Dragonflies and damselflies in your garden

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Front cover photograph: A male southern hawker dragonfly. This species is the one most commonly seen in gardens. Steve Cham.

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Dragonflies and damselflies are amazing insects. They have a long history and modern species are almost identical to ancestors that flew over prehistoric forests some 300 million years ago. Some of these ancient dragonflies were giants, with wingspans of up to 70 cm.

Top: Male brown hawker dragonfly. BDS/I. Hulme
Bottom: Male migrant hawker dragonfly. BDS/J. Stevens

Modern dragonflies are tiny by comparison, but are still large and spectacular enough to capture the attention of anyone walking along a river bank or enjoying a sunny afternoon by the garden pond.

This booklet will tell you about the biology and life-cycles of dragonflies and damselflies, help you to identify some common species, and tell you how you can encourage these insects to visit your garden.

Male blue-tailed damselfly. Tim Beynon.

Despite their name – and some legends – dragonflies are quite incapable of hurting humans. Neither do they deserve their nickname 'horse stinger'. Some people have seen grazing horses apparently shying away from hawker dragonflies and assumed the dragonflies have stung them – in reality, the dragonflies are hunting the biting flies that are bothering the horses.

Male common blue damselfly. Most damselflies hold their wings against their bodies when at rest. BDS

Dragonflies and damselflies belong to the insect order known as Odonata, meaning 'toothed jaws'. They are often referred to collectively as 'dragonflies', but dragonflies and damselflies are two distinct groups.

Damselflies

Damselflies are small, delicate-looking insects with a weak flight. They often stay close to water. When at rest, most species hold their wings closed along their body (an exception is the emerald damselfly which holds its wings half open). All four wings have the same size and shape. The eyes are always separated, never touching, and positioned on either side of the head.

Dragonflies

Dragonflies are usually larger than damselflies. They are stronger fliers and can often be found well away from water. When at rest, they hold their wings open, rather like an aeroplane. The hindwings are usually shorter and wider than the forewings. They have large eyes – occupying most of the head – that are very close to one another, often touching.

The four-spotted chaser dragonfly. Dragonflies keep their wings open when at rest. BDS/I. Hulme

Identification

Dragonflies and damselflies are creatures of the sun. In England, they may be seen on any warm day between April and October, but most commonly at the height of summer. The distinctive colours of the adults make it relatively easy to tell one species from another and they are quite riveting to watch. (One point of caution – the colours of dragonflies and damselflies change as they mature, see 'Colour changes' page 18.)

The charts on the following pages list those species most likely to be seen in English gardens, though unusual weather patterns may occasionally bring in some unexpected exotic species.

Male (top) and female (above) banded demoiselles damselflies: note the dark patch on the male's wings. Steve Cham (both photographs)
Below: Male large red damselfly. Steve Cham

Above: Female of the same species. BDS/J. Stevens
Bottom: Male emerald damselfly. Unusually, this species holds its wings half open when at rest. Steve Cham

Top: Female emerald damselfly. John Mason
Left: Male red-eyed damselfly. Steve Cham

Opposite page left: Male azure damselfly. BDS/J. Stevens.
Opposite page right: Blue-tailed damselflies mating. BDS/I. Hulme

Left: Mature male broad-bodied chaser dragonfly with powdery blue colouration. BDS/J. Stevens
Right: Female of the same species with yellow-brown colouration. BDS/I. Hulme.

Bottom: Male emperor dragonfly. BDS/J. Stevens

Above: Female ruddy darter dragonfly.
David Goddard
Right: Male ruddy darter dragonfly. Bill Furse

The charts on the following pages list those species most likely to be seen in English gardens, though unusual weather patterns may occasionally bring in some unexpected exotic species.

