Dragonfly Dynamics

Introduction

Masters of aerial acrobatics, dragonflies and damselflies (collectively known as Odonata), are a captivating group of insects. They have the highest success rate of any predator at catching their prey. They require not only suitable terrestrial habitats in which to hunt, but clean fresh water to successfully reproduce.

There are 47 species of dragonfly and damselfly which breed in Britain, with others that have not been recorded breeding appearing as vagrants. They have strong flight muscles relative to their size and are effective colonisers of new areas. High concentrations of individuals often causes dispersal behaviour into new areas and can mean that species travel northwards and westwards. This has led to some species colonising Britain for the first time. Climatic changes have been shown to have affected the distribution of dragonflies and damselflies dramatically.

Masters of the air, dragonflies are a captivating group of insects. They are great indicators of water quality and require clean water in which to successfully reproduce. Dragonflies and damselflies are expanding northwards in response to climate change. Photo © Ross Hoddinott/2020VISION

Expanding ranges and shifting flight periods

Many dragonfly species are benefitting from climate change by expanding their existing ranges or colonising Britain for the first time (Cham et al., 2014; Cham, 2014). Some examples include:

- Small red-eyed damselfly *Erythromma viridulum* – this species was discovered in Essex in 1999 and then spread at a rate of approximately 30km per year. This species is now common in our area.

- Willow emerald damselfly *Chalcolestes viridis* – this species first colonised Britain in 2007 and is now widespread in our area, where willows overhang the water.

- Norfolk hawker *Anaciaeschna isoceles* – as its common name suggests, this species used to be restricted to a small area of Norfolk; it has now spread into our area.

- Southern hawker *Aeshna cyanea* – this species used to be restricted to southern England but is now found as far north as Scotland.

- Emperor dragonfly *Anax imperator* – this species used to be restricted to southern England but is now found as far north as Scotland.

- Scarce chaser *Libellula fulva* – this was historically a scarce species. It is no longer scarce and is widespread in Bedfordshire and Northamptonshire. This species favours flowing water but also breeds in gravel pits, such as those found at Felmersham nature reserve.

The flight periods of dragonflies and damselflies are also changing as species shift their flight periods to earlier in the year. In the case of the familiar large red damselfly *Pyrrhosoma nymphula*, it now emerges a month earlier than it did in 1991.

The scarce chaser *Libellula fulva* was historically a scarce species. It is no longer scarce and is widespread in Bedfordshire and Northamptonshire. This species favours flowing water but also uses gravel pits. Photo © Ryan Clark

Dragonflies at Felmersham Gravel Pits

This site, located in Bedfordshire, was an important site for gravel extraction up until the end of the Second World War. It has left behind a series of pools that now form an incredibly important and diverse habitat supporting a vast array of wildlife. There are 21 breeding species of Odonata recorded in Bedfordshire, 18 of which breed at Felmersham Gravel Pits nature reserve. Other species use the site's grassland and open water areas for hunting but do not breed on the site.

Extensive management is needed on the site to maintain a range of successional habitats suitable for a wide variety of species, including those yet to colonise our area. Trees can often overshade open areas of water making them less suitable for Odonata. We invest a lot of resources into managing the vegetation on site to ensure it is suitable for a wide variety of species.

Felmersham Nature Reserve is home to a wide variety of dragonfly and damselfly species, 18 of which breed on the site. Photo © Steve Cham

The Norfolk hawker

The Norfolk/ green-eyed hawker *Anaciaeschna isoceles* appeared at Felmersham Gravel Pits in 2018 and is starting to breed there. The Norfolk hawker is Britain's second rarest dragonfly, so Felmersham is an important site for this species. Due to climate change some of the other sites this species is found on may be lost to sea-level rise, higher tides and storm surges. In the UK this species is often associated with sites that have water soldier *Stratiotes aloides* present.

It is considered that the structure of this plant provides an optimal habitat for breeding (Cham, 2019). Water soldier was introduced to these gravel pits around 1975 and has the potential to conflict with the botanical interest of the site. However, through careful management, it can be allowed to thrive while maintaining the rare aquatic plants present on the site. Floating water soldier plants are removed annually, but will now be left untouched in one corner of the lake.

Also, we have put in place controls to stop the water soldier spreading further around the site. Water soldier also provides a habitat for aquatic invertebrates. We are currently carrying out further research to inform the management of this site to balance the needs of a variety of species.

The Norfolk hawker *Anaciaeschna isoceles* is Britain's second rarest dragonfly. In 2018 it was seen at our Felmersham Gravel Pits nature reserve in Bedfordshire and is starting to breed there. Photo © Steve Cham

By maintaining our freshwater habitats in peak condition and creating early successional habitats, we allow a wide variety of species to thrive. Dragonflies are excellent indicator species that tell us about the quality of our freshwater habitats, especially where we have evidence of breeding.

Some species that may become more common in suitable habitats in our area include:

- Southern emerald damselfly *Lestes barbarus* – this species is starting to colonise our adjacent counties. Its range is expanding slower than other species but there have been some sizeable new populations discovered in 2020 (S. Cham, 2020, pers. comm.).

- Southern migrant hawker *Aeshna affinis* – this species is spreading rapidly and favours ditches and pools that are prone to drying out. This species had a good season in 2020, resulting in several new breeding sites in southern England (S. Cham, 2020, pers. comm.).

- Lesser emperor *Anax parthenope* – this is a species that is being recorded in increasing numbers each year across the UK, including in our area, probably in response to warming climates (S. Cham, 2020, pers. comm.).

Climate change is not all good news for dragonflies and damselflies, some ponds may dry out resulting in the loss of habitat. It is essential that where we can, we maintain ponds in a wide variety of successional states to benefit as many species as possible. Some species are also highly sensitive to changes in water temperature, so although the adults may be able to colonise new areas, the larvae may not be able to survive. In some cases, the newly arriving species may also compete with our existing fauna and it is hard to predict what the effect of this might be.

The effect of climate change on bats

Alongside dragonflies, some bat species have become more frequent in Britain due to climate change. Studies have shown that there has been a range expansion of Nathusius' pipistrelle bat *Pipistrellus nathusii* due to climate change (Lundy, M., Montgomery, I. & Russ, J, 2010). Nathusius' pipistrelle is a migratory species with the UK being at the northern tip of its range. Over time, this species has become more common in the UK and has started to breed in some areas. We contribute to the National Nathusius' Pipistrelle Project, which aims to improve our understanding of the ecology, status and conservation threats for this species in Great Britain. This includes ringing bats under license, which helps us discover more about their migration routes and how they use different areas.

Our monitoring work has shown that we have three pipistrelle species on some sites in our area. Here is Soprano pipistrelle (left), common pipistrelle (centre) & the slightly larger Nathusius' pipistrelle (right). Bats are ringed under license to help us to discover more about their migration routes and how they use different areas. Photo © Gwen Hitchcock.

Summary

Climate change will enable several dragonfly and damselfly species to colonise or expand their ranges in Britain. This is only possible if there are suitable high-quality habitats for them to expand into, which our reserves provide. Some species may experience losses in some areas but our reserves can form an important refuge for them. Our conservation work has to include an element of forward planning to ensure that our reserves are resilient to changes in climatic conditions.

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References

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