Freestanding Wildlife Pond

Garden Wildlife Guide

By Dr Neville Carrington
Carrington Eco Products

Version: 1.4

Neville Carrington was founder of a leading company manufacturing products for ornamental fish, has written books on fish diseases and water chemistry, and is a prolific writer on subjects connected to pond life.

Your Wildlife Pond will provide a valuable benefit for many creatures in your garden. You will be surprised how quickly the birds, dragonflies and butterflies will find and colonise the area. Amphibians such as newts and frogs are almost certainly in your locality but may take a little longer to find the water.

This guide has been designed to provide a step by step guide on how to install your wildlife pond along with an overview of the wide range of creatures the pond attract to your garden. If you wish to explore any particular points of interest then further links are provided.

Introduction

This guide has been prepared to provide you with suggestions on how and where to install your Lifepond, the best pond-friendly native plants you may want to introduce, and pond maintenance. This guide also provides an introduction to the wildlife you may encounter once the pond is established.

Further information

We do not intend for this to be a comprehensive guide into all things ponds and wildlife. If you want to find out more, we provide some suggested sources you may want to investigate. We cannot guarantee the accuracy of information provided by third party sources and do not necessarily endorse any information provided.

Unfortunately we regret that neither Dr Neville Carrington nor Carrington Eco Products are able to provide a personal advisory service or enter into any personal correspondence.

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Section 1 : Installation and maintenance

1.1. Preparation

Your pond is designed with two straight sides which enable you to place the unit close to a wall or in a suitable corner if you wish; .and with two ornamental sloping sides with a pebble finish to help wildlife access.

If you wish to change the colour, we recommend the paints by Farrow and Ball or you can use spray paints such as sold by Halfords.

Place the pond on a flat, level surface. Choose a sheltered position where your pond will have around two to four hours direct sunlight each day – preferably not when the sun is at its hottest.

Now is the time to fill the plant container with suitable compost [see 1.2] and install the plants. You may find it useful to place a stone or broken piece of a flowerpot, for instance over the irrigation channel to prevent compost from escaping in to the main part of the pond, but do not block the channel completely since the marsh garden would dry out.

Try to use only native plants but remember that it is an offence to take plants from the wild and also wild specimens may need special attention to acclimatise to the new conditions. See section A3.

1.2 Selection of compost

Marsh plants generally grow best in soil which is slightly alkaline [for more details **see Link 1.2.1**]. Compost containing peat has an acid tendency and is therefore not suitable for this reason besides being ecologically undesirable.

It is best to use Aquatic compost but if this is not available then mix peat free compost with an equal portion of horticultural sand. It is quite a good idea to mix a small quantity of slow release fertiliser granules [such as Osmokote] with the compost.

The compost should be very moist before use.

1.3. Maintenance

Regular attention

The water level should be kept within about 2 cm of the top of your Lifepond. Provided the Pond is properly placed so that it gets not more than about two hours direct sunlight day, and provided it is positioned in a sheltered area out of the prevailing wind, then only occasional topping up should be necessary

Particularly during warm dry weather, check the pond regularly and top up preferably with rain water. The problem with using tap water particularly from a hard water area is that the salts in the water will build up in much the same way as the scale in a kettle. [see link 1.3.1] . If rainwater is not available then deionised of RO [reverse osmosis] water is ideal but do not use water which has been softened with a domestic water softener since the balance of dissolved salts in this type of treated water is unsuitable to sustain the life in the pond.

Unless your Lifepond is topped up mainly with rainwater or deionised water [see link 1.3.1], then some water change is desirable. A good scheme is to replace about ¼ of the volume [total volume is 38 litres and you could change about 10 litres] every month. Alternatively you could clean out the pond in the autumn, but saving about ¼ of the water to re-seed the pond with some of the creatures which have colonised it. October is a good time, since those creatures which are looking for places to hibernate will have left the pond, yet any life which is settling down for the winter in the water should not be unduly stressed.

With a healthy growth of plants and with the right light conditions, the water in your pond should stay clear and healthy throughout the year.

You may be able to protect from excessively cold weather, but there is a case for emptying the pond entirely for the coldest months of the year when bees, butterflies and amphibians will not be using it. However the birds do appreciate a water supply particularly in the depth of winter and you will lose any creatures wintering in the water.

About the end of October is the time to cut back the plants ready for next season's growth.

Trimming plants

When trimming plants, please remember that some creatures such as Dragonflies do lay their eggs on the stems of plants; also the flowers are important to the butterflies, bees and insects. [See link 3.5]

Winter maintenance

Depending upon the creatures which you find are over-wintering in your pond, it is probably not necessary to take any particular precautions to prevent the pond freezing. However because your pond is above ground level and is relatively small, in a severe winter the water could freeze completely.

Birds do need a source of water and in frozen conditions this may be difficult to find. Except in very severe cold you can pour hot water on the ice to provide some liquid for them. Never try to break the ice with a hammer since the shock waves can kill any creatures still in the pond.

Frogs can spawn any time from the middle of February and a freeze then can kill the spawn. [see section 3.6 and 3.6.1]

You may be able to prevent freezing by using an insulating material such as Bubblewrap, or you wish to consider the purchase of a small pond heater.

1.4 Troubleshooting

Green water is caused by millions of minute free-swimming green organisms in the water.

This is probably an indication that your pond is in too much sunlight. Whilst green water is probably not in itself harmful to the pond life [see link 1.4.1], you may consider it unsightly. The best remedy is to experiment with the position of the Lifepond, and to introduce submerged plants to compete for the nutrients in the water.

Blanket Weed [aka Hair Algae] is another indication of too many nutrients in the water, and an encouragement to introduce more submerged plants. It is desirable not to leave too much blanket weed in the pond since it can trap and kill creatures in its filamentous strands. [See link 1.4.1]

Biological controls are commonly available for both Blanket Weed and green water.

The minute organisms which are seen as green water and blanket weed are a fascinating study – please see section 5 and study the fascinating small world in the water with an electronic microscope attached to your computer.

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Section 2: Plants and planting

If you buy the plants from a water garden centre, they will probably come in a perforated basket. The planting area of your pond is designed to accommodate the height of the average basket. However we recommend removing the plant from the basket but keeping the soil intact, then filling the space around them with compost. Exceptionally you may wish to leave a basket in front of the irrigation channel to prevent the compost from escaping into the main body of the pond.

