS) recommends applying a sequential set of criteria (including number of species, their local importance, abundance and evidence for breeding) when deciding if a site is a priority site or dragonflies. The criteria are also tailored to different regions of the UK. In Yorkshire, one of the current criteria is that a site should have had at least 8 species recorded during the last 10 years. For simplicity we have used the presence of at least 8 species as an indicator that a site is important for dragonflies in the Hull area. The following section provides details on publicly accessible sites where this criterion is met or where interesting species can be found (Figure 3). We have included evidence from previous records when available.

[Note: As part of the criteria for determining a priority site for dragonflies, the BDS approach takes account of the presence of nationally important and locally important species. Hull does not have any nationally important species but it does have records of the following species currently listed by the BDS as locally important in Yorkshire: Red-eyed Damselfly, Small Red-eyed Damselfly, Migrant Hawker, Emperor Dragonfly, Hairy Dragonfly and Black-tailed Skimmer. We consider that this list needs updating as some of these species (notably Migrant Hawker and Emperor Dragonfly) have become quite common in South East Yorkshire.]

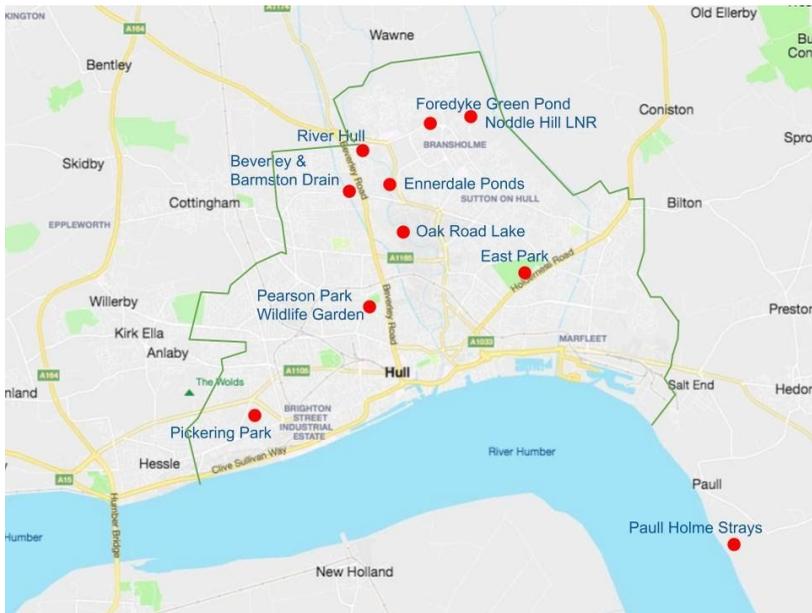


Figure 3. Best sites for dragonflies in the Hull Dragonfly survey area. The green line is the approximate boundary of the city of Hull. The best sites to watch dragonflies are shown by red dots.



Paull Holme Strays

Paull Holme Strays (Grid ref. TA180251) is a managed realignment scheme currently managed by the Yorkshire Wildlife Trust. The scheme created environmentally valuable mudflats and saltmarshes by breaching the Humber Bank in two places in 2003, allowing the Humber to flood the site, and by realigning the Humber Bank inland. This was the first major realignment project in the Humber Estuary. On the landward side of the realigned bank are dykes and a large pond by the car park (photo above). The car park pond was created in 2003 to replace an established borrow pit with a rich invertebrate fauna that was lost as a result of the realignment. The macro-invertebrates, including Odonata larvae, of these new water bodies of the landward side were monitored by pond-netting in the Spring from 2004 to 2008 (Hammond, 2008). The water on the landward side was reported to be brackish. The salinity varied: notably in May 2006 the salinity of the car park pond approached half that of seawater and no Odonata larvae were found but in May 2008 the salinity was low enough to allow a damselfly to complete its life cycle (a recently emerged damselfly was noted). We have not located any salinity information for the years after 2008. The new area on the landward side has become attractive to dragonflies and damselflies but the extent of the species list is also a reflection of the high observer effort (e.g. <https://paullholmestrays.wordpress.com>). It is relevant to note that some Odonata are tolerant of brackish water

notably the Blue-tailed Damselfly as recorded at Spurn (Butler & Popham, 1954) and elsewhere (Dudaniec *et al.*, 2018).

Despite the access to the car park pond being restricted this year due to engineering works, ten species have been recorded in the Paull Holme area, most of them from the Car Park Pond, but also in nearby Thorgumbald drain and the Paull Fort and Church area adjacent to the site. Small Red-eyed Damselfly, Common Blue Damselfly, Blue-tailed Damselfly, Common Darter, Ruddy Darter, Migrant Hawker, Emperor Dragonfly, Four-spotted Chaser, Black-tailed Skimmer and Broad-bodied Chaser were seen.

Including historical records, 18 species have been recorded at Paull Holme Strays. The following 8 species were not recorded this year: Azure Damselfly (14 pairs, 2004 and 2 records, 2015; it is thought to be a common species in the area, possibly under-recorded), Hairy Dragonfly (1 record, 2014), Large Red Damselfly (1 record, 2015), Emerald Damselfly (2 records, 2006; seen also in 2007 and 2014, not since), Southern Hawker (?), Black Darter (1 record, 2013), Banded Demoiselle (1 record, 2016), Brown Hawker (first seen 2015, and every year since). Some of these species (Large Red Damselfly, Hairy Dragonfly, Southern Hawker and Black Darter) are likely vagrants with no established populations in the area. Breeding behaviour has been recorded for Common Darter (ovipositing, 2004) with some evidence for Azure Damselfly (in tandem, 2004) and Black-tailed Skimmer (males holding territories and females present, 2006). In addition, the following larvae were recorded by Hammond in his April/May surveys in the period 2004-8: Blue-tailed Damselfly, Emperor Dragonfly and Four-spotted Chaser, as well larva of a Darter and larvae of a Blue Damselfly (probably Azure).

Car Park Pond photograph © Mat Fascione and licensed for reuse under Creative Commons Licence CC BY-SA 2.0.



Foredyke Green Pond

This pond underwent restoration as part of the redevelopment of Foredyke Green and is located near Wilberforce Woods (grid ref. TA100348). The pond has shallow areas with marginal vegetation, floating vegetation and willows on the western side. It is surrounded by an accessible path with benches and has two metal pond-dipping platforms. The pond is sheltered by trees on its northern side. In the vicinity of the pond there is a meadow, hedgerows and a dyke, the Foredyke Stream. The Wilberforce Wood next to this area also has ditches and a temporary pond. The site is best accessed through Kesteven Way, where there is plenty of parking.

Eleven species were recorded this year at Foredyke Green pond, the top site for the number of species during the survey. We obtained evidence of breeding for 4 of these species (breeding evidence in brackets): Emperor, Broad-bodied Chaser (ovipositing), Four-spotted Chaser, Common Blue Damselfly, Blue-tailed Damselfly (ovipositing), Azure Damselfly (ovipositing), Common Darter (ovipositing), Southern Hawker, Brown Hawker, Migrant Hawker, Emerald Damselfly.

A survey in 2004 (June, July and September) revealed 10 species, including Ruddy Darter which wasn't found this year. Azure Damselfly and Southern Hawker were not recorded in 2004.



Noddle Hill Nature Reserve

A local nature reserve, previously known as Bransholme Fishing Ponds (grid ref. TA110348). It has scrub, woodland and grassland and includes a diversity of wetland habitats: ditches and drains (which surround the site), wet meadows, permanent and temporary ponds and a large fishing lake (photo). The woodland surrounding the lake offers shelter during windy conditions and has rides with plenty of insects. Some of the aquatic sites are well vegetated too, a few of them becoming overgrown. The site is best accessed through Bransholme Road and there is a small free parking site.

Noddle Hill is a well known site for dragonflies, a total of 16 species have been recorded in the site overall, of which 10 have been recorded this year (breeding evidence in brackets): Common Blue Damselfly, Blue-tailed Damselfly, Red-eyed Damselfly, Azure Damselfly (mating), Southern Hawker, Emerald Damselfly, Black-tailed Skimmer, Ruddy Darter, Common Darter (mating), Migrant Hawker (mating).

