

**Watchtree Nature Reserve
Odonata Monitoring 2007**



Male Banded Demoiselle (Watchtree, June 2007)

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1. INTRODUCTION

Odonata are a good indicator of the health of water bodies, with most species requiring relatively clean, unpolluted water with a supply of food for nymphs and for adults in the surrounding habitat. Additionally the water bodies need to provide suitable sites for ovipositing. Odonata vary in their ovipositing behaviour. Most species oviposit onto or into the tissues of submerged aquatic plants while some species drop their eggs directly into water or into the muddy margins of water bodies. Thus, the quality and availability of suitable aquatic and marginal plants, and often the bottom substrate, will influence the presence, species composition and abundance of odonata at water bodies.

2007 was the fifth year in which full odonata surveys took place at Watchtree. There were no major operational, construction or habitat management works in 2007 which significantly affected any of the wetland areas which were surveyed for odonata.

2. METHODS

Odonata surveys were carried out monthly from May to September. Along with these specific surveys, additional casual records were kept while carrying out other monitoring work. These incidental records were mainly used to give an indication of any migratory or visiting species that would probably not have been recorded during the monthly odonata surveys.

Surveys concentrated on the water bodies, wetland areas and their surrounds. The areas surveyed were the mature ponds in Watchtree Map area 8a, the open ditch located in Watchtree Map area 9a, the lake (Watchtree Map area 6) and associated outflow ditch, the reedbed system, constructed wetland/lagoon and the "southern lagoon" (Watchtree Map area 7a). It was generally not feasible to count individuals (particularly of damselflies) during surveys; rather an index of abundance was created.

The margin of each wetland area was walked slowly and data collected on the numbers of each species and their behaviour. The most important behaviour to note during odonata surveys was whether there was evidence of breeding or possible breeding attempts (territorial behaviour was included in this). The presence of mating pairs and ovipositing females was therefore recorded. For larger species such as darter and hawk species an attempt was made to count total numbers present over the waterbodies and within a one metre margin of the waterbody. The males of species such as darters and hawkers will come to waterbodies and hold territories, patrolling for newly emerged females. Males will usually stay close to the water's edge when territorial, which makes it possible, while walking around the water margin, to get a relatively accurate count of these males.

The abundance of each species recorded in one of four categories below.

1. Abundant (over 50 individuals)
2. Common (between 20 and 50)
3. Scarce (between 5 and 19)
4. Rare (between 1 and 4)

Behaviour categories recorded were;

1. Breeding (ovipositing and mating)
2. Territorial behaviour (seen exhibiting territorial behaviour but not seen ovipositing or mating)
3. Present (no evidence of breeding i.e. present but only seen hunting, resting)

3. RESULTS

Tables 1 (a-g) show the results of the monthly odonata surveys in the target areas at Watchtree Nature Reserve. A total of 14 species were recorded at Watchtree during 2007 including one new species. A single male Banded Demoiselle (*Calopteryx splendens*) was found during other survey work on 12/06/2007 in Watchtree map area 3(s), at the southern edge of woodland 8a. This species is limited in Cumbria to the lower stretches of a few rivers which flow into the Solway Firth. The closest population to Watchtree is on the River Wampool and it is assumed that this record was of a dispersal movement from this population.

Table 1(a) Mature ponds in Watchtree map area 8a.

As in previous years the mature ponds in Watchtree map area 8a held a wide range of species of breeding odonata, often in very high numbers. Black Darter was recorded here for the first time this year with a single mature male present. Several male Ruddy Darters were recorded along the woodland rides around the ponds in Woodland 8a, with a single mature adult male recorded once at the ponds in September. Common and Southern Hawkers were recorded along with territorial male Emperor Dragonflies in August and September. Two male Migrant Hawkers were also recorded at the ponds in September although there was no evidence of breeding behaviour.

Table 1(b) Open drain in Watchtree map area 9.

The open drain area in Watchtree map area 9 is a short open drain flowing from the fields to the north into a small area of shaded standing water at the northern edge of mature woodland (Watchtree map area 8b). This drain is becoming overgrown with little open water generally now present in the summer, making the ditch less attractive to breeding odonata than in previous years. Although Emerald, Large Red, Common Blue and Four-spotted Chasers were observed at this location, no breeding behaviour was observed. Common Darter was the only species which was seen ovipositing here in 2007.