If you buy plants by mail order in plant plugs [see 2.1 below] then you should fill the plant container with compost, make suitable size holes and gently press in the soil around them.

The species mentioned below are mainly natives of the UK.

2.1. Marsh plants

Your water garden centre will have a small selection of plants and may advise you. However we have arranged with Puddleplants, a specialist supplier [www.puddleplants.com] to prepare a selection of plants to provide a continuous flowering period in the Spring and Summer with particular emphasis on attracting birds and butterflies.

The selection supplied by Puddleplants will vary according to the season but will include plants such as Marsh Marigold, Forget me not, Cotton Grass, Soft Rush, Watercress, Water Mint and Penny Royal.

Please note that Puddleplants is an independent recommended supplier and is not associated directly with Carrington Eco Products.

2.1.1 Plants to provide cover.

Plants such as these can break up the outline of the pond whilst providing food and cover for froglets and other creatures.

Creeping Jenny [aka Moneywort]
(*Lysimachia nummularia*)

Picture N Carrington

This plant is at home both in moist conditions and in the water. Bright yellow flowers in late spring and early summer attract bees and other insects. Dies off in winter.
Excellent ground cover.

Houttunia
[*Houttunia cordata*]

Picture N Carrington

Houttunia appears above ground in Spring and spreads rapidly in moist ground. Simple white flowers appear in early Summer. The plant is used as a medicine by the Chinese and can have a somewhat unpleasant fishy smell if the leaves are crushed.

Viola species

Various varieties and colours of viola are available from garden centres and they can add instant colour to your bog garden. Many varieties will flourish in the damp conditions.

2.1.2 Plants to attract birds and butterflies

Puddleplants can supply Ragged Robin, Hemp agrimony, Cuckoo flower, Forget me Not, Water mint, Purple loosestrife, Water cress, Meadow sweet, Water dock and Penny Royal

See www.puddleplants.com

2.1.3 Plants to attract Bees

Marshmallow, Marsh marigold, Ragged robin, Water mint, Penny royal, Purple loosestrife, Forget me not, Meadow sweet and Cuckoo flower

See www.puddleplants.com

2.1.4 Plants to attract frogs and other amphibians

Suitable marsh plants are Bogbean, Brooklime, Water Mint, Yellow flag, Marsh marigold, and Water Violet

See www.puddleplants.com

2.2. Water plants

The water plants in your pond have the dual purpose both in providing a haven for small creatures and in helping to keep the water clear. Those plants described below which have both surface leaves and under water vegetation are particularly suitable.

Submerged water plants are frequently called "oxygenating plants" but this is not a good description. It is true that on a sunny day you can see bubbles of oxygen emerging from the plants, but most of the oxygen dissolved in the water is absorbed from the atmosphere at the water surface and does not come from the plants, whose main purpose is to serve as cover for the creatures in the pond, as a reservoir of insects and to keep the water in good condition [see link 1.4.1] .

Starwort
[*Callitriche palustris*]

Picture by Puddleplants

This aquatic perennial forms a dense floating mass of rosette-shaped leaves about 5mm wide, and with its small submerged leaves on slender stems, Starwort is an excellent choice for your Lifepond.

Tillea

Tillea recurva

Picture N Carrington

A little plant which is most comfortable floating in shallow water. Copious small white flowers about 3mm across are produced from late spring throughout the summer. Grows quickly to provide a thick mat of vegetation giving shelter to many little creatures. However you must be careful not to let it take over the whole water surface of the pond! Now considered invasive by the RHS.

Common duckweed

[*Lemna minor*]

Picture N Carrington

This plant has a floating leaf [thallus] about 4mm diameter and a root growing in the water. Reputedly the fastest growing water plant, which can double its biomass in less than three weeks.

Common duckweed may be introduced by birds, but it is best avoided since it is very difficult to eliminate and is somewhat unsightly. However, duckweed can reduce the amount of unwanted

nutrient and hardness in the water, and counteract Green Water, nevertheless it is best avoided.

Ivy –leafed Duckweed
[*Lemna trisulca*]

Picture N Carrington

This delicate-looking plant may be a cousin of Common Duckweed but it is not nearly so invasive. It is distributed throughout the United Kingdom except the northern counties. The plant floats just under the surface, only showing above the water when flowering. A highly desirable local plant which can harbour creatures in the water.

Fontinalis [aka Willow Moss]
[*Fontinalis antipyretica*]

Picture N Carrington

Fontinalis is widely spread throughout Northern countries including the UK, Scandinavia and Canada. The name antipyretica derives from its fireproof properties whereby some northern populations use the moss for sealing gaps in chimneys. Very good for sheltering water-borne wildlife.

Frogbit

[*Hydrocharis morsus-ranae*]

Picture N Carrington

Another native British pond plant. Like a miniature water lilly, the leaves are the size of a 50p piece. The plant lies dormant in winter at the bottom of the pond and re-emerges in late Spring. Flowers in Summer. Another plant which can shelter a myriad of water life

Hornwort

[*Ceratophyllum demursum*]

Picture N Carrington

An aquatic plant which sinks to the bottom in winter and floats just below the surface in late spring and summer, only breaks the surface for flowering in summer. Whilst Hornwort can provide an excellent shelter for dragonfly larvae, water beetles, baby newts, tadpoles etc. it really prefers cool conditions and may not be suitable if your pond heats up in the daytime.

Canadian pondweed [aka Elodea]
[*Elodea canadensis*]

Picture N Carrington

A fast growing pondweed .

Introduced into Ireland by mistake in 1836, it was brought into England in the 1880s by botanist Dr Babington. Elodea soon began to choke the waterways and became known as Babington's Curse for this reason. Not a native plant and therefore not recommended.

Please do not discard any surplus into our natural ecosystem.

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Section 3 : Creatures you may see

3.1 Birds

All birds need water to drink and bathe, both of which are essential for them to stay healthy. You will be amazed at how installing a pond in your garden increases its attractiveness to a wide variety of bird species.

With a little patience, over a period you may be able to spot upwards of seventy different species of bird in your garden. Some of the most common garden birds which you may see are described below. For more information, visit for instance the RSPB website. www.rspb.org.uk/wildlife/birdguide

THRUSHES

Blackbird
[Turdus merula]

Picture M. Deane

This is a very common bird which spends much of its time on the ground. It is usually 25 - 28cm in length.