Damselflies	Colours, markings and key identification features of flying adults (M: males. F: females). Wings are transparent unless otherwise stated.	Size (adult length)	Flying season	UK distribution	Preferred habitats	Garden likelihood: **1** rare **2** uncommon **3** possible **4** likely
Banded demoiselle *Calopteryx splendens*	M: metallic blue-green body with distinctive large blue patch on wings. F: metallic green body, green tinge to wings.	41–45 mm	Mid-May to early Sep.	Lowlands of England, Wales and Ireland.	Slow-flowing rivers and canals.	2 (if garden is near a suitable river or canal.)
Emerald damselfly *Lestes sponsa*	Keeps wings half open when at rest. Both M and F have metallic green body. M: powdery blue colour at top and tip of abdomen.	36–38 mm	Late Jun to end Sep.	Throughout the British Isles.	Ponds, ditches, canals, lake margins and acid bogs, all with plenty of emergent vegetation.	2 (often depending on density of plants in and around a garden pond.)
Large red damselfly *Lestes sponsa*	Mainly red, with black markings at the end of abdomen.	35–36 mm	Mid-Apr to late Aug/ early Sep.	Widespread throughout the British Isles.	Ponds, canals, ditches and bogs.	4
Azure damselfly *Coenagrion puella*	M: blue, with thin black segments, black u-shape on 2nd segment of abdomen. F: black and green, with narrow green stripes on thorax.	33 mm	Mid-May to late Aug/ early Sep.	Widespread in England, Wales; lowlands of south & central Scotland.	Small sheltered pond and lake margins.	4
Common blue damselfly *Coenagrion puella*	M: bright blue, with thin black segments, black oval or mushroom shape on 2nd segment of abdomen. F: black and either blue or dull green, with wide stripes on thorax.	32 mm	Mid-May to late Sep.	Widespread throughout the British Isles.	Wide variety of habitats including ponds, lakes, gravel pits, slow-flowing rivers and canals.	3/4 (may avoid smaller ponds.)
Blue-tailed damselfly *Ischnura elegans*	M: black abdomen with blue 'tail' (8th segment). F: black abdomen with blue or brown 'tail'.	31–32 mm	May to Sep.	Widespread throughout the British Isles (except Scottish Highlands).	Wide range of still and flowing waters.	4 (may be one of the first species to colonise new ponds).
Red-eyed damselfly *Erythromma najas*	M: red eyes, dark abdomen with blue tip. F: eyes brown-red and black abdomen with no blue 'tail'.	33–35 mm	Mid-May to Aug.	Southern England and Welsh border.	Usually larger ponds with abundant floating-leaved plants.	2 (likelihood is increased if water lilies are present.)