Table 1(c) Reedbed system in Watchtree map area 7a.

Emerald, Large Red, Azure, Common Blue and Blue-tailed Damselflies were recorded at this location along with both Common and Black Darter, Common and Southern Hawkers and one record of Emperor Dragonfly. Azure Damselflies were recorded at the reedbeds for the first time in 2005 although on only one occasion and with no evidence of breeding. The reedbeds management and development in summer of algal growth means that there is little available water above the gravel substrate and thus provides poor conditions for breeding odonata. Migrant Hawker and Ruddy Darter were the only two species present at Watchtree in 2007 which were not recorded at the reedbed system. Although all other species were recorded as present, none were observed breeding here. The reedbeds were used by odonata as a sheltered roosting/resting and hunting location.

Table 1(d) Constructed wetland/lagoons in Watchtree map area 7a.

Five species of damselfly; Emerald, Large Red, Azure, Common Blue and Blue-tailed Damselfly were recorded at the constructed wetlands to the south of the reedbed system (Watchtree map area 7a). Both Azure and Emerald damselfly were recorded here for the first time in 2006 although neither species was recorded breeding. In 2007 Emerald Damselfly was recorded breeding for the first time. Although Azure Damselfly was again recorded here, it was not recorded breeding. Common and Black Darters were also recorded, with Common Darter present in good numbers. Black Darter was recorded ovipositing at this location for the first time in 2007. Common and Southern Hawker along with Emperor Dragonfly were also recorded hawking over the constructed wetlands although no breeding behaviour was recorded. The only species not recorded at this location were Ruddy Darter and Migrant Hawker.

Table 1(e) Southern lagoon in Watchtree map area 7a.

This location held good numbers of Common Blue Damselflies and Common Darter. Blue-tailed Damselflies and Black Darter were also present in smaller numbers. Large Red and Azure Damselflies were recorded here although they were not observed breeding. Emerald Damselfly was recorded here for the first time in 2006 and in 2007 breeding behaviour was recorded for the first time, with in-cop pairs recorded in marginal vegetation. Of the larger species of odonata, Four-spotted Chasers were recorded ovipositing and Common and Southern Hawkers were recorded hunting over the lagoon, although no breeding behaviour was seen. Emperor Dragonfly was recorded here for the first time in 2007. The only species not recorded at this location were Ruddy Darter and Migrant Hawker.

Table 1(f) The Lake (Watchtree map area 6).

Emerald, Large Red, Azure, Common Blue and Blue-tailed Damselflies were recorded breeding here, along with Common and Black Darter. Azure Damselflies were recorded here for the first time in 2006 although only in small numbers and not recorded breeding. This species was recorded again in 2007 although still not observed breeding. These individuals were probably dispersing from the more sheltered outflow ditch from the lake (see below). Large Red Damselflies were not recorded on the lake in 2006 but in 2007 this species was recorded

breeding here for the first time in small numbers. As with Azure Damselfly, this species was probably dispersing from the lake outflow ditch. Four-Spotted Chasers were also recorded here in good numbers with up to 13 males holding territory in late June. Common Hawkers were recorded ovipositing in August and September and both Southern Hawker and Emperor Dragonfly were seen hawking over the lake in August.

Table 1(g) Outflow ditch from Lake (Watchtree map area 6)

This location held all five species of damselfly which have been recorded at Watchtree. Azure Damselfly was the most abundant species, as in previous years. Common and Black Darter were also recorded breeding along with Four-spotted Chaser. Common Hawker was also recorded hawking along the outflow ditch although no territorial males or breeding behaviour was observed. There were no records of Migrant Hawker, Southern Hawker, Emperor Dragonfly or Ruddy Darter.

4. DISCUSSION

One new species, Banded Demoiselle (*Calopteryx splendens*), was recorded at Watchtree in June 2007. This species is generally quite sedentary and does not tend to make large-scale dispersal movements. Any dispersal movements are, on average, in a radius of 0.14 to 0.80 km and have been shown to be related to habitat quality factors and population density and dispersal movements are not exclusively directed along streams and their tributaries. (Stettmer, 1996). The habitat at Watchtree is not suitable for the establishment of a population of this species, as this is a species of slow-moving rivers and streams, not still waters as found at Watchtree.