Very young birds are a brown colour with dark spots, and are palest around the throat. Males have completely black plumage and a yellow eye-ring whilst females retain their brownish colour. They feed primarily on worms and other invertebrates and also eat fruit.

[For more details see 3.1.2 : link to RSPB website]

Mistle Thrush

[Turdus viscivorus]

picture to follow

The Mistle Thrush is often confused with the Song Thrush which is a little smaller, and which announces its presence with its song. The somewhat less conspicuous Mistle Thrush is about 27 cm. long and has a brown upper side with distinctive large dark spots on the underside. Diet is similar to the blackbird. Together with the song thrush, they are able to crack open snail shells to access the juicy contents!

[For more details see 3.1.3 : links to RSPB website]

Song Thrush

[Turdus philomilos]

Picture M. Deane

The Song Thrush is slightly smaller than the Mistle Thrush at 23cm long and has less distinctive spots on the underside. A bird with a beautiful song which is characterised by repeating the same tune over and over again as well as mimicking familiar noises in the locality such as car alarms and telephones ringing. Its diet is the same as other thrushes and it is altogether a very welcome visitor to the garden.

[For more details see 3.1.4 : links to RSPB website]

Robin

[Erithacus rubecula]

Picture M.Deane

The male is well known for its distinctive red breast with blue-grey body and wings. Robins are very territorial and can be quite vicious towards rival males in the garden. Females are the same size, about 14cm long, but quite plain without the red breast. Food is primarily small insects, so a very useful bird to have in the garden.

[For more details see 3.1.5 : links to RSPB website]

THE FINCH FAMILY

Goldfinch

[Carduelis carduelis]

Picture M Deane

A colourful little bird, about 12cm long when adult. The body is buff and white with a black pattern on the head; its wings are black with a yellow leading edge. They are mainly seed eaters and often seen hanging at precarious angles from garden plants such as teasel. Goldfinches are also frequent visitors to bird tables and feeders. They are sociable birds which are often seen in flocks, often with other species such as chaffinch and greenfinch.

[For more details see 3.1.7 : links to RSPB website]

Greenfinch

[Carduelis chloris]

picture to follow

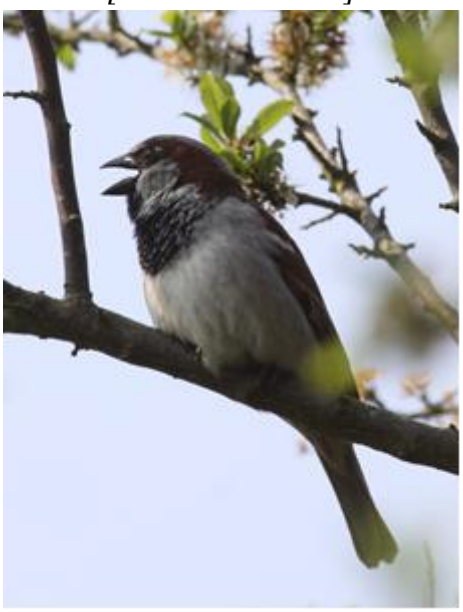
As the name implies, a mainly green bird, up to about 15cm long. The male is a very attractive yellowish green colour with yellow streaks around the edges of the wings and around the tail, with black tips to the wings.

Females are similar but the colours are not so bright.

[For more details see 3.1.8 : links to RSPB website]

Tree Sparrow

[Passer montanus]



Picture M.Deane

Sparrows are generally not so common as they used to be. The tree sparrow is a little bird about 13cm long. Both sexes have a black cap and a dull greyish white underside with streaked brown wings. Diet is mainly seeds and they appreciate tit-bits such as breadcrumbs.

[For more details see 3.1.9 : links to RSPB website]

House Sparrow

[Passer domesticus]

picture to follow

Similar in appearance to the Tree Sparrow except there is a yellowish ring around the eye and they are slightly larger up to about 15cm. Both sexes look similar. Large flocks of house sparrows were once a common sight in urban and rural gardens but they have declined considerably over the past few decades and to see a resident flock of these cheeky little birds is now a special treat.

[For more details see 3.1.10 : links to RSPB website]

THE TIT FAMILY

Great Tit

[Parus Major]

Picture M. Deane

This is one of the more common garden birds. It is colourful with its green upper body, yellow underbody with its black 'cravat', black cap and dark wings with white streaks. It is relatively small being up to about 15 cm long and feeds mainly on seeds and small insects.

[For more details see 3.1.12 : links to RSPB website]

Blue Tit

[Cyanistes caerulescens]

Picture M.Deane

This is one of our most common and most colourful garden visitors. This cute little bird is about 11cm long and has a distinctive yellow underside with a blue cap and dark blue line through the eye. The upper part of the body is green and the wings are blue.

Similarly to the great tit the blue tit feeds on seeds and small insects.

[For more details see 3.1.13 : links to RSPB website]

THE WAGTAIL FAMILY

Pied Wagtail

[Motacilla alba yarellii]

picture to follow

So called because it moves its long tail up and down whilst on the ground, this bird is about 18cm long and is predominantly black with a white underside. This bird and its cousins may be seen on your lawn looking for small invertebrates.

[For more details see 3.1.14 : links to RSPB website]

Yellow Wagtail

[Motacilla flava flavissima]

picture to follow

A very attractive summer visitor with the same distinctive tail wagging habit as the Pied Wagtail, but slightly smaller at about 16cm long. Adults have a greyish black upper body with a yellow underside. Females are slightly less colourful than males.

[For more details see 3.1.16 : links to RSPB website]

Grey Wagtail

[*Motacilla cinerea]*

Picture M. Deane

About the same size as the Pied Wagtail again with the distinction of the tail flapping up and down. The upper parts are blue-grey with pale yellow underside. Frequently associated with water.

[For more details see 3.1.17 : links to RSPB website]

THE WOODPECKER FAMILY

Great Spotted Woodpecker
[Dendrocopus major]

Picture M Deane

This black and white bird is about 24 cm long and has distinctive white bars on its wings. It also has striking red markings on its rump and in the case of the male on the back of its head (or nape). The drumming sound made against trees by its long beak is unmistakeable as is its alarm call.

As the name implies, this bird is adept at digging insects from trees and rotting woodpiles. Nuts are also part of its diet and peanuts are welcomed.

