



Managing Habitats for Dragonflies





Red-eyed Damselfly (*Erythromma najas*) in a typical position sat atop pondweed. © David Kitching

Introduction

Dragonflies are interesting and beautiful. Their large size makes them valuable for quickly assessing water quality and for the study of insect behaviour. They also have the capacity to perform many useful functions for humans, for example as a biological control of mosquitoes. Dragonflies are special and need our help. Much can be done by creating new garden ponds but many dragonflies, including most of the rarer species, depend on other habitats which already exist - lakes, ponds, rivers, ditches, marshes and bogs. If dragonflies are to flourish in the British Isles, these habitats must be managed so that they can support them.

In this booklet we first outline what all dragonflies require. If these requirements can be provided in any particular habitat, the species dependent upon these requirements may colonize it. It is very important to be aware of the general requirements of dragonflies because these provide the basis for practical measures that have to be taken. Secondly, we outline the particular problems associated with managing each type of habitat and suggest ways of solving them. The Atlas of Dragonflies in Britain and Ireland, available at the BDS shop, gives a more detailed account of the requirements and current distribution for each species, allowing you to identify particular dragonflies which may occur at your site and to manage for them. Fact files, including habitat threats and management advice, for the most rare or endangered species can be found freely available on our website, on the individual species profile page.

What all dragonflies require

Larvae

All British dragonflies develop in water. Most breed only in habitats that contain free water all year, although a few can survive withdrawal of water for a month or more during late summer. The water must contain sufficient oxygen and be free from toxic substances. Some species require still water, others flowing water. No British species can live in very fast-moving rivers and streams, so these are naturally without dragonflies. Many rivers, canals, lakes and ponds would be suitable were they not polluted by agricultural or industrial wastes.

The larvae of many species prefer waters with an abundant growth of water plants in which the larvae can hide from predators and ambush their prey. However, dragonflies can breed in habitats that are sub-optimal for them. Many require emergent water plants up which a larva, in its last stage, can climb in order to emerge as an adult. Most species are fairly catholic in their requirements and will occur in a variety of habitats if the climate is suitable for them. Climate is crucial in determining what species will occur in any one place. For example, the Shetland Islands contain numerous water bodies, which, if they were further south, would support many dragonflies, but nearly all lack dragonflies because of the climate. The larvae of some species have very exacting requirements that are not well understood.

Adults

Adult dragonflies need feeding and roosting areas near their breeding places. They and their prey require warmth and, therefore, sunny, sheltered places provided by trees and bushes. The trees and bushes should not be at the water's edge but a few metres away. Some species will make use of shelter some distance away from water. In the treeless fens and levels tall marsh plants provide reasonable shelter. Most dragonflies disperse efficiently and quickly discover restored habitats and newly constructed ponds and gravel pits.

Habitats: management problems and solutions

Lakes

Definition: water bodies of more than 1000 m² and with pH more than 6

Lakes can be natural or man-made. In southern England nearly all lakes are man-made and are particularly rich in dragonfly species. New lakes, in the form of gravel and clay pits, borrow pits and reservoirs, are being created continuously and provide great opportunities for management for dragonflies and other wildlife. In lakes, dragonfly larvae are confined to the warm shallow edges where water plants flourish. Therefore, one large lake contains fewer dragonflies than does a series of small lakes covering the same area.

The management problems presented by lakes and their solutions are as follows:

1. Unless controlled, willows and other waterside trees can shade out water plants. Therefore, ensure that some stretches of the lake are free of trees and bushes. However, some species, such as the Brilliant Emerald (*Somatochlora metallica*) prefer lakes edged with good tree cover so ensure you are aware of the species in the lake before planning management. In newly made lakes and gravel pits control the development of trees and bushes along the shores.
2. Steep sides to a lake reduces the zone of shallow water. Therefore, when creating lake habitats, ensure that there is a gradual slope at the margins in at least part of the lake.
3. Large lakes are subject to considerable natural wave action and fast-moving boats can also produce similar effects. Vigorous wave action can cause turbulence which reduces the amount of light reaching submerged water plants and can prevent their growth. Waves can also hinder the emergence of dragonflies. Floating booms can be used to reduce wave action in small bays. Boat speeds can be controlled by co-operation with local authorities and boat hire firms. A system of zoning, so that some areas are kept free of boats and their wash, is the best solution.
4. Lakes are easily polluted by drains from lakeside dwellings, by boats and particularly by agricultural or industrial waste entering them through streams that drain into the lake. Pollution can only be reduced by co-operation with local landowners, industries, local government and the National Rivers Authority (NRA).
5. Large numbers of wildfowl or roosting gulls can enrich the water of some lakes so that the lakes cease to be a suitable habitat for dragonflies. Therefore, do not rear mallard or maintain a collection of ornamental waterfowl on lakes where you want dragonflies to be conserved.
6. Lakes with unnaturally large populations of fish contain few dragonflies because the fish eat the larvae. Therefore, do not develop fishing lakes with artificial feeding and high stock rates on lakes where you want dragonflies to be conserved.