Migrant Hawker was first recorded at Watchtree in 2004, a year after this species was recorded in Cumbria when there was a sudden expansion northwards. There have been no records of this species at Watchtree since 2004 until the 2007 surveys when it was recorded at two locations; the ponds in woodland 8a and around the open drain in Watchtree map area 9, to the north of woodland 8b. Emperor Dragonfly was recorded for the second year running at the ponds in woodland 8a, and for the first time at several other locations at Watchtree including the reedbed system and southern lagoon. This species is known to be a pioneer species – it may occur for a few years before becoming much less common or disappearing altogether. This species, like Migrant Hawker has been expanding its range northwards through Cumbria over the last few years. As a species of well-vegetated ponds, lakes and flooded gravel pits, it is entirely possible that the water bodies which are developing at Watchtree will be suitable for this species to develop a population here. The habitat management work around the ponds in woodland 8a, involving the removal of marginal trees and scrub to open up the site and let more light into the pond area, will benefit this species, as will the development of the aquatic and marginal plants around the southern lagoon, lake and constructed wetlands.

Ruddy Darter was first recorded in 2006 at the ponds in woodland 8a. Although no breeding behaviour was recorded in 2007, a small population is obviously present now either at Watchtree or somewhere close. Several male Ruddy Darters were recorded along the rides and to the east of woodland 8a and also to the east of woodland 8b. This is another species which is expanding northwards through Cumbria although small disjunct populations have existed in north Cumbria for several years before this species' arrival at Watchtree.

The record of a single male Black Darter at the ponds in woodland 8a is unusual as this species has been recorded at Watchtree since 2003 when it was recorded breeding at the constructed wetlands and reedbed system. Interestingly, it was also recorded once in 2003 at Watchtree map area 8c which is to the north of the ponds in woodland 8a. Although the adult is known to be a wanderer and can be found in small numbers away from water in most locations at Watchtree, there have been no records of this species at the ponds in woodland 8a since surveys began in 2003. This species is normally associated with shallow, acidic, nutrient-poor pools with abundant emergent vegetation on heathland, moorland and bogs. This makes the Black Darter population at Watchtree unusual as the water in the constructed wetlands, southern lagoon and the Lake where the Black Darter numbers are highest, is slightly alkaline.

Azure Damselfly is a weak-flying species which prefers sheltered locations with plenty of vegetation. In the early years of the development of Watchtree this species was mainly confined to the established ponds in woodland 8a and to the sheltered outflow ditch from the Lake. As the marginal vegetation and grasslands around the more recently constructed wetlands has developed, this species is slowly spreading to colonise the constructed wetlands, the southern lagoon and the Lake. Other damselfly species which are also slowly spreading in range are Large Red Damselfly and Emerald Damselfly however, for all three of the above species, breeding has been so far not been observed in these newly colonised locations. The fact that they are now regularly utilising these water bodies, albeit in small numbers, raises the hope that this is the first stage in their successful colonisation of these wetland areas.

As in previous years, the reedbeds proved to be relatively unattractive to odonata. Changes in water levels and long periods where most of the reedbed system held little or no available surface water meant that they were not suitable as breeding locations. Although this may not be a suitable breeding site for odonata, it provides a good feeding site and sheltered overnight roosting site for odonata using the other wetland sites close by.

The 2007 monitoring of odonata at Watchtree has again shown a very encouraging sustained pattern of increase in the distribution and numbers of odonata at Watchtree. The natural development of the water bodies, particularly the lake and the constructed wetlands has also been seen to have a benefit to the developing odonata population. It has been encouraging to see effects that a small amount of positive, targeted habitat management in the form of scrub and tree removal at the ponds in woodland 8a can have within a few years of being carried out.