[For more details see 3.1.19 : links to RSPB website]

Green Woodpecker

[Picus viridis]

Picture N.Carrington

A very attractive bird which may be seen on lawns digging holes for worms and insect larvae with its distinctive long beak. It is a shy bird and often the best glimpse of this bird you will get is its rump as it flies away in a characteristic bouncing flight. Although it is rare to see this bird for more than a fleeting moment its loud 'laughing' call is a much more familiar sound of the British garden. It is larger than its Great Spotted cousin at about 34 cm length, this bird has a red crown and green upper part with a greyish white underpart.

[For more details see 3.1.20 : links to RSPB website]

3.2 Bats

All UK bats emerge at dusk and they hunt by emitting a sound frequency which is inaudible to humans. They pick up the frequency when it bounces off their prey. They are the only flying mammals [i.e. they are warm blooded creatures with fur] in Britain. These small creatures have earned themselves quite a sinister reputation through folklore. However in reality they are quite the opposite being entirely harmless to humans and other mammals. It has been estimated that one bat can feed on 3,000 midges in one evening and for this reason they should really be considered as friends

The most common bat species in people's gardens and urban areas are Pipistrelle Bats - The Common Pipistrelle Pipistrellus pipistrellus and the Soprano Pipistrelle Pipistrellus pigmaeus.

The Common Pipistrelle

[Pipistrellus pipistrellus]

picture to follow

Pipistrelles are the bats you are most likely to see. They are typically 35 to 50 mm. head and body length [under 2"] and they normally weigh no more than 8 grams [1/3 ounce].

The two species are very similar but emit different frequencies.

Both species are common in both town and countryside.

Pipistrelles emerge at sunset and are said to consume up to 3,000 insects in one night. They have a relatively long life of over ten years.

Emerging soon after sunset, a Pipistrelle bat can consume up to 3,000 insects in a night and therefore perform a valuable function.

Brown Long-eared Bat
[Plecotus auritus]

picture to follow

Brown long-eared bats are second only to pipistrelles in their abundance in the British Isles. A long-eared bat has ears almost as long as its body. You might not notice this feature when the bat is at rest, because at that time its ears are usually curled back or even tucked out of sight beneath its wings, leaving only the inner lobe, called the tragus, showing.

The brown long-eared bat is 4 to 5 cm head-and-body length and weighs 6 to 12 gm. It is in most respects very similar in appearance to its close relative the Grey Long-eared Bat (Plecotus austriacus), a rare species sometimes seen in southern England. It is very difficult to distinguish between the two long-eared bat species with some experts insisting that the only accurate method is through DNA analysis.

The Brown Long-eared Bat is a little bigger and heavier than the Pipistrelle.. The size of the bat's ears is obvious when it is flying, but when resting the ears tend to be folded back.

These bats only emerge after dark and they tend to eat rather larger insects than Pipistrelles; they may take some insects back to their roosting places.

3.3 Bees

There are about 250 different species of bee in the UK and we cannot describe them all. A good article with much detail can be found at www.buzzle.com

Bees are important to promote pollination of flowers and they are essential for the germination of many of our food crops. If your Lifepond has the appropriate flowering plants then you are likely to see Bumble Bees and Honey Bees. There are many other sort of bee but these are unlikely to be attracted to the Lifepond.

Native bees are not aggressive, but like many animals they may attack if they feel threatened and become frightened. Unfortunately a more aggressive species has recently arrived in the UK but they do not appear to have caused much of a problem yet.

Bumble Bee

[several species]

Picture M Deane

Honey Bee

[several species]

Picture M Deane

3.4 Butterflies and moths

It is easy to confuse butterflies and moths – both belong to the same scientific order of Lepidoptera. Butterflies only fly in the daytime and whilst most moths fly by night, some do fly in the daytime. The easiest distinction is that all butterflies have a club-like end to their antennae and this is not shared by moths.

Below is a description of some of the butterflies and moths which you may be lucky enough to see attracted to your pond depending upon the plants which you select. There are several websites giving a wealth of information about butterflies, for instance http://butterflywebsite.com/

Choose the plants carefully for your marsh garden and you may attract all kinds of butterflies [see www.puddleplants.com] . Here is a list of common species and you can find out much more by going to www.ukbutterflies.co.uk .

Comma
[Polygonia c-album]

Picture M Deane

Somewhat smaller than the Brimstone at 45mm wingspan, the wings have a distinctive shape. The upper wings are a brownish colour with dark markings, the under wings are greyish brown and has white 'comma' marks. May be seen March to September.

Brimstone

[Gonepteryx rhamni]

picture to follow

As the name implies, this butterfly is a light yellow colour. With a wingspan of about 60 mm, the wings have a characteristic shape. See from April to September.

Common Blue

[Polyommatus icarus]

Picture M Deane

The most common blue butterfly, at about 32 mm is slightly bigger than the Holly Blue. Only the male has blue upper wings, the female being basically brown. The under wings of both sexes are greyish brown with dark spots. May be seen April to September.

Holly Blue

[Celastrina argiolus]

picture to follow

Violet blue wings with black wingtips and a wingspan of 30 mm. The Blue most likely to be seen in gardens in late spring and early autumn.

Red Admiral

[Vanessa atlanta]

Picture M Deane

A spectacular butterfly with a 60mm wingspan, with black upper wings with red strips and white spots. Mainly seen in July and August.

Hawkmoth

[various species]

This is a convolvulus Hawkmoth. Picture M.Deane

Hawkmoths vary in size from about 45 mm to 100 mm wingspan. For more details see http://ukmoths.org.uk

Humming Bird Moth

[Macroglossum stellatarum]

picture to follow

Whilst many moths fly at night, this interesting species flies during the day and behaves rather like a humming bird! This moth collects nectar using its long tongue and makes a humming noise. Wingspan only about 45mm. Seldom seen in Britain since it breeds on the continent. You may be lucky to see it during the summer.

3.5. Dragonflies & Damselflies

These beautiful creatures will almost certainly find your Lifepond very soon. There are two distinct groups of dragonflies – the larger ones which fly strongly and rest on pondside vegetation. When their wings are outstretched you can see there are two dissimilar pairs. These are the so called Hawker and Darter Dragonflies. More delicate looking are the closely related Damselflies which flutter in a way reminiscent of butterflies.

The larger dragonflies can look quite fierce – but they are completely harmless to us, but hunt for small insects which the can dismember with their powerful jaws. Reproduction is by laying eggs which hatch and spend some time as larvae or nymphs in the pond before metamorphosing in to adults. See section 3.7 on water creatures.