Other species for which there is evidence of breeding from previous years are: Blue-tailed Damselfly (larvae, 2002), Emperor (larvae, 2002), Brown Hawker (ovipositing, 2002), Black-tailed Skimmer (ovipositing, 2006) and Ruddy Darter (ovipositing, 2006).



East Park

Hull's largest park (grid ref. TA121312), with 120 acres, is a Grade II listed park which opened in 1887 as part of Queen Victoria's Golden Jubilee celebrations. There was a council assisted £10 million Lottery Grant refurbishment and restoration in 2008. The park is well known for its birds, with over 62 bird species recorded.

The park has a large lake with islands. The western side of the lake has concrete sides, while the eastern side has more natural margins. Both sides of the park have patches of marginal vegetation and trees and abundant floating vegetation. The lake is well stocked with fish. The best area for dragonflies, especially at the end of the season, is the easternmost edge by the boardwalk (see photograph), where there is a wide patch of marginal vegetation sheltered by trees. The second lake, a model boating lake, with artificial edges, has plenty of underwater vegetation and is favoured by Small Red-eyed Damselfly.

A total of 10 species of dragonflies and damselflies were recorded this year (breeding evidence in brackets): Emperor (ovipositing), Black-tailed Skimmer (mating), Four-spotted Chaser, Common Blue Damselfly, Blue-tailed Damselfly (mating), Red-eyed Damselfly, Small Red-eyed Damselfly (ovipositing), Migrant Hawker (ovipositing), Willow Emerald Damselfly, Common Darter (tandem pair). The few previous records for East Park did not include any additional species or evidence of breeding.



Oak Road Lake

A lake on a bend of the River Hull (grid ref. TA092321), adjacent to the river bank in the Oak Road Playing Fields, managed by Hull City Council. The lake was created as a borrow pit when the banks of the River Hull needed to be repaired. All but the west side of the lake is fringed by a belt of reeds. The east side has fishing platforms. There are marginal trees such as willows and alder. The area is wooded offering shelter from winds. This lake became well known amongst odonatologists as it was the first site in Yorkshire where Small Red-eyed Damselfly became established in 2006. Although a good site for dragonflies and damselflies, the diversity and number of individuals appear to have decreased in recent years, particularly after the floods of 2007 (Andrew Ashworth, *pers. comm.*). In the past, the lake had a rich carpet of floating vegetation. However, floating vegetation was very limited this year, possibly due to dredging, and probably accounts for several species becoming absent or rare.

The lake is accessible through Beresford Avenue, and it has a free car park. There is a path around the lake and access to a good area for dragonflies in the River Hull.

Nine species have been recorded this year: Common Blue Damselfly, Blue-tailed Damselfly (ovipositing), Red-eyed Damselfly, Small Red-eyed Damselfly, Brown Hawker, Southern Hawker, Migrant Hawker, Ruddy Darter, Common Darter (ovipositing).

There are historical records of a further six species: Emerald Damselfly, Azure Damselfly, Black-tailed Skimmer, Emperor Dragonfly and Four-spotted Chaser. There is a single record of Hairy Dragonfly (2018).

Small Red-eyed Damselfly, Emperor, Common Darter have bred before (breeding status from maps in Ashton, 2013).



Pickering Park

Pickering Park, created in 1911, has a long, narrow lake (oriented N-S) with a series of wooded islands (grid ref. TA058274). It is a fishing lake and used to be a boating lake. The north and east sides of the lake have abundant marginal and floating vegetation. The lake is in places quite exposed, with scattered trees and open grassy fields. There is also a small pond in the park surrounded by trees. The south end of the playing fields is prone to flooding.

Access is from Pickering Road or Hessle Road and there is ample parking alongside the road and in the access road through the park.

The survey revealed eight species this year: Emperor, Four-spotted Chaser, Common Blue Damselfly, Blue-tailed Damselfly (mating), Small Red-eyed Damselfly (ovipositing), Common Darter (ovipositing), Ruddy Darter, Migrant Hawker (ovipositing). It is an excellent place to watch territorial Emperor Dragonflies and breeding Migrant Hawkets and holds a population of Small Red-eyed Damselfly.

Of particular note was the large number of Migrant Hawkets present on 14th September. Most large clumps of tall emergent vegetation around the edge of the lake had 2-5 males patrolling through and

around the vegetation. In total it was estimated that 60-100 males and about 6 females were seen, with plenty of evidence of breeding. Although a great site for damselflies and dragonflies, there are only a few historical records and no previous evidence of breeding. There are records from 1997 for Blue-tailed Damselfly, Common Blue Damselfly and Common Darter. There is also a tantalising comment in the Hull Biodiversity Action Plan (Marshall, 2002) that “Migrant Hawkers (*Aeshna mixta*) were found in Pickering Park Lake prior to a herbicide accident in 1999”. It would be good to find out more about the pre 1999 record(s) as it/they constitute the earliest record of Migrant Hawkers in the Hull area.



Ennerdale Ponds

Two recently created ponds, one temporary the other permanent, north of the Ennerdale Sports Centre near the River Hull (grid ref. TA089331). The south pond is permanent and has a belt of trees on one side. There is some marginal vegetation, floating algal mats and plenty of bare margins. Both ponds are surrounded by grassland.

The temporary pond was quite dry, devoid of vegetation and unproductive for dragonflies this year. The south pond had seven species of dragonflies and damselflies present, five of them with evidence of breeding: Common Darter (ovipositing and teneral), Emperor (ovipositing), Common Blue Damselfly (mating), Azure Damselfly (ovipositing), Blue-tailed Damselfly, Black-tailed Skimmer (ovipositing), Small Red-eyed Damselfly.

No previous records of damselflies or dragonflies for this site were found.

Access to the ponds is via the banks of the River Hull, near Ennerdale.



Pearson Park Wildlife Garden

A small pond in the wildlife garden owned by the Yorkshire Wildlife Trust (YWT), located at the southern end of Pearson Park (grid ref. TA083301). It has a pond-dipping platform and is surrounded by a meadow and by hedges and trees. There is plenty of marginal and floating vegetation and no fish.

Six dragonfly and damselfly species have been recorded this year, with evidence of breeding obtained for four of them: Southern Hawker (exuviae), Broad-bodied Chaser (exuviae and tenerals), Azure Damselfly (exuviae), Common Blue Damselfly, Common Darter (exuviae) and Migrant Hawker. In past years, Ruddy Darter and Emerald Damselflies have been recorded at the pond.

Given the small size of the pond and presence of a pond-dipping platform, this site offers great opportunities for close observation of all the species it holds. Exuviae are easily found and the YWT holds pond dipping events.

The pond is publicly accessible during working hours Monday to Friday. Parking is available around Pearson Park and Princes Avenue. The pond is accessible to wheelchairs.



Beverley and Barmston drain

A drain of variable width running west of the River Hull from the edge of the recording area until joining the river Hull at Wilcomlee. Given its NNW-SSE orientation it has a sunny aspect that favours dragonflies. It has plenty of marginal and floating vegetation and in long stretches there are hedges and trees alongside it.

Seven species were recorded during the survey period: Blue-tailed Damselfly, Azure Damselfly, Emperor, Four-spotted Chaser, Common Darter, Southern Hawker and Migrant Hawker (mating). All of these are widely distributed species that can be observed at several sites in the survey area. In past years there is a record of Black Darter (2013).

The drain has paths running alongside it, some of them accessible others grassy, with public access from Greenwood Avenue (TA078329), Beresford Avenue (TA087317) and Sculcoates Lane (TA093307) amongst others. North of Greenwood Avenue, a bend in the drain with a repositioning of the path lower on the bank allows closer access to the water.