Dragonflies	Colours, markings and key identification features of flying adults (M: males. F: females). Wings are transparent unless otherwise stated.	Size (adult length)	Flying season	UK distribution	Preferred habitats	Garden likelihood: **1** rare **2** uncommon **3** possible **4** likely
Common hawker *Aeshna juncea*	M: dark, with paired yellow & blue dots along abdomen. F: brown with paired yellow dots.	71–74 mm	Early Jul to early Oct.	Western and northern Britain.	Wide range of standing waters, from small moorland pools to lakes.	1
Migrant hawker *Aeshna mixta*	Small yellow triangle at top of abdomen. M: fairly dark brown, with small, blue, paired dots along abdomen. F: brown, with dull yellowy-green spots.	63–65 mm (small hawker)	Late Jul to Oct.	Southern Britain (spreading northwards)	Ponds, lakes, gravel pits, canals and slow-flowing rivers.	1/2
Southern hawker *Lestes sponsa*	M: blackish, marked bright green, with blue at tip of abdomen. F: chocolate brown with green/yellow markings.	70–73 mm	Jul to Oct.	Lowlands of England & Wales.	Woodland and garden ponds, lakes, canals. Lays eggs on old logs by the margins of ponds.	3/4 (increased likelihood if shrubs/ hedge in garden)
Brown hawker *Aeshna grandis*	Large brown species with amber-brown wings. M: blue dots along side of abdomen.	73–74 mm	Late Jun to early Oct.	Lowland Britain & Ireland.	Large garden and park ponds, lakes, canals, gravel pits, slow-flowing rivers.	2/3
Emperor *Anax imperator*	M: green thorax and bright blue abdomen. F: all green. Both sexes have dark line running along top of abdomen.	76–78 mm	Late May to early Sep.	Southern England & Wales (spreading northwards).	Well-vegetated ponds, lakes, ditches and canals.	3
vFour-spotted chaser *Libellula quadrimaculata*	Medium-size brown species, with black-tipped abdomen; dark spot on middle of front edge of each of the four wings; small dark patch at base of hindwings.	43–47 mm	Late May to mid Aug.	Widespread around UK (except N-E England).	Wide range of acidic standing waters, also some canals and slow-flowing waters.	3/4
Broad-bodied chaser *Libellula depressa*	M: broad blue abdomen with yellow spots along sides. F: broad yellow to yellow-brown abdomen. Both sexes have dark patches at base of wings.	44–46 mm	May to end Jul.	Southern England & Wales.	Ponds, small lakes and ditches.	3/4
Common darter *Sympetrum striolatum*	M: orange-red abdomen. Young and F: yellowish to light brown abdomen.	37–41 mm	Mid-Jun to late Oct.	Much of UK, except Scottish Highlands.	Wide range of habitats including ponds, lakes, ditches and rivers.	4
Ruddy darter *Sympetrum sanguineum*	M: blood-red abdomen with clear slim 'waist'. F: dull yellow-brown, with thin black lines along sides of abdomen.	34 mm	Late Jun to early Oct.	Southern Ireland & Wales; S-E England up to Midlands.	Well-vegetated ponds, lakes, canals, ditches; also rivers near woodland.	2 (more likely on densely vegetated ponds).

Dragonfly biology and behaviour

Life-cycle and reproduction

Most of a dragonfly's or damselfly's life – perhaps as much as 95 per cent of it – is spent in the water. The eggs, which are usually laid underwater, develop into larvae, free moving, water-dwelling nymphs, from which the flying adult insects eventually emerge. The whole process may be completed within six

Emperor dragonfly larva. The spines at the end of the body are typical of dragonfly larvae. Steve Cham

months, but for most species takes one or two years. In contrast to the larvae, the adults are generally short-lived.

While in the water, the larvae undergo a series of moults as they grow. Once a larva is ready to become an adult, it leaves the water by crawling up a plant stem or twig and then undergoes its final moult – the skin of the larva splitting to release the winged adult. You may find these discarded skin casts, called 'exuviae', on vegetation by the edge of your pond: clear evidence that dragonflies and damselflies have

Small red-eyed damselfly larva. Damselfly larvae have three leaf-like appendages at the end of the body. Steve Cham

bred there. Watching the transformation of a dowdy, aquatic larva to a glistening, splendid, airborne adult is an extraordinary experience.

Once the young adults have matured and gained their full colours – process which may take a couple of weeks – the male and female are ready to breed. Males use claspers at the end of their bodies to grab a female, and the couples fly in tandem while they mate. After mating, the female lays her eggs, either alone or while still in tandem with the male. The females of some species deposit eggs directly into the water, while others insert individual eggs into leaves, stalks or pieces of rotting wood which may be floating on the water surface. Depending on the species, the eggs hatch after few weeks or months. Small damselflies live only for a couple

A common darter dragonfly emerges from its larval skin. BDS

of weeks as flying adults. In Britain, larger dragonflies can fly for three or four weeks but seldom for longer than two months. Many die from accidents or predation. Dragonflies and damselflies are unable to hunt in poor weather and large numbers simply starve at these times.

Female southern hawker dragonfly laying eggs in decaying wood. Steve Cham

Mating common blue damselflies (female below). BDS/I. Tew.