THE DRAGONFLY FAMILY

Broad Bodied-chaser
[Libellula depressa]

Picture M Deane

You will find that this striking dragonfly will be one of the first to colonise your newly installed Lifepond. It is one of the smaller Dragonflies, with a length of about 43mm. The body of the male is blue with a black tip to the tail while the female is a golden brown colour. This dragonfly actively hunts insects but also can perch for long periods. It is very common in the South of England.

Common Darter

[Sympetrum striolatum]

picture to follow

This is one of our more common dragonflies and is incredibly variable in colour. The males are typically bright red whilst the females seem to range from an orange colour to a dull muddy brown.. The common darter is quite small being only about 36mm long. This species of dragonfly is also an early coloniser of ponds and can be seen frequently resting upon the ground. Perhaps its success as a species is due to it being active for a long period – from June to end October.

Four Spot Chaser

[Libellula quadrimaculata]

Picture M Deane

The four spot chaser is another small Dragonfly, only about 40mm long. It is common in South and Central England and readily distinguished by the four marks on the wings. It is one of our earliest dragonflies to emerge from ponds as larvae and can be seen in its adult form flying from May to August.

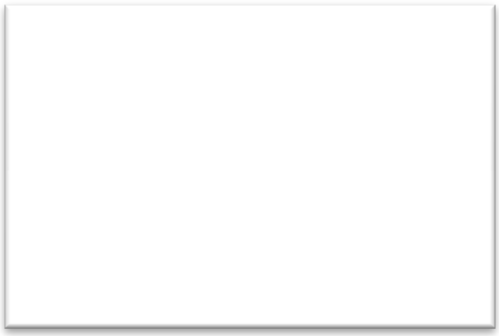
The Big Blue Emperor
[Anax imperator]

picture to follow

The Big Blue Emperor Dragonfly is particularly spectacular.

This species lives mainly in the South of England and the Midlands. The male has an azure blue abdomen with a black stripe down the middle. The female tends to be more green than blue. These dragonflies are one of our more conspicuous species, not only due to their size but also due to their territorial tendancies. They can often be seen patrolling their patch, fighting with other dragonflies that cross their path.

Common Blue Damselfly
[Enallagma cyathigerum]



picture to follow

These delicate damselflies are likely to be one of your first visitors as they are one of our most common and adaptable species. They are about 32 mm long and as the name suggests both sexes are predominantly blue in colour, with black markings down the centre of their backs.

They are active from May to September and can often be seen in clusters of large numbers, even by small garden ponds such as the Lifepond.

Large Red Damselfly
[Pyrrhosoma nymphula]

Picture M Deane

The large red damselfly is slightly larger than the Common blue, being about 35 mm in length. It has a distinctive red abdomen and the black markings towards the end of its abdomen distinguish it from its smaller, less common relative the small red damselfly. It is one of our earliest damselflies to emerge from ponds and a first sighting of this species, sometimes as early as late April, is a sure sign that spring has arrived. However, typically the large red damselfly is active from May to August.

3.6 Amphibians

An Amphibian is a creature which can live both on land and in water. Typically an amphibian lays its eggs in water and has an aquatic larval stage such as a tadpole, which develops into a generally land-based air breathing creature which returns to the water to breed. There are about 15 amphibians in the UK, frogs, toads and newts. For detailed information visit for instance www.amphibiaweb.org/ .

Common Frog

[*Rana temporaria]*

Picture M Deane

Frogs are very widely spread although there have been reports that the population is in decline due to a disease, to loss of habitat and to predation. Frogs can vary in colour and they tend to blend in with their habitat. Adult frogs vary in size from about 60 mm to 100mm, females being larger than males. They are sometimes confused with toads, but they have smooth skin, a stripe on each side and are very able jumpers whilst toads hop rather than jump and tend to walk in a way which frogs do not.

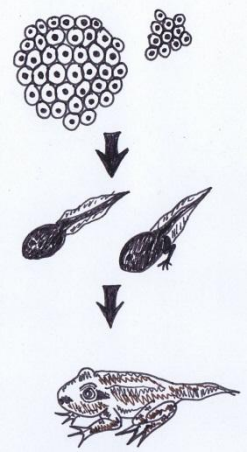
Frogs spend most of their time in moist places out of water but always return to water to breed in late February or March depending upon the weather when they emerge from hibernation. Generally frogs will try to return to the pond in which they were born but you may be lucky to have them breeding in your Lifepond – if so please ensure that the pond remains frost free.

Frogs have a varied diet of worms and grubs etc. – and are well known for their ability to shoot out their tongue to catch flies that stray too near. They are common residents of small ponds in both urban and rural locations and a welcome addition to the garden community for keen gardeners by eating small slugs and other grubs.

Eggs, Tadpoles and Froglets

Tadpoles in Lifepond

Picture N. Carrington



In early spring, frogs produce their eggs in a gelatinous mass. They may try to go back to the place where they were born but they are also likely to use any reasonable area of water – and Lifepond is very suitable.

By April the eggs should have hatched into tadpoles and they should be growing quickly so that by late spring they should be turning into froglets

Click here for link 3.6.1 for more on the life cycle of the frog

Drawing Hannah Stebbings

Common Toad
[*Bufo bufo]*

picture to follow

Whilst toads are frequently confused with frogs, they are easy to tell apart. Toads tend to be a darker colour and their skin is uneven since it is covered in small warts [which contain a toxic substance – so do make sure you wash your hands after handling a toad]. Size is similar to frogs - but they can grow somewhat larger. There is also a marked difference between the sexes with the females often reaching several times the size of the males. They spend more time on land than do other amphibians. Whilst toads like damp places, they will often seek any snug place which is dark during the day. The cavern under your Lifepond is an ideal venue, from which they can emerge at night to hunt for worms, slugs and other food.

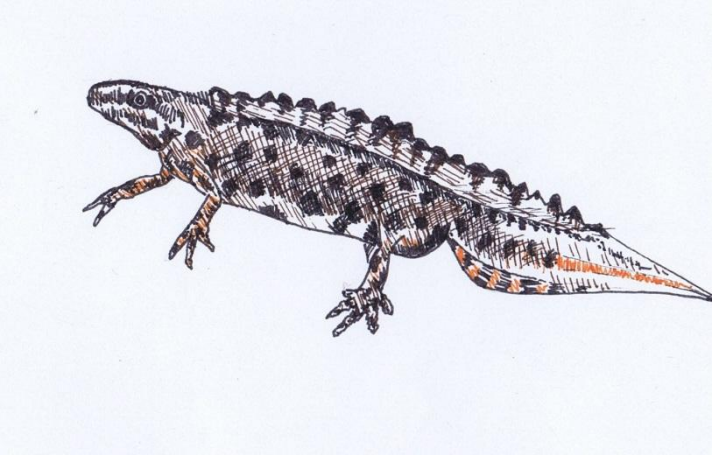
Click here for link 3.6.2 for the life cycle of the toad.

