

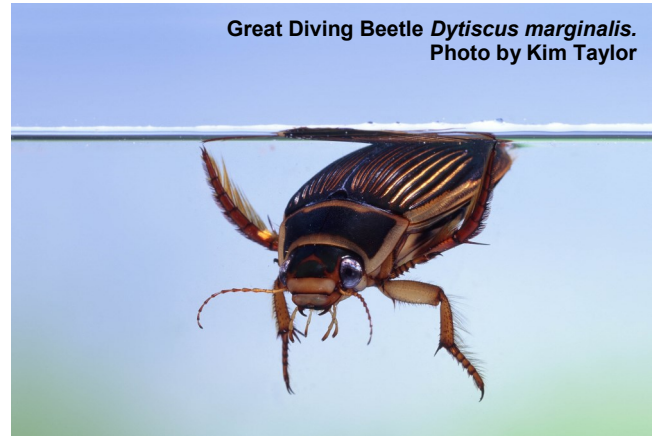
Wildlife Profiles: Water Beetles

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What?

Water beetles are insects belonging to the Order *Coleoptera* which means 'sheathed wings' as the wings are covered by hard wing cases (elytra). The order is huge and includes a wide variety of groups, some of which have a close association with water, living on or in it for most of their adult life. These have representatives from two main Sub-orders, *Adephaga* (the water beetles in this group are often referred to as *Hydradephaga*) and *Polyphaga*.

The *Hydradephaga* are more your typical diving beetles, include 5 families, and are purely aquatic. The *Polyphaga* are more loosely associated with water and usually termed scavenger water beetles. They include 9 families but study is usually limited to the 6 that are more commonly aquatic or semi-aquatic as adults.



Great Diving Beetle *Dytiscus marginalis*.
Photo by Kim Taylor

All species are adapted in some way to an aquatic lifestyle, often flattened and oval in outline, with their 6 limbs modified to varying extents, to enhance their swimming or submerged crawling ability. Their wing cases meet in a straight line down the centre of the back, unlike bugs, and are modified to not only create an efficient suit of armour but also to store air like an aqualung. They can spend prolonged periods underwater but still have to return to the surface to breathe and restore their air supply, though some, the polyphagous *Elmidae*, can use the bubble as a rudimentary 'lung' and stay submerged more-or-less permanently.

The water beetles comprise approximately 14 families:

Adephaga	Polyphaga	
<i>Gyrinidae</i> (whirligigs)	<i>Elmidae</i> (riffle beetles)	<i>Hydrochidae</i>
<i>Hygrobiidae</i> (Screech beetle)	<i>Dryopidae</i>	<i>Helophoridae</i>
<i>Noteridae</i> (burrowing water beetles)	<i>Hydrophilidae</i> (scavenger water beetles)	<i>Spercheidae</i>
<i>Dytiscidae</i> (diving beetles)	<i>Hydraenidae</i>	<i>Limnichidae</i>
<i>Halplidae</i> (crawling water beetles)	<i>Georissidae</i>	

There are 283 (Denton 2007) species in the UK although the exact number is contentious as some families have purely terrestrial species in them and some leaf beetles or weevils may or may not be included. Of this number, 5 are regionally extinct, 34 are threatened, 37 are near threatened and 84 are nationally scarce (Foster 2010).

Water beetles vary greatly in size from the tiny species of *Anacaena bipustulata*, *Elmis aenea* and *Ochthebius minimus* which are around 1.5 - 2mm, to the 30mm (+) great diving beetles. Most, however, are somewhere in the middle. Many water beetles are predators but others feed on algae and detritus. The larvae of the carnivorous species may prey on other aquatic species, such as dragonfly larvae, water bugs and fish.

Where?

Water beetles prefer shallower areas of water such as streams, ditches, river bottoms and margins, lake margins, ponds, pools, marshes and puddles. A few species, however, like deeper lakes. The majority of species live in still, fresh water, but there are some highly adaptable species that are at home in fast-flowing rivers or brackish water.

If beetles are in an unsuitable habitat they may opt to fly away, at least those species which can fly. This is believed to usually be in the evening or at dusk. It is also determined by temperature and many need warmth to get their flight muscles working. There are a number that cannot fly including *Agabus undulatus* and *Noterus crassicornis* and these are classified as fenland relics.

New ponds tend to have a high nutrient content and the first colonisers are usually one or two species including *Hydroglyphus geminus* and *Helophorus grandis* that prefer little or no vegetation. Still water with a high organic content attracts some different species, while others might prefer acid ponds or brackish water.

The most species-rich water tends to be well-vegetated, neutral or slightly alkaline ponds and lakes. Puddles and water troughs, however, often support various species as there will be no fish or predators present.

The majority of water beetles are to be found in shallow areas around vegetation or close to the shore. As predators, they like to hide and ambush aquatic larvae, feed on carrion on the bottom, or floating on the surface, and as some are mostly herbivorous they crawl/feed on the plants or eat algae. Some may supplement their diet with micro crustaceans as well. The reproductive cycle varies for many species but can include coming onto land, vegetation or silt to lay eggs and support larvae/pupae. A few species will populate open water with *Haliplidae* and *Gyrinidae* being the most common. Many *Hydrophilidae* occupy the damp, maybe mossy areas at the edges of ponds and ditches and these micro-habitats can sustain a high number of different water beetle species, *Anacaena limbata* being one of the most common.

When?

Water beetles can be long lived and therefore can be encountered at any time of year, although they often have peaks in the spring and autumn. Some species overwinter as larvae, others as adults, but they can be found in the colder months, when they have not buried themselves in mud during very low temperatures. Some may leave the water altogether when they hibernate.

Coleoptera undergo complete metamorphosis in their life cycle, like a butterfly. The egg hatches out into a larva, which is aquatic and bears little resemblance to the adult. There are usually 3 moults, or instars before the larvae leaves the water to pupate on land, usually in the silt margins or under leaf litter.

Similar to water bugs, a good time to pond dip is in the spring, after the hibernating beetles appear. This is dependent on the weather but it is usually in April or May when the species are adult. The other good time is autumn, around September or October, after the summer offspring have matured.

Why are we interested in them?

Some families tend to lend themselves to monitoring. Water beetles, in conjunction with other aquatic insects, are very useful in wetland conservation monitoring, for several reasons:

- Diverse enough to give fine discrimination between good, mediocre and poor sites
- Several species found in almost all habitats
- A manageable number of species, 283 in Britain
- Identification less difficult than most invertebrates
- Rich ecological and behavioural literature

Where can I learn more?

- Denton J. 2007. Water Bugs and Water Beetles of Surrey. Surrey Biodiversity Partnership
- Foster G.N. and Friday. L. E. 2011. Keys to adults of water beetles of Britain and Ireland (Part 1). Royal Entomological Society
- Foster G.N. 2010 A review of the scarce and threatened Coleoptera of Great Britain. Part 3. Water Beetles
- Friday L.E. 1988. A key to the adults of British water beetles. Field Studies Council
- Merritt R. 2006. Atlas of the water beetles (Coleoptera) and water bugs (Hemiptera) of Derbyshire, Nottinghamshire and South Yorkshire, 1993-2005. Sorby Record Centre



Dytiscus marginalis and *Acilius sulcatus* clustered around an air bubble trapped beneath the ice of a frozen pond.
Photo by Kim Taylor



Hydaticus transversalis discovered in the Nene Valley by the Ecology Groups.
Photo by Henry Stanier