Dragonflies and water

After transforming from an underwater nymph to flying adult – but before becoming sexually mature – young adults may spend a week or more away from the water. During this period, the larger dragonfly species can travel several kilometres away to feed on flying insects. This is the reason you might see dragonflies in your garden even if you don't have a pond nearby.

Newly emerged four-spotted chaser dragonfly next to its larval skin. BDS/I. Hulme

Male azure damselfly with prey. Steve Cham.

Female azure damselfly laying eggs while in tandem with a male. BDS/I. Tew

Dragonflies as predators

Dragonfly and damselfly larvae will eat almost any creature that is smaller than they are. Prey may include bloodworms, snails, water fleas, tadpoles and the larvae of mosquitoes or other aquatic insects. The larvae of larger dragonflies may also catch and eat small fish.

Larvae are mostly ambush predators, hiding in wait until prey animals come close enough to pounce on. They have a unique extendible lower jaw, called a mask, which they can extend with lightning speed to impale their prey with sharp, hook-like mandibles.

Male common blue damselfly with prey. Steve Cham

As adults, dragonflies and damselflies are big eaters and may consume 20 per cent of their bodyweight in food each day. They eat other flying insects, particularly flies, midges and mosquitoes – making them very useful creatures to have around the garden! The larger species will also take butterflies, moths and even smaller dragonflies or damselflies.

Adults use their impressive eyesight to detect prey. In flight, they hold their bristly legs in a basket shape to scoop up and then firmly grasp their targets before eating their catch, often in mid-air.

A southern hawker dragonfly nymph uses its 'mask' to catch a stickleback. Steve Cham

Dragonflies as prey

Among the species that catch and eat adult dragonflies and damselflies are birds (such as wagtails and hobbies), spiders, frogs; and larger species of dragonflies. However, dragonflies and damselflies are not helpless, their excellent eyesight and flying skills help protect them from capture, while the warning colours of some species – black and yellow, or black and red – deter some bird predators.

A young azure damselfly in a spider's web. BDS/A. Welstead

In the larval stage, dragonflies and damselflies are preyed on by fish, frogs, toads and newts, as well as other aquatic invertebrates such as water scorpions and beetle larvae.

Colour changes

When dragonflies and damselflies first emerge from the water, most have very muted colours. It can take several days before they gain their brilliant adult appearance. Common blue damselflies, for example, are often a pale pinkish-brown rather than sky-blue when they first appear as adults.

A young large red damselfly yet to develop its adult colours. BDS/I. Tew

Some damselflies, like the blue-tailed species, undergo a gradual colour change as they mature. The females of these species have several different colour forms, with some changing from violet to blue or rich brown, and others from salmon-pink to yellowish-brown. Some of the larger dragonflies also change colour as they age. For example, the common darter dragonfly goes from yellow brown to reddish brown, and the black-tailed skimmer dragonfly goes from yellow-brown to blue-grey. Sometimes, older females may start to develop the coloration of the males.

Female common darter dragonfly with yellowish body. BDS/I. Tew

Male common darter dragonfly with orange-red body. David Goddard.

Young male broad-bodied chaser dragonfly developing a blue colouration. Steve Cham

The young male black-tailed skimmer dragonfly third from the top above (BDS/I. Hulme) will eventually resemble the mature adult pictured above (BDS)

Male southern hawker dragonfly. Note the two characteristic broad yellow bands behind the head. Steve Cham.

Quick movers!

Dragonflies can out-fly almost all other insects. The maximum speed of large species like the hawkers is about 30 km/h (20 mph). Their average cruising speed is probably about 16 km/h (10 mph). Small dragonfly species and damselflies are much slower.

Some species are capable of covering large distances and some exotic visitors come from very far afield. If you live in southern England you might see dragonflies that have come from southern Europe or even North Africa.