River Hull

The River Hull runs through the middle of the city dividing it into an east and west side, and joins the Humber at the southern edge of the recording area. The river is tidal throughout its course in Hull and a belt of marginal vegetation has developed north of Clough Road, with Common Reed, Sea Aster and other reeds. Although its meanders are preserved, it is embanked with grassy earth banks, steep in places. North of Clough Road there are areas of grassland and woodland by the banks. North of Raich Carter Way the river crosses agricultural land. Middleton (2001) notes that above Sutton Road Bridge, five miles north of its confluence with the Humber, the river is still tidal but its vegetation assumes many of the aspects of the larger land drains.

Most of the length of the River Hull is accessible by public footpaths on one or both banks. Access to the footpaths are through Oak Road Playing Fields, Sutton Bridge (photo), Raich Carter Way, Dunswell, Wawne and Thearne.

During the survey, six odonata species were found alongside the River Hull: Banded Demoiselle, Emperor, Common Blue Damselfly, Brown Hawker, Migrant Hawker and Common Darter. No evidence of breeding was obtained. We have included the river in the best sites as it is the only site that has regularly had Banded Demoiselles. This species can be found on marginal vegetation of the river bank. The only historical records found were of Banded Demoiselles on the Wawne area (2008).

Species calendar

The following table shows when adult damselflies and dragonflies were recorded during 2019 (for the period April to November). Regular recording started in early May (at the beginning of the season for adult emergence) and finished at the end of September (when very few adults were seen).

	A	M	J	J	A	S	O	N
Banded Demoiselle			X	X				
Emerald Damselfly			X	X	X			
Willow Emerald						X		
Red-eyed Damselfly		X	X	X	X			
Small Red-eyed Damselfly				X	X	X		
Blue-tailed Damselfly		X	X	X	X			
Azure Damselfly		X	X	X	X			
Common Blue Damselfly		X	X	X	X	X		
Migrant Hawker				X	X	X	X	
Southern Hawker				X	X	X		
Brown Hawker				X	X			
Emperor Dragonfly			X	X	X			
Hairy Dragonfly			X					
Four-spotted Chaser			X	X				
Broad-bodied Chaser		X	X					
Black-tailed Skimmer			X	X	X	X		
Common Darter				X	X	X		
Ruddy Darter			X	X	X	X		
Black Darter					X			

Species accounts

We provide details on each of the 19 species recorded during the survey in 2019 in the following Species Accounts. The common name, scientific name and a brief description is given. We have included distribution maps obtained from the iRecord records for those species with records from more than one site. The status and distribution in the area is described with reference to historical and survey records for 2019. The number of km² grid squares in which a species was observed this year is given, indicating how widespread a species was in the survey area. We also remark on notable sites where the species is recorded and historical and current breeding evidence. Note that for simplicity we refer to km² to indicate km² OS grid squares. Sections on habitat, flying season, behaviour and a selection of photos follow.

Willow Emerald Damselfly

Chalcolestes viridis

A bright metallic green and large damselfly which perches with wings open, as the Emerald Damselfly. They lack blue pruinescence on the thorax and last abdominal segments, and have pale pterostigma with black margins and pale abdominal appendages. In side view, a forward-pointing dark spur on the thorax is distinctive. Note eyes are not blue.

Status and distribution

A strongly expanding species which has been recorded this year on several locations on the south bank of the Humber, at North Cave Wetlands and at one location in North Yorkshire. We had anticipated that this rapidly expanding species might make it into Hull during our survey. Indeed, the first record for South East Yorkshire was during a survey on the 8th September 2019, a single male at East Park. Most likely the same individual male was refound on the 10th of September.

Habitat

Breeds where there are ponds, lakes, slow flowing rivers and canals fringed with trees and bushes. Often found settled on sheltered trees, sometimes high up, and in marginal vegetation. Does well in urban habitats.

Flight period

A long flying season, from June until October. The two records are from the 8th and 10th of September 2019.

Behaviour

A stronger flyer than the Emerald Damselfly. Males defend territories on marginal trees such as willows and alders. Females oviposit into branches overhanging the water, creating characteristic gall-like parallel scars on the branch.

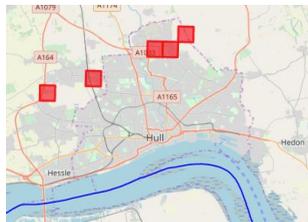


Male Willow Emerald Damselfly from East Park.

Emerald Damselfly

Lestes sponsa

A bright metallic green damselfly which perches with wings open, unlike other damselflies (but see Willow Emerald Damselfly). Males have blue eyes and develop a powdery blue 'pruinescence' on the thorax and last abdominal segments; females are all green.



Status and distribution

One of the longest established species in the area, although uncommonly seen. Two records in 1988 from Burton Constable and one in 1997 at Salt End are the earliest. It has been previously recorded at Pearson Park Wildlife Garden, Noddle Hill LNR, Oak Road Lake, Paull Holme Strays and a private Avenues pond, but with no evidence of breeding. This year, just five records from five locations were obtained: Mirmeredales Pond, Foredyke Green Pond, Snuff Mill lane private pond and Noddle Hill LNR. A mating pair was observed in a well vegetated ditch in Willerby. It could be under-recorded due to its unobtrusive habits.

Habitat

Ponds, ditches, temporary ponds, and lakes with abundant marginal vegetation and shallow water areas. They tolerate brackish and acidic water, and do not fly far from their breeding sites.

Flight period

Early June to end of September, peaking in July. They are long-lived in comparison to other damselflies, able to survive over two months. The first records in 2019 were on the 29nd of June, the last record on 23rd August.

Behaviour

They are weak, slow fliers and are often found perched amongst marginal vegetation, well camouflaged. Eggs are inserted in underwater stems of rushes and other plants, a female often completely submerges when egg laying, usually when in tandem

with a male. Eggs overwinter (egg diapause) and hatch the following spring.

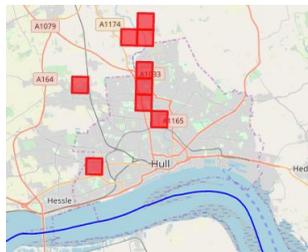


Emerald Damselfly. Top: Immature female. Bottom: mature male. Both from Noddle Hill LNR.

Banded Demoiselle

Calopteryx splendens

A large damselfly with bright metallic colours and flitting, butterfly-like flight. Males are metallic blue with a large iridescent dark spot towards the end of each wing. Females are metallic green and have clear wings with a greenish tint.



Status and distribution

A recent colonist to the area, possibly aided by the warming climate and/or improved water quality. Since 2000, it has steadily colonised the lower reaches of the River Hull and Beverley & Barmston drain, between Tickton and High Eske. The earliest records in our recording area are from the River Hull, near Clough Road and at Wawne in 2008. There are also two records from Noddle Hill in 2013 and 2015. No historical evidence of breeding was found. The fact that a total of 18 records from 9 km² were obtained this year suggests that the colonisation is ongoing. The records are spread along the River Hull from the southernmost ones at Clough Road to the northern boundary of the city and near Thearne/Wawne. Additional records were also obtained at Mill Beck, Cottingham and Costello Stadium lake. Although most records are of single individuals, up to 6 individuals were observed in the Wawne area, but no evidence of breeding was obtained.

Habitat

Breeds in slow flowing rivers and streams, sometimes canals and drains with plenty of aquatic vegetation and muddy bottoms. Can be found in nearby ponds, unsuitable as breeding sites. It is tolerant of water with high nutrient levels.

Flight period

From mid May to early September. It peaks from early June to mid July. The first record in 2019 was from the 6th of June, and the last on the 15th of July.

Behaviour

They are often found resting on bank-side vegetation, with their abdomen pointing upwards and wings closed. Young males defend high quality spots with clumps of plants favoured by females for oviposition, chasing intruders away. Individuals often repeatedly flick their wings open while sitting on their favoured perch. As males age they lose their territory to younger intruders. Banded Demoiselles can be found in high densities and then territorial defence collapses, with groups of males chasing passing females or couples in tandem or females ovipositing. Male courtship involves rapid fluttering wing-beats in front of females. Egg laying takes place in floating vegetation and may involve the female completely submerging.