Hairy Dragonfly (*Brachytron pratense*), an uncommon species of lakes © Keith Noble

Llangorse Lake, Brecon Becons, Wales, is a fantastic site for dragonflies, boasting 16 species to date.
© Keith Noble





Southern Hawkers are a typical pond species, with even small ponds capable of supporting great numbers. © David Kitching

Ponds

Definition: water bodies of less than 1000 m² and with pH more than 6

Ponds are particularly good for dragonflies because a large proportion of their water is shallow and they are often sheltered from wind though not from sun. By their nature, most are transient habitats and, unless managed, they quickly develop into marsh and, ultimately, woodland. Their management, therefore, is particularly important. There is great scope for making ponds on both farms and in gardens. The guidelines for making small ponds on farms are the same as that for making them in gardens (see 'Dig a Pond for Dragonflies'). On farms it is easier to make larger ponds, but lining them with butyl etc. is usually prohibitively expensive so larger ponds on farms have to be made in one of the following ways:

- a) Dig the pond on an area underlain by impervious clay
- b) Dam a small stream. Permission must be sought from the NRA. Ponds made by damming streams are liable to nutrient pollution if the stream flows through land treated with fertilizers. Such ponds are also liable to fill up with sediments brought down by the stream and will require frequent dredging. Only a part of the pond should be dredged in one year.

The management problems associated with ponds and their solutions are as follows:

1. Shallow ponds rapidly become overgrown with water plants that have arrived naturally or have been introduced. Reeds and reed mace or bulrush are particularly liable to dominate ponds thus reducing the amount of open water and suitable habitat for submerged aquatic plants. Therefore, control these by cutting or pulling out when they first appear. If herbicides are used, restrict each application to a quarter of the pond to limit deoxygenation; the MAFF guidelines in Booklet 2078 must be strictly adhered to.
2. Trees and bushes at the pond edge cause the same problems as for lakes but in ponds can be more severe. In many ponds so many leaves fall into the pond that they poison the water. Therefore, do not plant willows etc. close to ponds or, if you do, control their growth frequently.
3. Nutrients and pesticides can enter ponds by streams or drift. Nutrients cause algal blooms and excessive growth of duckweed. Therefore, as far as possible prevent spraying in the immediate vicinity of the pond and feeder streams. If the time of pollution is predictable, for example when the fields above the pond are sprayed, cut off the stream with a dam where it enters the pond, and allow polluted water to bypass the pond through a previously prepared ditch.

4. Do not introduce non-native water plants, such as *Crassula helmsii*, which can take over a pond.
5. Many farm ponds, small gravel and clay pits are used as dumps for rubbish, some of which can be very toxic. Therefore, if an old pond is being renovated, it is important to clear rubbish out of it before it is allowed to refill.
6. Farm stock can muddy ponds to such an extent that submerged plants cannot grow in them and emergent vegetation is lost by trampling. Therefore, where this occurs, restrict access of stock to a part of the pond with fencing that extends into the pond. Similarly, in urban areas, anglers, children (and even dragonfly enthusiasts!) can severely damage bank side vegetation. In such places, exclude people from part of the pond by fencing.
7. Ponds are even more susceptible to manuring by wildfowl than are lakes. A small pond can rarely take more than one pair of mallard. Therefore, do not use ponds for domestic geese, ducks or ornamental waterfowl if you want dragonflies on the pond.
8. Adult dragonflies at ponds close to houses or farm buildings, where there are exceptionally large populations of house sparrows, can be severely affected by predation. Newly emerged dragonflies are especially vulnerable. Therefore, avoid siting new ponds in such places.
9. Dragonfly larvae in ponds, as in lakes, are vulnerable to predation by fish if these are kept in unnaturally large numbers. Therefore, if possible avoid stocking ponds with goldfish, carp etc if you want the ponds to be suitable for dragonflies.