Garden ponds and dragonflies

Although garden ponds cannot compensate for the loss of wetland habitats, they are still of great value for dragonflies and damselflies, especially for the more common species. There may now be more than one million ponds in British gardens and the number is growing rapidly. Taken as a whole, these areas of water now make a significant additional habitat for many wetland species. It is thanks to garden ponds that dragonfly species such the emperor, southern hawker and common darter now occur even in the centres of big cities.

Well-vegetated ponds are ideal for dragonflies, especially those with nearby cover to provide shelter from high winds. Dr Steve Head.

Attracting dragonflies to your pond

Your pond should have clean, unpolluted water and shallow margins. It needs to be in a sunny location and sheltered as far as possible from strong winds. Rotting logs placed by the edge of a pond may attract the southern hawker dragonfly as it uses these as places to lay its eggs. The aquatic vegetation in your pond should be varied and include a mixture of submerged plants (such as pondweeds and crowfoots) and floating-leaved plants (such as water-lilies and frogbit). Around the pond margins, brooklime and water forget-me-not are useful, as are taller emergent plants such as flowering rush and water mint. Ideally, all your pond plants should be native species.

The plants around your pond are equally important. Areas of short and long grass close to the pond will be used as mating and feeding grounds, while nearby shrubs and trees are roosts where dragonflies and damselflies can shelter from rain, high winds and predators.

The larval skin of a hawker dragonfly. BDS/J.Silsby.

For more detailed information on creating a pond, consult the Natural England booklet Garden ponds and boggy areas, see 'Contacts' page ??.

Things to avoid

- Water pollution. Many chemical sprays used in the garden can be very harmful. Avoid even small quantities reaching your pond through wind drift.

- Water enrichment. Tap water often contains high levels of nutrients which can encourage unwanted algal growth in your pond water. For the same reason, take care not to allow lawn fertilisers run off into your pond. If possible, collect rainwater and use that to top up your pond.
- Shading. Too much shading will inhibit the plants growing in and around your pond. Also, many pond creatures – especially insects – do best when the water is warmed by the sun.
- Pond cleaning. Although ponds do need to be cleaned occasionally – to remove excess plant growth or dead leaves – doing too much at once is bad for pond life. Dragonfly and damselfly larvae often live in and amongst water weeds and pond debris, so only clear small sections of your pond at a time. Once taken from the water, vegetation and debris should be left on the pond margin for 24 hours to give trapped creatures a chance to return to the water.
- Introductions. Dragonflies will find their own way to your pond if the conditions there are right. Taking eggs or larvae from another pond to put in yours is not a good idea as your pond may be unsuitable. You could also bring in tiny fragments of invasive alien plants. There are several alien species that can rapidly colonise ponds, choking them completely and making them unsuitable for almost any wildlife.
- Fish. These are often found in formal ponds and they are not very wildlife-friendly. Fish are the main predators of dragonfly and damselfly nymphs. They pose such a threat, that some dragonfly species have adapted to live in the acidic waters of heathland and peatland bogs, where fish cannot survive. Dragonflies and damselflies may co-exist with fish, but only in larger ponds that have a complex underwater 'architecture' of vegetation in which the nymphs can hide.

Emperor dragonfly: the shiny wings indicate this is a very young adult. BDS/R. Perchard

- Waterbirds. These will prey on emerging adults and can also damage vegetation, either through trampling, grazing or nesting. In addition, excessive droppings from aquatic birds can add nutrients to the water, encouraging the growth of unwanted algae and/or bacteria (which use up oxygen in the water).

Even small garden ponds can be visited by several dragonfly species. Ian Johnson

Water contaminated in this way is unsuitable not just for dragonflies and damselflies but for many other invertebrates and plants.

Dragonfly conservation

Since 1960, three species of dragonflies in Britain and Ireland have become extinct. There are now just 39 breeding species of dragonflies and damselflies, one of which is confined to Ireland. Although some species are extending their range, at least one third of all our dragonflies and damselflies are rare and localised. We need to do everything possible to prevent any further loss of these magnificent creatures.