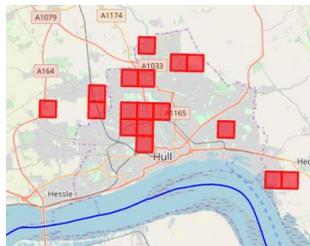


Banded Demoiselle. Top:
Male. Bottom: Female
Both from the River Hull.

Azure Damselfly

Coenagrion puella

A blue and black damselfly. The forward-pointing black 'spur' on side of thorax is the best identification feature in the area, together with markings at the top of the abdomen and narrower 'shoulder' stripes than Common Blue. Females are green and black or blue and black.



Status and distribution

Widespread and common. It can be found in large numbers in suitable habitats. Records in the area began in 1997, in Thorngumbald Drain. This late date is likely due to under-recording, possibly through misidentification with Common Blue Damselfly. Since then, it has been recorded at many sites. Past evidence of breeding include larvae at Noddle Hill in 2002, several "pairs" reported at Paul Holme Strays in 2004 and pairs in tandem at Loglands NR and Pearson Park Wildlife Garden (both in 2012). This year a total of 32 records from 17 km² were obtained. Evidence of breeding in the form of mating and ovipositing was obtained in several sites including Pearson Park wildlife garden, Noddle Hill and Foredyke Green pond. Emerging individuals were recorded at Pearson Park wildlife garden.

Habitat

Sheltered small ponds, drains and ditches with abundant marginal vegetation.

Flight period

It flies from early May to early August, peaking in late May. The first record this year was on the 17th of May and the last record on the 19th August.

Behaviour

Found hunting and perching on vegetation around ponds and on marginal vegetation, but tends not to fly very far from shore over

water. Males hang onto females while they oviposit in tandem and often many pairs oviposit together.

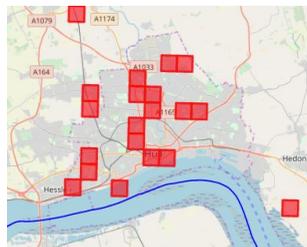


Azure Damselfly. Clockwise from top left: male; pair in tandem; two pairs ovipositing; mating pair.

Common Blue Damselfly

Enallagma cyathigerum

A blue damselfly with black markings lacking black spur on each side of the thorax. The blue stripes at the top of the thorax are wide, giving an overall paler impression than Azure Damselfly. Females are blue as males or greenish. Check Azure Damselfly for comparison.



Status and distribution

Common and widespread. One of the few species with old records in the area, the first record at Burton Constable lake in 1986, but there is a record from Beverley in 1960 and one at Figham Common in 1981. We found no historical evidence of breeding. A total of 67 records were obtained from 20 km² this year. It is found in large ponds or lakes with floating vegetation: East Park Lake, Pickering Park Lake, Noddle Hill Lake and Oak Road Lake amongst others. Mating was observed at Pickering Park and Ennerdale South Pond, with mating, ovipositing and two teneral recorded at St Andrews Quay pond.

Habitat

Prefers larger ponds and lakes with floating vegetation, where it often perches, less dependent on marginal vegetation.

Flight period

Late April to late September, peaking in June and July. The first record this year was on the 13th May, and the last record on the 13th September.

Behaviour

A strong flyer which often skims over the water far from shore, checking other damselflies and dragonflies. Will perch on marginal vegetation too. Mating pairs often seen flying low over the water surface. Oviposition can be in tandem or alone.

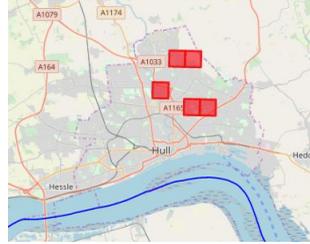


Common Blue Damselfly. Top: mating pair. Middle: male. Bottom: tandem pair in flight.

Red-eyed Damselfly

Erythromma najas

A stout damselfly, male mostly black with blue markings and burgundy-red eyes. The dark thorax with bronze iridescence and blue tail are distinctive even in flight and at a distance. It may be confused with the Blue-tailed Damselfly, but the red eyes will separate it from this species. The Small Red-eyed Damselfly is smaller, flies later in the year and the blue tail pattern is a different shape.



Status and distribution

A recent colonist after northwards range expansion. The first records in the area were at Noddle Hill LNR in 2007. Subsequent records are from Oak Road Lake (including a pair in tandem in 2018) and Noddle Hill LNR, but given its habits, it might well be under-recorded. This year a total of 8 records were obtained from 5 km² grid squares at three sites, Oak Road Lake, Noddle Hill and the first records in East Park main lake. No breeding evidence was obtained.

Habitat

A species favouring large lakes, canals and drains with plenty of vegetation with floating leaves, such as Amphibious Bistort, Broad-leaved Pondweed or Water Lilies.

Flight period

Early May to end of August, peaking in June. The first record in 2019 was the 23rd of May and the last record the 29th August.

Behaviour

Adults spend much of their time perched on floating leaves. Males fly low over the water, patrolling in search of females. Oviposition is in tandem, with the eggs inserted into floating leaves, and the pair might totally submerge.

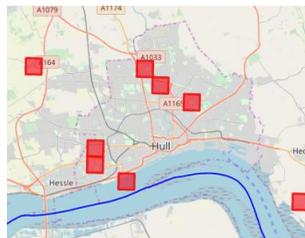


Red-eyed Damselfly. Top: Teneral individual at Noddle Hill lake.
Bottom: Male resting on Amphibious Bistort at East Park.

Small Red-eyed Damselfly

Erythromma viridulum

A small damselfly with bright red-eyed males and a late and short breeding season. Close examination or photographs are ideal for identification, as it differs in the pattern of blue on the tail from the closely related Red-eyed Damselfly.



Status and distribution

A recent colonist, involved in a strong range expansion through the UK since first detected in 1999. The first locations in East Yorkshire were in Hull, at Oak Road Lake (including one pair mating and egg laying) and Noddle Hill LNR (Bransholme fishing lake) in 2006. A large number of individuals (84) were counted at Oak Road Lake on 10th August 2007. In 2011, the species was found at Paull Holme Strays. In 2018, many individuals were reported by Nathan Pickering from East Park boating lake, with at least one pair ovipositing. This year's survey has documented the species further spread, with 19 records in 8 km² grid squares. East Park has become a stronghold, with dozens of pairs ovipositing both in the main lake and the model boating lake on 13th and 25th of July and at least 5 pairs on the 30th August. Many individuals and oviposition were noted at Pickering Park. Oviposition was also recorded at Costello Boating Lake, which is adjacent to Pickering Park. Two adults were recorded at St Andrews Quay Pond, several at Oak Road Lake and one at a private pond at Skidby, Ennerdale South Pond and Paull Holme Strays car park pond.

Habitat

Eutrophic lakes, ponds and ditches with abundant floating vegetation (hornworts, water millfoil, and *Elodea* spp).

Flight period

Short, late flight season from mid July to early September, peaking in mid August. The first record this year was on the 13th of July and the last record on the 13th of September.

Behaviour

Males often perch on floating vegetation, debris or feathers away from the water's edge. Their direct flight skimming the water is noticeable. Oviposition is in tandem into submerged vegetation.

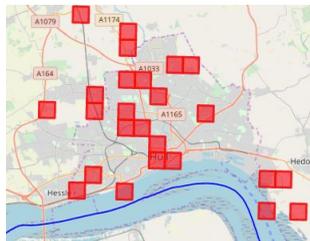


Small Red-eyed Damselfly. Top: Pair in tandem, with female ovipositing at Pickering Park. Bottom: A male perched on emergent vegetation near the lake shore at Oak Road.

Blue-tailed Damselfly

Ischnura elegans

Males are blue and black, with the abdomen mostly black, bearing a striking blue band near its tip. Various colour morphs in females. Females resemble males (androchrome females) at high population densities. Eyes blue in males.



