

### Background

The monitoring of important dragonfly sites such as nature reserves and Key (or Priority) Sites needs to be easily repeatable, meaningful and robust.

By aligning monitoring with Key Sites criteria, a regular measure can be made of whether a site remains in favourable condition for the target species. There are three main criteria that need to be satisfied: presence, abundance and breeding evidence. Where the abundance threshold is not met, evidence of breeding in at least two years needs to be established as an alternative.

### Methodology

Some dragonfly sites are more accessible than others. Some have close access alongside water bodies, whilst others can only be viewed at specific points. The first step in any monitoring programme is to assess the site and decide which of the following options is most suitable:

- Species recording at specific points around or along a water body or across a permanently wet site – recording at each point ceases when no new species have been recorded for a set period of time (this provides presence/absence data for each point).
- Timed counts at specific points around or across a site – count periods should be pre-set and standardised. Counts for each individual species could be stopped once the threshold number is reached (see below).
- Transect sections through or beside suitable dragonfly habitats – the sections can be standard lengths (50m or 100m) or matched to significant, easily recognised and unchanging landmarks on the site. When walking a transect alongside water, record within a corridor spanning 2m inland of the route and up to 5m out over water (less if the watercourse is narrower than this). Transect sections adding up to the first 100m of any survey, should record all species and are sufficient to count most Damselflies (Zygoptera) and darters (*Sympetrum*) effectively. Beyond this first 100m longer transects need only record Dragonflies (Anisoptera) other than darters, plus demoiselles (*Calopteryx*) in each further section.

The critical considerations are that the area surveyed should be where any important species occur and that the chosen method should be repeatable over a number of years, easily achievable given both time and weather constraints and, if necessary, transferable between recorders.

At small sites a single recording point or transect may be sufficient to provide adequate site data. At larger sites a set of sub-sites or multiple transects may need to be established. Wherever possible sites or sub-sites should avoid crossing Ordnance Survey 1km grid lines, so that resulting data can be used nationally at the 1km square (monad) scale for mapping purposes and analyses.

At sites where weather or other conditions are rarely favourable for recording adult dragonflies the methods outlined above for species recording at specific points or timed counts could be adapted for larval or exuvia sampling.

### Weather conditions

It is important that when monitoring adult dragonflies that visits are only carried out when there is a reasonable chance of them being active. Ideally there should be less than 60% cloud cover, little wind (no more than Force 3) and an air temperature of at least 17°C. When looking for larvae or exuviae, however, weather is less important, although it should be noted that the latter soon become detached in wet and/or windy weather.

### **Repeated visits**

For general site monitoring on nature reserves to inform year-to-year management a minimum of three visits should be completed each year. These should be timed so that the main flight periods of all potential species are covered. Ideally more visits should be conducted. To cover all species adequately monthly visits from May to September are suggested. If fortnightly visits can be made, so much the better.

Where rarer species are to be monitored, visits should be made as frequently as practical throughout the relevant main flight period. If possible weekly visits should be conducted, with the interval between separate counts being at least three days.

Where there are time constraints for site condition assessments in relation to Endangered, Vulnerable or Near-Threatened species (Daguet et al. 2008), it may only be possible to assess sites annually. If so, visits should be timed to coincide with good weather at the peak of the main flight period for the target species, in order to maximise the chances of securing sufficient abundance and breeding evidence.

### **Presence/absence**

The first record to make is whether or not each target species is still present at the site. Simple presence/absence data in ditch sections or site compartments can feed into national population trends, but will enable only a limited assessment of the sub-section covered.

### **Abundance**

Key Sites criteria require certain abundance thresholds to be passed for each qualifying species. These thresholds align with the estimated codes for dragonfly recording. For all damselfly species except Scarce Emerald Damselfly *Lestes dryas* and Scarce Blue-tailed Damselfly *Ischnura pumilio* the abundance threshold is 21 individuals (estimate code 'D'); for these two rarer species the threshold is six individuals (code 'C').

For all dragonfly species except those listed below the abundance threshold required is six individuals. For the following species the threshold is 21: Migrant Hawker *Aeshna mixta*, Four-spotted Chaser *Libellula quadrimaculata*, Keeled Skimmer *Orthetrum coerulescens*, Black-tailed Skimmer *Orthetrum cancellatum*, Common Darter *Sympetrum striolatum*, Ruddy Darter *Sympetrum sanguineum* and Black Darter *Sympetrum danae*.

### **Breeding and persistence**

Ideally, breeding evidence for Key Sites and other important sites is obtained at least once in each five year period. This evidence may be obtained during standard monitoring as outlined above or it may require a supplementary study repeated periodically.

Criteria for proof of breeding have been defined by the BDS. A copulating pair of dragonflies constitutes possible breeding evidence. Successful breeding at a suitable waterbody is shown by females ovipositing (oviposition scars in over-hanging trees in the case of Willow Emerald *Lestes viridis*) or the presence of a larva, exuvia or teneral individual at the waterbody.

Where monitoring transects or point observations fail to secure breeding evidence for target species, it is suggested that separate exuviae searches are made at a suitable time in the year or that dipping for larvae is carried out.

### **Reference**

Daguet, C.A., French, G.C. and Taylor, P. (2008). The Odonata Red Data List for Great Britain. *Species Status* 11; 1-34. Joint Nature Conservation Committee, Peterborough.