Smooth Newt [aka Common Newt]
[Triturus vulgaris]

Picture M Deane

Three species of newt are normally found in the UK – but the Smooth Newt is one you will very likely find in your Lifepond. Newts hibernate during the winter but return to water in early spring to lay their eggs. Whilst the baby newts develop in water, the adults return to dry land

after spawning and seek damp or sheltered places until they hibernate in November. They readily hibernate amongst piles of stone or rubble and so by providing such habitat near to your Lifepond it will help to encourage this species to take up permanent residence in your garden.



Smooth Newt
Drawing by Hannah Stebbings

Palmate Newt
[*Triturus helveticus]*

Drawing by Hannah Stebbings

The Palmate is our smallest newt, being only about 8 cm long whilst generally the Common Newt may be about 1 cm longer. Both sexes have a yellowish belly but in the breeding season the male develops heightened colouring with orange markings

Great Crested Newt
[*Triturus cristatus]*

Drawing by Hannah Stebbings

The rarest and largest of our newts, the adults being up to 16 cm long. Blackish brown in colour with an orange- yellow underbelly. Easy to distinguish from other species of new due to the size and the distinctive crest.

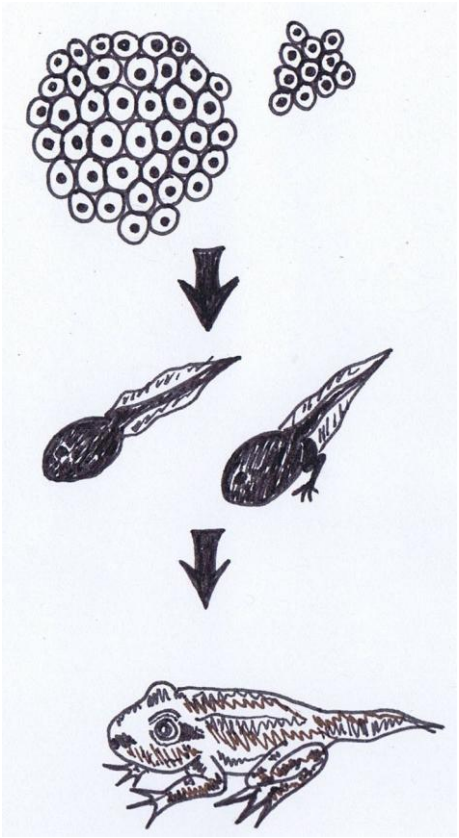
Tadpoles & spawn

It should be obvious if you are lucky enough to have any of the amphibians mentioned above breeding in your pond. Frog spawn appears as a mass of jelly containing black dots [which are the developing tadpoles]; Toads lay their spawn in strings. Newt eggs are however, less obvious. They will lay single eggs on vegetation and fold the leaf over using their hind legs with amazing dexterity and seal the leaf in this position through secreting a sticky jelly, thus providing protection for their eggs from potential predators. A favourite plant for egg laying is water forget-met-not and so by planting this you may catch sight of the curled over tip, hiding a newt egg. Be careful not to disturb it though, you may ruin its chances of survival.

Even the spawn has some predators – ducks are particularly partial to frog spawn. For a successful hatch it is essential to ensure that the pond does not freeze. Newt eggs are high on the menu of fish and more surprisingly, other newts.

Tadpoles in Lifepond

Picture N.Carrington



In early spring, frogs produce their eggs in a gelatinous mass. They may try to go back to the place where they were born but they are also likely to use any reasonable area of water – and Lifepond is very suitable.

By April the eggs should have hatched into tadpoles and they should be growing quickly so that by late spring they should be turning into froglets

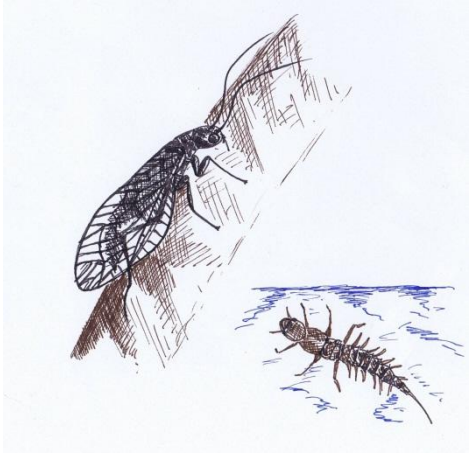
Click here for link 3.6.1 for more on the life cycle of the frog – and for other species of frogs, toads, newts and snakes.

Drawing Hannah Stebbings

3.7 Water creatures

The water in your LifePond will soon be teeming with life – from quite large creatures to minute plants and animals which you can only see with a microscope. This section will describe life which is visible either with the naked eye but in many cases the use of a magnifying glass will add to the enjoyment. The following is a list of the most common creatures you are likely to see:-

Alderfly larvae
[*Sialis latria]*



Drawing by Hannah Stebbings

The commonest alderfly is *Sialis latria*. The females lay up to 2,000 eggs on the stems or leaves of plants. After about 2 weeks the larvae fall into the water where they spend up to 2 years crawling in the silt where they feed on any small insect they encounter. They have six legs and when fully grown they are about 25mm long.

For more information click link 3.7.1

Blue Tailed Damsel Fly

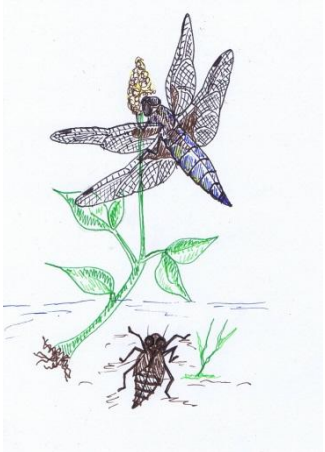
[Ischnura elgans]

Drawing Hannah Stebbings

This damselfly is widely distributed throughout the British Isles and can often be seen near ponds, lakes and ditches. About 32 mm long, as the name implies, it has a distinctive blue tip to the end of its abdomen. The larva has three parts to its tail, somewhat like a large version of mayfly larvae.