Status and distribution

A very common and widespread species which rapidly colonises small garden ponds. One of the earliest species recorded in the area, with records from 1984 at Risby Park, and 1987 at Burton Constable and a record at Figham Common just outside the recording area in 1981. It has been reported as breeding in Loglands LNR (2012) and Noddle Hill LNR and Oak Road Lake (both 2018). There was a total of 80 records from 26 km² this year, making it the most common and one of the most widespread damselfly species. Mating was observed at Pickering Park, East Park and on the River Hull near Thearne; oviposition was documented in Oak Road lake, East Park and Foredyke Green pond.

Habitat

A range of habitats such as small and large ponds, lakes, ditches and including polluted or brackish water. Tolerant of fish.

Flight period

Late April to late September, peaking in June and July. The first record this year was on the 20th of May and the last record on 28th August.

Behaviour

In dull weather it can be the most noticeable Odonata, where they can be found perched in marginal vegetation, often in large numbers in favoured sheltered areas and they are often active. Males may be seen sparring and attempting to grab females. Mating is long, with

the pair perched on vegetation. Females oviposit alone near the shore.



Blue-tailed Damselfly: Top left: mating pairs in East Park. Top right: male. Middle, two female colour forms. Right, oviposition.

Southern Hawker

Aeshna cyanea

A large and colourful dragonfly. Males have sky blue and apple green markings on dark brown, females are greener.



Status and distribution

A species that has strongly expanded its range northwards well after the millennium. The first records in the area were in 2005: single individuals were seen in Cottingham, Priory Fields and on the Hull/Anlaby boundary. Historical evidence of breeding exists at Loglands LNR (2015) and Pearson Park wildlife garden, where ovipositing was observed (2018). This year, a total of 35 records were obtained in 18 km². Evidence of breeding was obtained at Pearson Park wildlife garden pond and two private garden ponds, where exuviae were observed. Ovipositing was observed beside a small pond at Marfleet Road Allotments and in a private pond. Other records include several sightings at Noddle Hill Lake, including an immature individual, and a patrolling male at Foredyke Green Pond.

Habitat

Small, shaded ponds in gardens or woods. Feeds in woodland rides and clearings.

Flight period

It starts to emerge in mid-June and flies until October, with a long peak from mid July to early September. First record this year was on the 2nd of July and last record 28th September.

Behaviour

It is hard to miss, as it likes to hunt flying low along shaded paths and wooded rides. It is also very curious and it will come to check observers out. Can be active in dull, muggy weather and in shady areas, sometimes well into the night. As other hawkers, it perches hanging from branches. Females lay eggs in emergent vegetation, rotten wood or moss outside of the water.

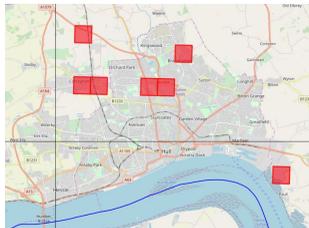


Southern Hawker. Top: Mature male at Foredyke Green pond. Bottom left, exuvia at Pearson Park wildlife garden. Bottom right, female ovipositing, Pearson Park wildlife garden.

Brown Hawker

Aeshna grandis

A large dragonfly which can easily be identified in flight by its bronze-tinged wings. Males and females are brown with two yellow stripes on the side of the thorax and small blue markings on the abdomen.



Status and distribution

Although a common and widespread species in lowland Britain, it is a rare hawker in the Hull area, with only a few annual records. Most records before this survey are from Noddle Hill and Oak Road, with a few from Priory Fields and Barmston Fish Farm, near Thearne. The first historical record is from 2002 at Noddle Hill, where ovipositing by two females was recorded in the small pond. This year, we compiled a total of 9 records from 6 km². Individuals were seen by the River Hull, Oak Road Road Lake, Foredyke Green pond, Thwaite Gardens and two sites north of Cottingham, but no evidence of breeding was obtained.

Habitat

Ponds, lakes, lowland rivers, ditches and canals. If often forages away from water and can fly into the evening. Breeds in well vegetated ponds and waterways.

Flight period

Early June to late September, peaking early July to late August. The first record this year was on the 4th of July, and the last on the 6th of September.

Behaviour

Males are territorial and may defend stretches of water or areas away from water. Very active, hawking high amongst trees or alongside ditches or rivers. It rarely settles. It perches like other hawkers, in sunny, sheltered spots, hanging from vegetation often low down. After mating, the female oviposits alone, on the shore, inserting her eggs into rotting wood.

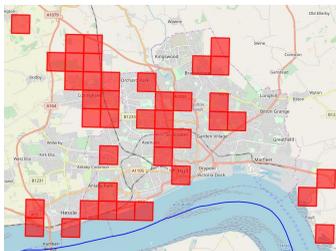


Brown Hawker. Top: male at North Cave Wetlands. Bottom: female ovipositing at Thornton-le-Dale pond.

Migrant Hawker

Aeshna mixta

A late summer dragonfly with a long flight season. A small hawker, mature males have blue markings on abdomen and eyes, and a well patterned thorax with two yellow stripes over brown on the sides. Females are brown with yellow markings. In flight, the abdomen is held higher than the body.



Status and distribution

The most commonly encountered hawker in the area. Its long immature period and wandering habits means that it can often be found away from water. It is reported to have been present in Pickering Park prior to 1999 (no further details have been located so far). The next records in the area are from 2002, where it was found in a garden in the avenues and at Noddle Hill Lake. It later became a common and widespread species, but no evidence of breeding in the area had been reported to our knowledge. This year it has been the most recorded and widespread species, with a total of 153 records from 40 km². Mature, patrolling males over water were seen at several sites potentially suitable for breeding. Mating was seen at Pickering Park, East Park, Beverley and Barmston Drain, Noddle Hill Foredyke Stream drain and Humber Bridge Country Park; ovipositing was observed at Foredyke Green, Pickering Park and East Park. The large numbers of males (c. 60-100) patrolling the tall emergent vegetation at Pickering Park lake on the 14th September was particularly notable.

Habitat

Roams widely away from water, preferring to feed in sheltered areas by trees, hedgerows or in gardens. Breeding takes place in well vegetated lakes and drains with plenty of marginal vegetation.

Flight period

From mid-late July to early November, peaking in August and September. The first record this year was on the 22nd of July, the last record on the 27th October.

Behaviour

Individuals are not aggressive and can hunt and perch together. Even at breeding sites males often only chase each other for short distances. Perches on vegetation either semi-horizontally or hanging. Hawking height is often 3-4 m high or tree-top level. At breeding sites males patrol the water's edge alongside marginal vegetation, frequently hovering while they look for females. Mating happens near water, with the pair hanging from marginal vegetation or in trees near water, and is longer than other species. Female oviposits alone on live plant leaves, well above water. As with other species of dragonflies and damselflies they can sometimes be seen flying whilst in the mating position.



Migrant Hawker. From top left, clockwise. Mature male, mature female, hovering male by lake shore, immature individual (note dull grey eyes), ovipositing female, mating pair.

Emperor Dragonfly

Anax imperator

The largest dragonfly in the recording area. A stocky hawkler, green and blue that often flies over water. Males have a grass green thorax and sky blue abdomen with a long dark irregular stripe, eyes are blue-green. Females can be all green or can look like the males, but the dark abdominal stripe is wider. Eyes are blue or green.



Status and distribution

The Emperor is a species of African origin which has undergone a dramatic range expansion through Northern Europe. First recorded in Preston and Hedon, on the east border of the recording area in 1998. In 2002 it was recorded at Noddle Hill. There are historical records of breeding (larvae) at Noddle Hill and Paull Holme Strays. This year's survey revealed how widespread the species has become. A total of 29 records were obtained from 16 km². Males were noted patrolling and defending territories at East Park, Pickering Park, Foredyke Green pond, Ennerdale South pond, St Andrews Quay pond and Beverley and Barmston Drain. Oviposition was recorded at Ennerdale South pond, Costello Stadium boating lake and East Park main lake.