Apart from their beauty and importance to wetland ecosystems, dragonflies and damselflies are also very valuable indicators of water quality. Larvae are very sensitive to pollution so the presence or absence of key species helps us monitor the health of aquatic ecosystems – ecosystems that humans rely on as much as any other creature.

Common darter dragonflies mating. BDS/A. Radford

As a gardener you can help conserve dragonflies and damselflies. Besides providing a suitable pond (or two!) you can stop buying peat-based compost.

Male common hawker dragonfly. BDS I. Hulme

This is one practical step towards halting the loss of peat bogs, which are home to many of our rarer insect species.

Threats to dragonflies

- Loss of habitat, from development and changes in land management.
- Pollution: including run-off from fertilisers used in agriculture, wind drift from insecticides and the use of herbicides on marginal vegetation.
- Drainage and artificial fluctuations in water levels.
- Overstocking of ponds with fish and/or ducks, geese and other water birds.
- Lack of appropriate management: including the drastic modification of water bodies (for example, river straightening) or their surroundings; and in some cases a lack of management resulting in the shading of water bodies by trees, or their choking with silt and plants.
- Climate change: this may be affecting some species adversely.

Legal protection

Two species of dragonfly are protected by law: the Norfolk hawker and the southern damselfly. It is illegal to kill either of these species. Neither is very likely to occur in gardens.

Recording dragonflies

The Dragonfly Recording Network (DRN) welcomes all dragonfly sightings, including those from garden ponds. These are very useful in tracking the arrival of new species and the spread of established species. Even the absence of species from gardens can be important as it might be an early sign of changes in their distribution. DRN local recorders would be delighted to hear from you.

Female migrant hawker dragonfly. David Goddard

A pair of ruddy darter dragonflies flying in tandem. BDS/J. Stevens

Their details are available via the British Dragonfly Society (see 'Contacts' page 26).

Code of Practice

The British Dragonfly Society has produced a code of practice for its members. The code contains two important principles:

- Dragonflies should not be killed without a justifiable and useful purpose.
- Live dragonflies should be held captive only for good reasons.

It is hoped that everyone reading this leaflet will follow these principles.

Contacts

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www.naturalengland.org.uk

British Dragonfly Society
23 Bowker Way
Whittlesey
Peterborough, PE7 1PY
www.dragonflysoc.org.uk

The British Dragonfly Society aims to promote and encourage the study and conservation of dragonflies and their habitats in the United Kingdom.

The Dragonfly Project
www.dragonflyproject.org.uk

The Dragonfly Project is a Cambridgeshire-based charity running dragonfly safaris and education courses.

Further information

This is one of a range of wildlife gardening booklets published by Natural England. For more details, contact the Natural England Enquiry Service on 0845 600 3078 or e-mail enquiries@naturalengland.org.uk

Natural England also produces Gardening with wildlife in mind an illustrated wildlife reference. Originally on CD but now also available on-line, Gardening with wildlife in mind has detailed information on 800 plants and animal species often found in our gardens, and shows how they are ecologically linked. See www.plantpress.com

A mating pair of brown hawker dragonflies. Tim Beynon

Other titles

Brooks, S. and Askew, R. *A guide to the dragonflies and damselflies of Britain.* Field Studies Council. (Pull-out chart). 1999.

Brooks, S. and Lewington, R. *Field guide to the dragonflies and damselflies of Great Britain.* British Wildlife Publishing. 2002.

Lucas, J. *Spinning Jenny & Devil's Darning Needle.* J. Lucas. 2002.

Smallshire, D. and Swash, A. *Britain's dragonflies.* WILDGuides. 2004.

British Dragonfly Society publications and teaching aids:

Dig a pond for dragonflies

Managing habitats for dragonflies

Learning about dragonflies (education pack for teachers of 7–11yr olds)

A dragonfly's world. (60 slide pack and lecture notes)