As in previous years, the threat of sustained filamentous algal growth on some of the wetlands, in particular the southern lagoon and constructed wetlands, poses possibly the biggest negative influence to the odonata community at Watchtree. One of the main concerns is the smothering and eventual killing of the submerged and emergent vegetation thus removing ovipositing sites for adult odonata in the breeding season. The loss of aquatic vegetation will also affect the nymph stages by reducing their prey which depends on this aquatic vegetation. As well as smothering aquatic plants, unchecked algal growth will eventually block out light and their decay leads to water oxygen depletion. Even minor losses of available oxygen in a small or shallow waterbody can have a serious impact on aquatic invertebrates. Effective, timely and proactive control of filamentous algal growth in the wetlands is strongly recommended, not only for the health of the odonata population but to ensure the future health and development of the water bodies and their entire fauna.

5. REFERENCES

- Stettmer, C., 1996.** Colonisation and dispersal patterns of banded (*Calopteryx splendens*) and beautiful demoiselles (*C. virgo*) (Odonata: Calopterygidae) in south-east German streams. **European Journal of Entomology, Vol. 93, no. 4, pp. 579-593. 1996.**

TABLES 1(a) – 1(g)

Key

B - Breeding (ovipositing and mating)

T - Territorial behaviour

✓ - Present (no evidence of breeding)

A - Abundant (over 50 individuals)

C - Common (between 20 and 50)

S - Scarce (between 5 and 19)

R - Rare (between 1 and 4)

Table 1(a). The relative abundance and behaviour of odonata species around the **mature ponds in Watchtree map area 8a.**

| Species | Survey month | | | | | | | | | |
|--|--------------|---|------|---|------|---|--------|---|-----------|---|
| | May | | June | | July | | August | | September | |
| Emerald Damselfly <i>Lestes sponsa</i> | | | ✓ | S | B | A | B | A | B | C |
| Large Red Damselfly <i>Pyrrhosoma nymphula</i> | B | A | B | A | | | | | | |
| Azure Damselfly <i>Coenagrion puella</i> | B | A | B | A | B | A | | | | |
| Common Blue Damselfly <i>Coenagrion cyathigerum</i> | ✓ | S | B | A | B | A | B | C | B | S |
| Blue-tailed Damselfly <i>Ischnura elegans</i> | B | S | B | C | B | A | B | S | B | R |
| Common Hawker <i>Aeshna juncea</i> | | | | | | | T | R | T | R |
| Migrant Hawker <i>Aeshna mixta</i> | | | | | | | | | ✓ | R |
| Southern Hawker <i>Aeshna cyanea</i> | | | | | | | T | R | T | R |
| Emperor Dragonfly <i>Anax imperator</i> | | | | | | | T | R | T | R |
| Four-spotted Chaser <i>Libellula quadrimaculata</i> | T | R | B | S | B | S | B | R | | |
| Common Darter <i>Sympetrum striolatum</i> | | | | | B | C | B | C | B | S |
| Ruddy Darter <i>Sympetrum sanguineum</i> | | | | | | | | | ✓ | R |
| Black Darter <i>Sympetrum danae</i> | | | | | | | | | ✓ | R |

Table 1(b). The relative abundance and behaviour of odonata species around the **open drain in Watchtree map area 9.**

| Species | Survey month | | | | |
|--|--------------|------|------|--------|-----------|
| | May | June | July | August | September |
| Emerald Damselfly <i>Lestes sponsa</i> | | | | ✓ R | |
| Large Red Damselfly <i>Pyrrhosoma nymphula</i> | | ✓ R | | | |
| Azure Damselfly <i>Coenagrion puella</i> | | | | | |
| Common Blue Damselfly <i>Coenagrion cyathigerum</i> | | ✓ S | | | |
| Blue-tailed Damselfly <i>Ischnura elegans</i> | | ✓ S | | | |
| Common Hawker <i>Aeshna juncea</i> | | | | ✓ R | |
| Migrant Hawker <i>Aeshna mixta</i> | | | | | ✓ R |
| Southern Hawker <i>Aeshna cyanea</i> | | | | | ✓ R |
| Emperor Dragonfly <i>Anax imperator</i> | | | | | |
| Four-spotted Chaser <i>Libellula quadramaculata</i> | | ✓ R | | | |
| Common Darter <i>Sympetrum striolatum</i> | | | | B R | ✓ R |
| Ruddy Darter <i>Sympetrum sanguineum</i> | | | | | |
| Black Darter <i>Sympetrum danae</i> | | | | | |