Habitat

Breeds in large ponds, lakes, drains and slow flowing rivers. They rarely fly away from water.

Flight period

Late May to late September, peaking mid-June to mid-August. The first records this year were on the 29rd June, the last ones on the 27rd August.

Behaviour

Males are very territorial, with a strong flight high over the water (1 or 2 m), occasionally rising to capture prey. They engage in impressive swift chases and clashes between males for territory,

sometimes ending in one of them falling onto the water. They normally feed on the wing and rarely perch. During cooler weather or when feeding on larger prey (butterflies, other dragonflies) they perch hanging low on vegetation or on the ground. Females oviposit alone, often away from the shore, on floating aquatic vegetation, inserting their eggs in plants under the water surface, often ovipositing in several areas in succession. When harassed by males they noticeably curve their abdomen under their body.



Emperor Dragonfly. Top: Male at rest at Beverley and Barmston drain. Bottom: Ovipositing female at Ennerdale South pond.

Hairy Dragonfly

Brachytron pratense

The early flying season and small size of the Hairy Dragonfly helps to distinguish it from other hawkers. It has a characteristically downy thorax, checkered abdomen with small blue markings in males and yellow in females over a black background.

Status and distribution

A recent colonist of South East Yorkshire, which has breeding populations in the middle reaches of the River Hull (Tophill Low and Leven Canal) and also at Far Ings in Lincolnshire. There are just two previous records in the recording area, one at Paull Holme Strays (2014) and another at Oak Road Lake (2018). This year we have obtained a single record, a female photographed emerging in a private garden in Hessle. We expect this species to steadily spread in the area in the future.

Habitat

Breeds in clean, still water bodies including ditches, and canals with a rich variety of emergent aquatic vegetation.

Flight period

A short flying season, from the end of April to mid July, peaking in late May. The only record this year is from the 28th of June.

Behaviour

Males patrol in a zigzagging flight, low by emergent vegetation, inspecting clearings. Mating pairs rest on trees, bushes or long grass. Females oviposit in decomposing floating vegetation, sometimes accompanied by the male.



Hairy Dragonfly. Top: Mating pair at Leven Canal. Bottom left: Female feeding on harlequin ladybird at Oak Road (2018). Bottom right: Emergent female at a private garden in Hessle (2019, photograph by Lynne Elvidge, with permission).

Broad-bodied Chaser

Libellula depressa

A medium-sized dragonfly with a distinctive, broad and flattered abdomen. Both sexes have dark markings on the base of each wing and brown eyes. Mature males have a pale blue abdomen with small yellow side spots. Females are brown and yellow, and, when in flight, they might be confused with a large wasp or hornet. Immatures look similar to females.



Status and distribution

A recent coloniser in the area, which remains locally distributed. The first record in our recording area was in 1995 at Humber Bridge Country Park. This species is still increasing in range and there are few Hull records (several from Priory Fields). We could find no historical evidence of breeding in the recording area. This year, 10 records were obtained from 5 sites in 5 km², with evidence of breeding in two of them. At Pearson Park Wildlife Garden pond, successful breeding was shown with an individual emerging, several teneral and several exuviae. However, mature individuals were not seen at this location, as they appeared to disperse away. In contrast, territorial males and an ovipositing female were observed at Foredyke Green pond. Single records were obtained at Snuff Mill Lane, Paull Holme Strays area and private gardens at Walkington and the Avenues.

Habitat

The Broad-bodied Chaser prefers small, shallow, sunny ponds with bare edges, including small garden ponds. It is one of the first species colonising new ponds, although it may abandon overgrown ponds later on.

Flight period

Flight period from mid May to mid August, peaking in June. The first record this year was on the 22nd of May and the last on the 7th of July.

Behaviour

Males are very territorial and patrol their territory, chasing intruders and regularly perching in favourite spots, hanging from their perch (yellow flag, rushes, sticks) or on the ground. There are fast patrolling flights and chases with intruders. The female oviposits by flicking its abdomen on the water surface near vegetation, either on its own or guarded by male, who flies near her. Larvae take 1 to 3 years to develop and emerge in marginal vegetation.

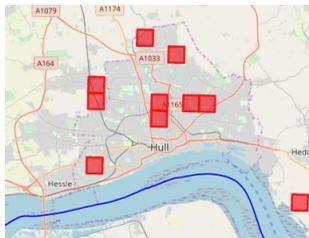


Broad-bodied Chaser. Clockwise from top left. Female, mature male, ovipositing female, emerging individual hanging from exuviae.

Four-spotted Chaser

Libellula quadrimaculata

A brown dragonfly with two diagnostic dark spots on each wing, a dark patch at the base of each hind wing and yellow spots on the sides of the abdomen. It can appear dull in flight, without distinctive features, but males are territorial and like to sit in prominent perches overlooking water, where their markings can be appreciated. Both sexes look similar.



Status and distribution

It appears to have colonised the recording area in the last 20 years. The first record was in 2002 at Noddle Hill lake. Larvae were found at Paul Holme Strays in 2008. This year we compiled 15 records from 10 km². Territorial males were in evidence at several sites, apparent brief oviposition was observed at East Park Lake and a teneral individual was recorded at a pond in Kingswood.

Habitat

A wide range of habitats including brackish and acidic waters. Breeds in lakes, ponds, drains and canals.

Flight period

Long flight period, from late April to late August, peaking in early June. The first record this year was on the 17th of May, the last one on the 25th of July.

Behaviour

Males are territorial and sit on prominent perches over water, to which they often return repeatedly. They also do patrol flights around the water's edge chasing rivals off and pursuing females. In areas with high population densities, communal roosting may occur. They fly about half a meter over the water. Mating is very fast and females oviposit by dipping their abdomen into the water while the male often hovers nearby.

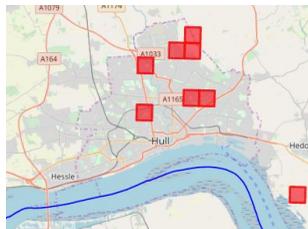


Four-spotted Chaser. Top: male at Foredyke Green pond. Bottom: 'praenubila' form (has enlarged dark spot near wing tip) at Snuff Mill Lane.

Black-tailed Skimmer

Orthetrum cancellatum

A medium-sized dragonfly, with long narrow tapering abdomen (unlike Broad-bodied Chasers) and lacking dark marks on wing bases. Males have a blue abdomen with black tip, females and immature are yellowish, with a black ladder-like pattern on the top of the abdomen and green eyes.



Status and distribution

An expanding species in the UK. The first records are from Paull Holme Strays and Noddle Hill in 2004. Many records in 2006 were obtained at Oak Road Lake, Noddle Hill and Paull Holme Strays. There is past evidence of breeding for Noddle Hill (oviposition) and possible breeding at Paull Holme Strays (both sexes present and 5 territories held). This year a total of 11 records were obtained in 8 km², including a private pond in The Avenues, Foredyke Green, Ennerdale South pond, Paull Holme Strays, Noddle Hill and East Park. Evidence of breeding was obtained for Ennerdale pond, where a female was observed ovipositing, and East Park, where a mating pair was observed.

Habitat

Breeds in open aspect ponds and lakes with bare, exposed ground on margins.

Flight period

Flies from mid May to mid September, peaking in July. The first record this year was on the 28th of June and last record on the 8th September.

Behaviour

Flies low over the water surface ('skims') and likes to perch on the bare shore edges. Females may bask on the ground amongst low vegetation, paths or vegetation away from the water. Oviposition

takes place by flicking the abdomen in the water while the male hovers nearby, following the female and chasing away intruders.



Black-tailed Skimmer. Top: male at East Park lake. Bottom left: Female ovipositing with attending male at Ennerdale South Pond. Bottom right: female resting away from water at Spurn Canal Scrape.

Black Darter

Sympetrum danae

A small, dark dragonfly that often hunts from a perch and flies in late summer. Mature males are mainly black with yellow stripes on the side of the thorax and a waisted abdomen. Females are yellow with black markings, the underside of the abdomen is black. A dark patch with three yellow spots on the side of the thorax is characteristic for both sexes at all maturity stages. Legs are black.