Broad-bodied Chaser

[Libellula depressa]



Drawing Hannah Stebbings

One of our most common dragonflies, about 42mm long with a distinctive very broad flattened abdomen with yellow spots on the sides. There are four wing patches. The male also becomes a bluish colour in the breeding season. Can be seen in southern England from late Spring to early Autumn.

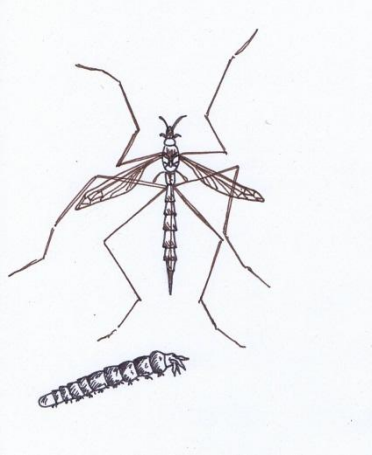
Broad bodied Chaser Larva
Picture M Deane

Caddis Fly Larvae
[several species]

Drawing Hannah Stebbings

There are about 250 different species of caddis fly in the UK. The larvae of some but not all species build a case around themselves from small pieces of stick, stones and other debris. Generally the larvae are about 25mm long. Some species hunt for other insects and some feed on algae and other vegetable matter.

Common Crane Fly
[Tipula paludosa]

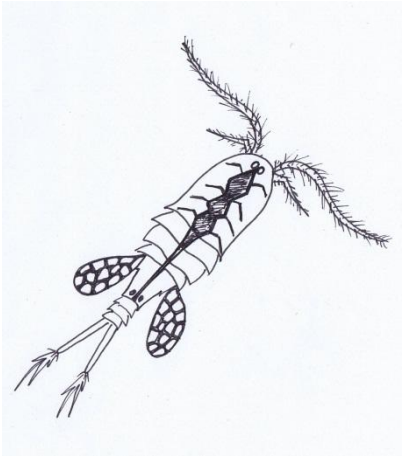


Drawing Hannah Stebbings

Commonly known as daddy longlegs, this insect is about 25mm long and is normally seen in the evening. Although it looks a little like a mosquito it is completely harmless.

The larvae are a brownish colour and might be found in the marsh area.

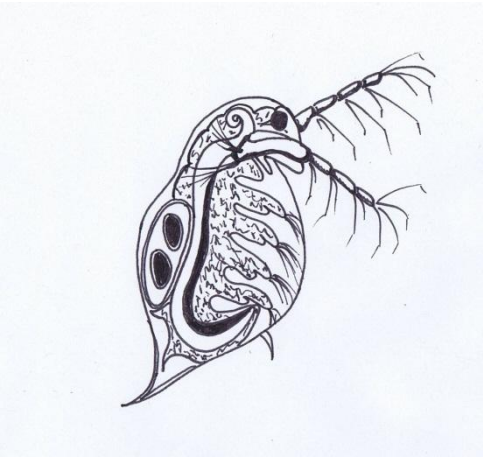
Cyclops
[several species]



Drawing Hannah Stebbings

These minute creatures about 1mm long belong to a group called Copepods. There are several different species, and they are almost always present when Daphnia are also present. The female Cyclops are most readily distinguished by the two egg-sacs at the rear.

Daphnia [aka Water Fleas]
[several species]



Drawing Hannah Stebbings

It is amazing how quickly Daphnia can colonise any small pond – seemingly from nowhere. This creature is usually about 1mm long and is called the Water Flea because of its jerky movement as it is propelled by its two feathery antennae.

Dragonfly Larvae

picture to follow

The larvae [or nymphs] vary according to species, but they are all voracious hunters of insects and even small fish. Most smaller dragonfly nymphs complete development in one year, but some of the larger ones can take two years.

Gnats

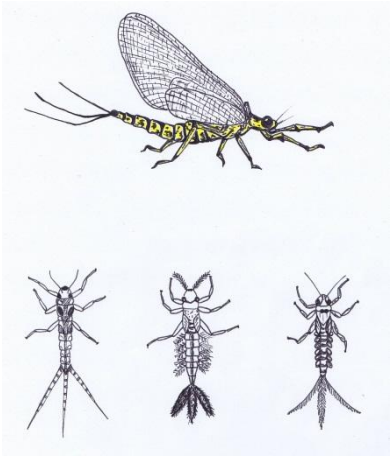
[Culex species]

Drawing Hannah Stebbings

Because of their enormous numbers, gnats form an important part of the food chain for many freshwater fishes and other aquatic animals. The larvae of the Common Gnat [Culex pipiens] can be found in even the smallest puddle. Gnats are completely harmless and do not give even mildly irritating bites.

Mayflies

[Ephemera species]

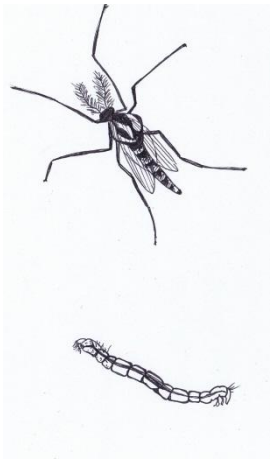


Drawing Hannah Stebbings

Mayfly nymphs can take various forms according to species, but they all have three long tail appendages in common. The nymphs, which can be between about 8 and 25 mm long, will hide under stones and are mainly active at night when they predate other insects.

Midges

[Chironomids]



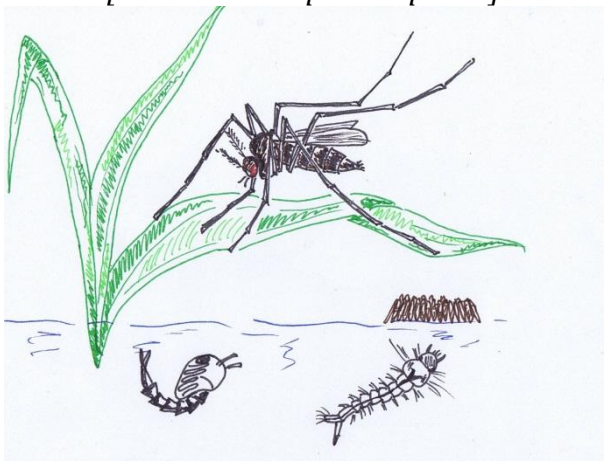
Drawing Hannah Stebbings

Midges are very common in even small volumes of fresh water and they occur in enormous numbers. The larvae are popularly known as Bloodworms because of their red colour but they are actually quite harmless. There are many different species but the larvae of the common ones, which do not give irritating bites to mammals, are between 3 and 10 mm long. They feed mainly on decaying organic matter.