Table 1(c). The relative abundance and behaviour of odonata species around **the reedbed system and in Watchtree map area 7a.**

| Species | Survey month | | | | |
|--|--------------|------|------|--------|-----------|
| | May | June | July | August | September |
| Emerald Damselfly <i>Lestes sponsa</i> | | | | ✓ R | |
| Large Red Damselfly <i>Pyrrhosoma nymphula</i> | ✓ S | ✓ R | | | |
| Azure Damselfly <i>Coenagrion puella</i> | ✓ S | ✓ R | | | |
| Common Blue Damselfly <i>Coenagrion cyathigerum</i> | | ✓ R | ✓ R | | |
| Blue-tailed Damselfly <i>Ischnura elegans</i> | | ✓ R | | ✓ R | |
| Common Hawker <i>Aeshna juncea</i> | | | | ✓ R | |
| Migrant Hawker <i>Aeshna mixta</i> | | | | | |
| Southern Hawker <i>Aeshna cyanea</i> | | | | ✓ R | |
| Emperor Dragonfly <i>Anax imperator</i> | | | | ✓ R | |
| Four-spotted Chaser <i>Libellula quadramaculata</i> | ✓ R | | | | |
| Common Darter <i>Sympetrum striolatum</i> | | | ✓ R | ✓ R | ✓ R |
| Ruddy Darter <i>Sympetrum sanguineum</i> | | | | | |
| Black Darter <i>Sympetrum danae</i> | | | | ✓ R | ✓ R |

Table 1(d). The relative abundance and behaviour of odonata species around **constructed wetland/lagoons in Watchtree map area 7a.**

| Species | Survey month | | | | | | | | | |
|--|--------------|---|------|---|------|---|--------|---|-----------|---|
| | May | | June | | July | | August | | September | |
| Emerald Damselfly <i>Lestes sponsa</i> | | | | | ✓ | R | B | C | B | C |
| Large Red Damselfly <i>Pyrhosoma nymphula</i> | B | S | ✓ | S | | | | | | |
| Azure Damselfly <i>Coenagrion puella</i> | ✓ | S | ✓ | S | | | | | | |
| Common Blue Damselfly <i>Coenagrion cyathigerum</i> | B | S | B | C | B | C | B | C | | |
| Blue-tailed Damselfly <i>Ischnura elegans</i> | ✓ | R | B | S | B | C | B | C | B | S |
| Common Hawker <i>Aeshna juncea</i> | | | | | T | R | ✓ | R | ✓ | R |
| Migrant Hawker <i>Aeshna mixta</i> | | | | | | | | | | |
| Southern Hawker <i>Aeshna cyanea</i> | | | | | | | ✓ | R | | |
| Emperor Dragonfly <i>Anax imperator</i> | | | | | | | ✓ | R | ✓ | R |
| Four-spotted Chaser <i>Libellula quadramaculata</i> | T | R | B | C | B | S | ✓ | S | | |
| Common Darter <i>Sympetrum striolatum</i> | | | ✓ | S | B | A | B | A | B | C |
| Ruddy Darter <i>Sympetrum sanguineum</i> | | | | | | | | | | |
| Black Darter <i>Sympetrum danae</i> | | | | | ✓ | R | ✓ | S | B | S |

Table 1(e). The relative abundance and behaviour of odonata species around **the southern lagoon in Watchtree map area 7a.**