An example of a farmland pond in Norfolk © Claire Install



Rivers, large dykes, large streams and canals

The habitat provided by lowland rivers, large dykes and canals is very similar to that of many lakes and large ponds and they support the same species. However, four species, Banded Demoiselle (*Calopteryx splendens*), White-legged Damselfly (*Platynemesis pennipes*), Common Clubtail Dragonfly (*Gomphus vulgatissimus*) and Scarce Chaser (*Libellula fulva*), normally require gently flowing water in which to breed. The problem for the owner of a riverside habitat is that he has only partial control of it; it can be seriously affected by what others do upstream.



White-legged Damselflies require gently flowing water.

© Tim Coleshaw

The management problems presented by rivers, dykes and canals and their solutions are as follows:

1. Agricultural, sewage and industrial pollution upstream can damage or destroy habitats downstream. Many rivers and canals in Britain are now so polluted that, in their present state, they cannot support dragonflies. However, most could be restored. The NRA, the water authorities, industry and farmers are all responsible for preventing effluents and other pollutants getting into rivers and the streams that feed them. Individuals can do much by supporting measures to clean up rivers, dykes and canals and by reporting pollution incidents.
2. Watercourses require to be cleared out from time to time. Dredging causes direct and indirect damage to submerged and marginal habitats. However, damage can be short-lived if plants and animals are able to recolonize the dredged areas from nearby undredged watercourses. Therefore, treated lengths should be as short as is practicable and never more than 1/4 mile.
3. Waterweed may be controlled by the use of herbicides, the use of which also has serious local effects. These effects are short-lived if the appropriate chemical is used as per MAFF's booklet 2078 (see above). Only short lengths should be treated at any one time. Where possible treat the two sides of a watercourse in different years, leaving at least two years between treatments.
4. Fast boats in narrow waterways produce harmful wave action; the effects are often more damaging in rivers and canals than in lakes. Therefore, the speed and number of boats should be strictly controlled on waterways with important dragonfly populations. This is best done by zoning.
5. Control of marginal vegetation is often necessary for anglers. If continuous stretches of marginal vegetation are cut this destroys much dragonfly habitat. Therefore, angling societies should be urged to restrict cutting to fishing points.

The River Wye, habitat for the restricted Common Clubtail Dragonfly (*Gomphus vulgatissimus*) © Dick Eastwood



Small streams and ditches

In many areas, small streams and ditches provide the only habitats for dragonflies. The dragonfly fauna of drainage ditches in the levels is similar to that of dykes. As long as the rate of flow of streams is not too fast, they provide a good habitat for Azure Damselfly (*Coenagrion puella*), Large Red Damselfly (*Pyrrhosoma nymphula*) and Blue-tailed Damselfly (*Ischnura elegans*). Fairly fast streams flanked by alders are the preferred habitat of Beautiful Demoiselle (*Calopteryx Virgo*). As with rivers, the owner of part of a stream or ditch has only partial control of its habitats.



A ditch at RSPB Mersehead, habitat for several damselfly species
© Genevieve Dalley

The management problems associated with streams and ditches and their solutions are as follows:

1. Ditches quickly become overgrown and so need frequent clearance to retain their agricultural function. An overgrown ditch provides good habitat for Scarce Emerald Damselfly (*Lestes dryas*) and Ruddy Darter (*Sympetrum sanguineum*) but is less suitable for other species. Where possible do not clean out a ditch more frequently than once every four years and do not clear too much at a time; never clear all the ditches on a farm in the same year. This applies to both mechanical and chemical treatment. If herbicides are used, make sure that the right one is used in the way stipulated.
2. Ditches and streams are particularly liable to agricultural pollution, directly by effluent from sheep dip and by washing spray equipment and, indirectly, by spray drift. Therefore, make sure that sheep dip and other chemicals do not get into the watercourse and, when applying fertilizer or pesticides, ensure that an adequate margin is left between the watercourse and the sprayed crop. Never spray on a windy day.
3. Some streams and ditches are liable to dry out and so become useless for dragonflies. Therefore, if dangerously low levels are reached, insert a temporary dam or sluice to retain water until levels rise naturally.
4. High stocking rates in adjoining fields can lead to the destruction of all tall plants growing by the watercourse. Therefore, protect part of the watercourse with electric or other temporary fencing.
5. In some low-lying districts excessive water extraction has led to groundwater becoming contaminated by salt from the sea and has made many ditches unsuitable for dragonflies. Only changes in water extraction and drainage policies can remedy this problem.