Status and distribution

A rare darter on the east side of the Yorkshire Wolds, with only a few records in the area, the first one from 2011 in the Priory Fields area, and no evidence of breeding. There are two records in 2013, one from the Beverley and Barmston Drain and another in the Paull Holme Strays Car Park. This year, a single record of a male was obtained from the brown field site east of Makro on St Andrews Quay, where it has been also reported in 2012 and 2016.

Habitat

It breeds in acidic sites such as bog, heathland and moorland pools. Adults wander widely though, and it may appear at sites away from breeding pools.

Flight period

Mid June to mid October, even November, peaking towards the end of July, August and September. The only record this year was on the 15th August.

Behaviour

A typically perching dragonfly. It will return to the same or a nearby perch after pursuing an insect. It often basks on the ground, especially on cooler days, and is non territorial.

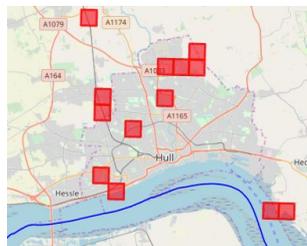


Black Darter. Top: Female at Brick Ponds, Goole. Bottom: Male near St Andrew's Quay (photo courtesy of Barry Warrington).

Ruddy Darter

Sympetrum sanguineum

A small dragonfly that often hunts from a perch. Their completely black legs (no pale stripe) help distinguish it from the Common Darter. Mature males are blood red with black markings and a noticeable waisted abdomen. Females are orange yellow with black markings.



Status and distribution

A relatively recent colonist, now common and widespread in the area. Just a few records before 2000, the first from Bilton church pond in 1995. Historical evidence of breeding (ovipositing) exists at Noddle Hill. This year, a total of 18 records in 13 km² were obtained in the recording area. Evidence of breeding was obtained at Midmeredales pond and a private Avenues pond, when tenerals were observed. Five individuals were recorded at Noddle Hill on several dates.

Habitat

Breeds in lakes and ponds with plenty of emergent vegetation, including garden ponds. Also ditches and slow flowing rivers. Tolerant of brackish and temporary waters.

Flight period

Mid June to mid October, peaking from the end of July to early September. The first record this year was at Midmeredales pond on the 29th June, the last record on the 18th of September.

Behaviour

It is a typically perching dragonfly. It will return to the same or a nearby perch after pursuing an insect or rival. Mating happens away from water and oviposition can be in tandem or with attending male, with female dropping eggs in water. It doesn't wander away from water as much as Common Darter. It tolerates temporary ponds as eggs are drought resistant.

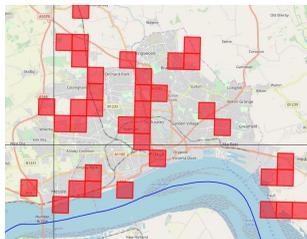


Ruddy Darter. Top: Female in typical perching position. Bottom: Male feeding in obelisk position.

Common Darter

Sympetrum striolatum

A small dragonfly, the commonest darter in our area. Males are orange-red with two yellow panels on the side of the thorax. Females have an all yellow side of thorax and are orangey yellow, turning greyish as they age. They have a characteristic yellow stripe along the length of each leg (but this can be hard to see). Eyes are green or red on top and yellow below.



Status and distribution

Widespread and common. Earliest record from the Hull area was in 1995 at Bilton. Past evidence of breeding includes ovipositing at Noddle Hill and Paull Holme Strays. Emergence was seen at Pearson Park Wildlife Garden in 2017. A total of 104 records in 37 km² were obtained this year. Evidence of successful breeding in the form of teneral individuals was obtained at Ennerdale South Pond, and at an Avenues private garden and Pearson Park Wildlife Garden. Darter exuviae were found at Pearson Park Wildlife Garden and a private Avenues Pond. Mating was observed at Noddle Hill, Fleet Drain, East Park and Oak Road and oviposition was observed at Ennerdale South Pond, Pickering Park, Pickering Road Allotments and Thwaite gardens. This species has a long season and roams widely before settling to breed.

Habitat

Very broad range of habitats, which include brackish ponds and ornamental ponds. Can roam away from water when hunting.

Flight period

Late and long season, from June until November, peaking at the end of August. The first record in the area this year was on the 4th July and the last record was on the 27th of October.

Behaviour

Individuals hunt from a perch. Males overlook ovipositing sites from marginal vegetation, trees or the ground and dart to catch prey or chase an intruder. Mating occurs sometimes away from water, with the pair resting, often on the ground. Ovipositing takes place in tandem, with the male attached to the female. The female dips her abdomen into water, releasing her eggs, sometimes in several locations near the edge of a pond.



Common Darter. Clockwise from top left. Male; female; ovipositing pair; pair mating.

Rare species

Large Red Damselfly, *Pyrrosoma nymphula*. The earliest flying damselfly in South East Yorkshire where it emerges from the end of April to early May, flying until late July, and peaking on the 3rd week of May. There are only a handful of records in the Hull area, despite being recorded in the Tickton area, from Welton Waters (breeding recorded in 2008 and 2010), and in recent years from Brantingham and Ellerker. A colonisation attempt seemed to have taken place at Noddle Hill LNR, with several records in 2006 and 2007, but there are no records afterwards. There are additional records at Paull Holme Strays car park pond in 2015 and Risby in 2018.

This damselfly is reported to be a widespread and common breeding species in Britain, mostly breeding in still water and having a wide ecological tolerance (Brooks & Cham, 2014; Mill, 2010). However, a decline in populations has been noted in intensively cultivated areas of eastern England (Brooks & Cham, 2014). Although (Mill, 2010) concludes that little is known about the ability of the Large Red Damselfly to disperse, some studies appear to suggest that an established population shows only limited dispersal potential (Conrad *et al.*, 1999); and see comments by Corbet & Brooks (2008) on the findings of Bennett & Mill (1995).

Common Hawker, *Aeshna juncea*. This species breeds in acidic moorland and heathland ponds. The closest populations to the recording area are west of the Wolds. There is just one verified record in the recording area supported by a photograph, in Cottingham in 2018. Given the difficulty of distinguishing this species from other hawkers like Migrant and Southern, particularly in flight, dispersing individuals of this species might be under-recorded.

Vagrant Emperor, *Anax ephippiger*. This is a sub-Saharan species known for its long distance migration northwards into Europe. A female was found in a private Hessle garden in 2015 by Barry Warrington. Barry also reported a possible sighting this year on Hessle foreshore (as it was only a possible sighting it has not been included in the species total for 2019).

Vagrant Darter, *Sympetrum vulgatum*. A common and widespread species in north-east Europe but a very rare migrant to the UK. There is one historic report of a female collected near Hull (Hagen, 1857). The specimen, which Hagen named *Lebellula vulgata* is referred to as *Sympetrum vulgatum* by Lucas (1900).

Potential colonists

The dragonfly fauna in the UK is in flux, global warming means many species are steadily expanding north at a pace dependent on habitat availability and species ecological requirements (Cham *et al.*, 2014; Hickling *et al.*, 2005; Platts *et al.*, 2019). Below are three species which have been reported as individuals and/or colonies in neighbouring areas in recent years and therefore might, in the future, be recorded in the Hull area. The likelihood of this occurring will depend on the dispersal potential of a species, the existence of suitable habitat and on continuing Odonata recording.

Variable Damselfly, *Coenagrion pulchellum*. This is a nationally important species which is classified in the British Odonata Red Book as near threatened. It is a rare resident species in South East Yorkshire, being found only in the Broomfleet area. This colony does not seem to be expanding. However if a colony ever did establish in the Hull area it would be a very significant development.

Southern Migrant Hawker, *Aeshna affinis*. A continental European species similar in appearance to the Migrant Hawker that is now breeding in Essex and Kent and showing further range expansion. Individuals were recorded at Flamborough in 2018 and Spurn in 2018 and 2019.