| Species | Survey month | | | | | | | | | |
|--|--------------|---|------|---|------|---|--------|---|-----------|---|
| | May | | June | | July | | August | | September | |
| Emerald Damselfly <i>Lestes sponsa</i> | | | | | ✓ | S | B | S | ✓ | S |
| Large Red Damselfly <i>Pyrhosoma nymphula</i> | | | ✓ | R | | | | | | |
| Azure Damselfly <i>Coenagrion puella</i> | ✓ | R | | | | | | | | |
| Common Blue Damselfly <i>Coenagrion cyathigerum</i> | ✓ | S | ✓ | A | B | C | B | C | B | R |
| Blue-tailed Damselfly <i>Ischnura elegans</i> | ✓ | R | B | S | B | S | B | R | ✓ | R |
| Common Hawker <i>Aeshna juncea</i> | | | | | ✓ | R | ✓ | R | | |
| Migrant Hawker <i>Aeshna mixta</i> | | | | | | | | | | |
| Southern Hawker <i>Aeshna cyanea</i> | | | | | | | ✓ | R | | |
| Emperor Dragonfly <i>Anax imperator</i> | | | | | | | ✓ | R | | |
| Four-spotted Chaser <i>Libellula quadramaculata</i> | T | R | T | R | B | R | ✓ | R | | |
| Common Darter <i>Sympetrum striolatum</i> | | | B | S | B | A | B | A | B | S |
| Ruddy Darter <i>Sympetrum sanguineum</i> | | | | | | | | | | |
| Black Darter <i>Sympetrum danae</i> | | | | | ✓ | R | ✓ | S | T | S |

Table 1(f). The relative abundance and behaviour of odonata species around the lake (Watchtree map area 6)

| Species | Survey month | | | | | | | | | |
|--|--------------|---|------|---|------|---|--------|---|-----------|---|
| | May | | June | | July | | August | | September | |
| Emerald Damselfly <i>Lestes sponsa</i> | | | | | B | C | B | C | B | C |
| Large Red Damselfly <i>Pyrrhosoma nymphula</i> | B | S | B | R | | | | | | |
| Azure Damselfly <i>Coenagrion puella</i> | ✓ | R | ✓ | R | | | | | | |
| Common Blue Damselfly <i>Coenagrion cyathigerum</i> | B | C | B | A | B | A | B | A | ✓ | C |
| Blue-tailed Damselfly <i>Ischnura elegans</i> | B | C | B | S | B | C | ✓ | S | | |
| Common Hawker <i>Aeshna juncea</i> | | | | | ✓ | R | B | R | B | R |
| Migrant Hawker <i>Aeshna mixta</i> | | | | | | | | | | |
| Southern Hawker <i>Aeshna cyanea</i> | | | | | | | ✓ | R | | |
| Emperor Dragonfly <i>Anax imperator</i> | | | | | | | ✓ | R | | |
| Four-spotted Chaser <i>Libellula quadramaculata</i> | T | S | B | R | B | S | ✓ | R | | |
| Common Darter <i>Sympetrum striolatum</i> | | | | | B | A | B | A | B | C |
| Ruddy Darter <i>Sympetrum sanguineum</i> | | | | | | | | | | |
| Black Darter <i>Sympetrum danae</i> | | | | | B | C | B | C | B | S |

Table 1(g). The relative abundance and behaviour of odonata species around the outflow ditch from the lake (Watchtree map area 6)

| Species | Survey month | | | | | | | | | |
|--|--------------|---|------|---|------|---|--------|---|-----------|---|
| | May | | June | | July | | August | | September | |
| Emerald Damselfly <i>Lestes sponsa</i> | | | | | B | S | B | S | B | R |
| Large Red Damselfly <i>Pyrrhosoma nymphula</i> | B | S | B | S | | | | | | |
| Azure Damselfly <i>Coenagrion puella</i> | B | A | B | A | B | C | | | | |
| Common Blue Damselfly <i>Coenagrion cyathigerum</i> | B | R | B | R | B | S | B | S | | |
| Blue-tailed Damselfly <i>Ischnura elegans</i> | B | S | B | R | B | R | B | S | | |
| Common Hawker <i>Aeshna juncea</i> | | | | | | | ✓ | R | | |
| Migrant Hawker <i>Aeshna mixta</i> | | | | | | | | | | |
| Southern Hawker <i>Aeshna cyanea</i> | | | | | | | | | | |
| Four-spotted Chaser <i>Libellula quadramaculata</i> | T | S | B | S | B | R | ✓ | R | | |
| Common Darter <i>Sympetrum striolatum</i> | | | | | B | S | B | R | B | S |
| Ruddy Darter <i>Sympetrum sanguineum</i> | | | | | | | | | | |
| Black Darter <i>Sympetrum danae</i> | | | | | ✓ | S | B | S | B | S |