Fast flowing streams are the preferred habitat of the Beautiful Demoiselle (*Calopteryx virgo*) © Tim Melling



Acid lakes, ponds, rivers and streams

Acid-water habitats range from large lakes to sphagnum bogs and seepages. The habitats blend with each other: many acid lakes and pools are fringed at least partly by sphagnum bog. Acid-water lakes, pools, rivers, streams and ditches face similar problems to those of non-acidic habitats. However, the problems are less acute because the acid waters are usually in districts where there is less intensive agriculture and less industry. Also, the productivity of vegetation is lower in acid waters and so vegetation requires less management. However, sheep-dip effluent is a much more frequent problem in many upland districts. Acid rain and large-scale forestry are both very important causes of pollution in acid waters and are much more difficult to remedy. Only changes in national policy can produce solutions to these problems.



The Golden-ringed Dragonfly (*Cordulegaster boltonii*) is a species of acid waters. © Dave Kitching

Acid bogs and seepages

These habitats are particularly important for the dragonflies of the British Isles: no less than seven species are wholly dependent upon them. Where commercial, mechanised peat digging is practised, enormous areas of dragonfly habitat are rapidly destroyed. Large-scale afforestation has also destroyed many dragonfly sites through drainage, though some habitats have been retained in open areas within the conifer forests.

The management problems associated with bogs and seepages and their solutions are as follows:

1. Drainage for sheep grazing, deer-farming and grouse-moor management can cause bogs to dry out and become unsuitable habitats for dragonflies. Drainage effects can be quite localised but are difficult to predict. Therefore, do not carry out drainage schemes in the immediate vicinity of dragonfly habitats intended for conservation.
2. Natural development of bogs can lead to the natural disappearance of bog pools. In areas where there are few pools, it is sometimes necessary to create new pools for dragonflies to colonize.
3. In lowland districts, colonization of bogs and their margins by birch, pine and other trees and bushes shades the bogs and lowers their water levels. This gradual process has lost many good dragonfly habitats. Therefore, bogs and their immediate edges should be kept clear of invading trees and bushes. It is much easier to pull out seedling trees than to have to fell and move large ones, especially in the case of trees like birch that sprout from cut stumps.
4. Shallow runners and seepages providing breeding places for Southern Damselfly (*Coenagrion mercuriale*) Small Red Damselfly (*Ceragrion tenellum*), Keeled Skimmer (*Orthetrum coerulescens*) and Golden-ringed Dragonfly (*Cordulegaster boltonii*) are particularly vulnerable, not only to nearby drainage and the growth of trees, but also to rut-making vehicles (mountain bikes, etc) and excessive trampling by people, horses and cattle. Fencing is sometimes necessary to reduce damage of this sort.

Chartley Moss NNR, a peat bog supporting endangered White-faced Darters (*Leucorrhinia dubia*) © Genevieve Dalley



Conclusion

Provision of unpolluted, shallow water suitable for dragonflies involves the manager with two types of activity:

1. Preventing the natural tendency of most shallow waters to develop into marsh and eventually scrub or woodland
2. Preventing, or at least reducing, damage caused directly or indirectly by man.

Therefore, the management of all water bodies for dragonflies largely consists of controlling invasive vegetation in the least damaging ways possible, and of controlling all forms of pollution. The first is usually easier to achieve than the second.

When new water bodies are created or old ones renovated, one can usually rely on their colonization by the plants and animals on which dragonflies depend for shelter and food. If a new habitat is very isolated, colonization by water plants may take some time and, therefore, nature can be helped by introducing water plants found in similar habitats in the area (see those listed in 'Dig a Pond for Dragonflies').

An Emperor Dragonfly (*Anax imperator*) egg-laying into a pond © Gordon Gray



This is the text of the British Dragonfly Society booklet "Managing Habitats for Dragonflies". The booklet was originally written in 1993 to assist people in managing various types of habitat for Dragonflies and Damselflies and is currently in revision. You should note that this is biased towards the United Kingdom. It is being published here to make it available to enthusiasts worldwide.



British Dragonfly Society