Red-veined Darter, *Sympetrum fonscolombii*. A migrant species from Southern Europe that has become a rare, but regular breeder in South East Yorkshire, with records of adults in most years. It is mostly confined to coastal locations, particularly Spurn (Branch, 2019) and Filey. A breeding colony was recorded in Goole in 2017 (Hincks, 2017). Due to its migratory habits, colonies are not stable. Shallow, exposed ponds are favoured as breeding sites.

Species checklist for 2019

1. **Willow Emerald**, *Chalcolestes viridis*
2. **Emerald Damselfly**, *Lestes sponsa*
3. **Banded Demoiselle**, *Calopteryx splendens*
4. **Azure Damselfly**, *Coenagrion puella*
5. **Common Blue Damselfly**, *Enallagma cyathigerum*
6. **Red-eyed Damselfly**, *Erythromma najas*
7. **Small Red-eyed Damselfly**, *Erythromma viridulum*
8. **Blue-tailed Damselfly**, *Ischnura elegans*
9. **Southern Hawker**, *Aeshna cyanea*
10. **Brown Hawker**, *Aeshna grandis*
11. **Migrant Hawker**, *Aeshna mixta*
12. **Emperor Dragonfly**, *Anax imperator*
13. **Hairy Dragonfly**, *Brachytron pratense*
14. **Broad-bodied Chaser**, *Libellula depressa*
15. **Four-spotted Chaser**, *Libellula quadrimaculata*
16. **Black-tailed Skimmer**, *Orthetrum cancellatum*
17. **Black Darter**, *Sympetrum danae*
18. **Ruddy Darter**, *Sympetrum sanguineum*
19. **Common Darter**, *Sympetrum striolatum*
20. _____
21. _____
22. _____

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References

- Ashton, P. (2006). *East Riding Dragonflies 2005 Annual Report*. Published privately.
- Ashton, P. (2007). *East Riding Dragonflies 2006 Annual Report*. Published privately.
- Ashton, P. (2013). *Dragonflies of South-east Yorkshire*. Published privately.
- Ashworth, A. (2007) Dragonflies and Damselflies (Odonata) of the Bransholme Fishing Ponds (TA 111 348) The Hull Natural History Society Newsletter 12
<http://www.hullnats.org.uk/Newsletters/Newsletter12.htm#dragonflies>
- Bennett, S., & Mill, P. J. (1995). Pre-and post-maturation survival in adults of the damselfly *Pyrrosoma nymphula* (Zygoptera: Coenagrionidae). *Journal of Zoology*, 235(4), 559–575.
- Blackshaw, A. (2008). *Kingston upon Hull open space assessment – Sites of Nature Conservation Interest (SNCI)*. Retrieved from Hull City Council & PMC Consult LTD website: <http://www.hull.gov.uk/environment/environment/sites-nature-conservation-importance>
- Branch, D. (2019). A summary of Odonata records in the Spurn Bird Observatory area: analysing the evidence for breeding and migration. *The Naturalist*, 144, 18–31.
- Brooks, S., & Cham, S. (2014). *Field Guide to the Dragonflies and Damselflies of Great Britain and Ireland*. British Wildlife Publishing.
- Butler, P. M., & Popham, E. J. (1954). The insect fauna of the ponds and dykes of Spurn following the flooding of 1953. *The Naturalist*, July-September, 104–107.
- Cham, S. A., Nelson, B., Parr, A., Prentice, S., Smallshire, D., & Taylor, P. (2014). *Atlas of dragonflies in Britain and Ireland*. Field Studies Council.
- Conrad, K. F., Willson, K. H., Harvey, I. F., Thomas, C. J., & Sherratt, T. N. (1999). Dispersal characteristics of seven odonate species in an agricultural landscape. *Ecography*, 22(5), 524–531.
- Corbet, P., & Brooks, S. (2008). *Dragonflies (Collins New Naturalist Library, Book 106)*. HarperCollins UK.
- Dudaniec, R. Y., Yong, C. J., Lancaster, L. T., Svensson, E. I., & Hansson, B. (2018). Signatures of local adaptation along environmental gradients in a range-expanding damselfly (*Ischnura elegans*). *Molecular Ecology*, 27(11), 2576–2593.
- East Riding of Yorkshire Council. (2010). *East Riding of Yorkshire Biodiversity Action Plan Strategy*. Retrieved from East Yorkshire Council website: <https://www.eastriding.gov.uk/council/plans-and-policies/other-plans-and-policies-information/sustainable-environment-policies-and-strategies/#East-Riding-of-Yorkshire-Biodiversity-Action-Plan>
- East Riding of Yorkshire Council. (2012). *Local Sites in the East Riding of*

- Yorkshire. *Part B. LWS Site Selection Guidelines*. Retrieved from East Riding of Yorkshire Council website: <https://www.eastriding.gov.uk/EasySiteWeb/GatewayLink.aspx?allid=229423>
- Goertzen, D., & Suhling, F. (2013). Promoting dragonfly diversity in cities: major determinants and implications for urban pond design. *Journal of Insect Conservation*, 17(2), 399–409.
- Hagen. (1857). A synopsis of the British Dragon-Flies. *Entomologists' Annual*, 39–60.
- Hammond, M. (2008). *Aquatic macro-invertebrate monitoring at Paull Holme Strays, East Yorkshire May 2008. A report for the Environment Agency*. Retrieved from Environmental Agency website: https://www.folkestone-hythe.gov.uk/webapp/lydd-airport/Proofs%20and%20Inquiry%20docs/NE/NE2%20-%20Heaver/NE-2-E/NE_2_E_L%20Hammond%20Invertebrate%20monitoring%20at%20Paull%20Holme%20Strays.pdf
- Hickling, R., Roy, D. B., Hill, J. K., & Thomas, C. D. (2005). A northward shift of range margins in British Odonata. *Global Change Biology*, 11(3), 502–506.
- Hincks, P. (2017). Field Note: Red-veined Darter in a Flash. *The Naturalist*, (142), 203.
- Lucas, W. J. (1900). *British Dragonflies:(Odonata)*. LU Gill.
- Marshall, B. (2002). *Hull Biodiversity Action Plan*. Retrieved from Hull City Council website: <http://www.hull.gov.uk/sites/hull/files/media/Editor%20-%20Environmental/HULL%20BIODIVERSITY%20ACTION%20PLAN.PDF>
- Middleton, R. (2001). *The plants of Hull: a millennium atlas*. Retrieved from <http://www.hullnats.org.uk/millennium/Comments.pdf>
- Mill, P. J. (2010). Species Reviews 3: The Large Red Damselfly *Pyrrosoma nymphula* (Sulzer) with notes on its close relative the Greek Red Damselfly *Pyrrosoma elisabethae* Schmidt. *Journal of the British Dragonfly Society*, 26, 34–56.
- Platts, P. J., Mason, S. C., Palmer, G., Hill, J. K., Oliver, T. H., Powney, G. D., Fox, R. & Thomas, C. D. (2019). Habitat availability explains variation in climate-driven range shifts across multiple taxonomic groups. *Scientific Reports*, 9(1), 15039.
- Sheppard, T. (1939). The Fordham Collection. *The Naturalist*, 995, 307.
- Smallshire, D., & Swash, A. (2018). *Britain's Dragonflies: A Field Guide to the Damselflies and Dragonflies of Great Britain and Ireland - Fully Revised and Updated Fourth Edition*. Princeton University Press.
- Sovic Davies, P. (2018). Engaging London's Dragonfly Detectives. *Darter*, 35, 10–11.
- Trippier, R., Brooks, S. & Isaac, N., 2015. Spatial distribution modelling of the colonisation of the Small Red-eyed Damselfly. *Journal of the British Dragonfly Society*, 31, 49-63.
- Williams, P., Briggs, J., Whiffield, J., Thorne, A., Bryant, S., Fox, G., &

Nicolet, P. (2018). *The Pond Book: A guide to the management and creation of ponds*. 3rd edition. Freshwater Habitats Trust, Oxford.