Because of the enormous numbers, they are very important in the food chain for amphibians and other aquatic creatures.

Mosquito Larvae

[Culex and Anopheles species]

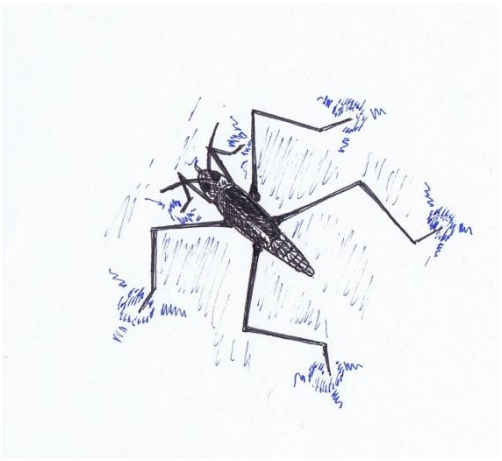


Drawing Hannah Stebbings

Mosquitoes will breed on any small area of water but the species found n the UK are harmless and should not cause any inconvenience.

Mosquitoes make rafts about 5mm long, consisting of up to about 300 eggs, cemented together. The larvae emerge on hatching has a characteristic 'wriggling' movement and need to break the surface to breathe. This life form mutates into a pupa about 4 days before emerging as an adult insect.

Pond Skaters [aka Water Striders]
[Gerris species]



Drawing Hannah Stebbings

These creatures, about 15mm long, frequently appear unbelievably soon after a pond is established. As the name implies, they stay above the surface of the water, supported by the surface tension. They are predatory bugs and will take any small live creature which falls on the surface of the pond.

There are about 10 different species of this veracious predator in the UK, and some will even take fish fry swimming near the surface.

Eggs are attached to plants just under the water surface with a jelly like substance. Sometimes the young are born without the ability to fly.

Rat-tailed maggots
[Larva of the Drone Fly Eristalis]

Drawing Hannah Stebbings

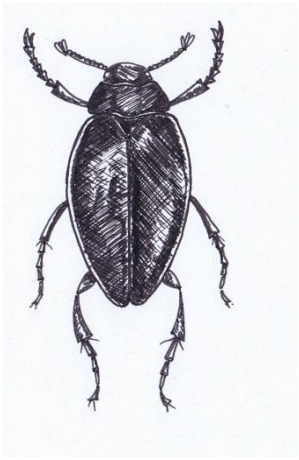
These are the larvae of some species of hoverfly such as Eristalis tenax. The mature maggot can be 20mm long and is characterised by a breathing tube which can be as long as 150mm when fully extended. This breathing mechanism allows the creature to survive in polluted as well as clean water.

Water Beetles

picture to follow

There are about 250 different species of water beetle in the UK. Most water beetles can fly for a considerable distance and your wildlife pond should quickly be colonised by more than one species.

Great Silver Beetle
[Hydrophilus piceus]



Drawing by Hannah Stebbings

Water Bugs

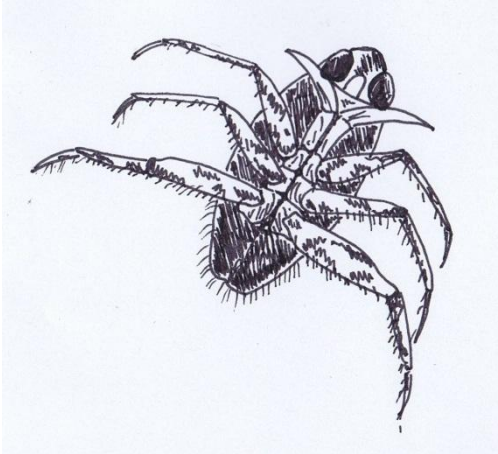
Water Scorpion
[Nepa cinerea]

Drawing Hannah Stebbings

This is a general term used to describe the species which live mainly in the bottom of the pond, or swim in mid-water. Most water bugs like a muddy pond base.

Typical is the water scorpion [Nepa rubra] which is found near the bottom of the pond, or on plants near the surface, which is pierced by its two breathing tubes.

Another common bug is the back-swimmer *[Notonecta species]* which feeds on both alive and dead aquatic life. They also occasionally surface to take in fresh air.



Common Back Swimmer
Drawing Hannah Stebbings

Take care in handling both the Water Scorpion and Back Swimmer since, despite their size the can give a nasty nip.

Nymph of the Water Scorpion
[Nepa cinerea]

Drawing by Hannah Stebbings

QUICK NAVIGATOR
Installation & maintenance ‖ Plants & planting
Creatures you may see ‖ Predators you may encounter ‖ The Lifepond Garden Guide Index

Section 4: Predators you may encounter

Cats

We are all familiar with the way in which cats catch birds. Also bats have a habit of swooping down for water at the same time each evening and cats are known to be there at the same time so as to catch a tasty meal. Cats are considered to be the main cause of bat deaths.

A deterrent such as a sonic device is probably the best way to minimise this risk.

Herons

You may have mixed feelings about herons. These beautiful birds will stand still for hours waiting for frogs or newts to move, then pounce. If heron are a problem, you may wish to place a meshcage 20 or 30 cm above the pond, otherwise various deterrents are available .

Seagulls and magpies

Seagulls can be a particular problem near the sea. They can be particularly persistent and some form of cage may be the only answer. There are other predatory birds but magpies stand out as being one of the most persistent menaces.

Bearing in mind that the pond is intended to reflect nature as far as possible, maybe it is necessary to accept that some predation will take place.

QUICK NAVIGATOR
Installation & maintenance ‖ Plants & planting
Creatures you may see ‖ Predators you may encounter ‖ The Lifepond Garden Guide Index

Section 5. Using an electronic microscope.

For less than £50 it is possible to buy an electronic microscope which connects to your computer and which is claimed to have a magnification of x400. If you could use all this power, then a creature only 10µ [10 microns = 1/100 of a millimetre] would appear as a 4mm. image!

Unfortunately it is difficult to use all the magnification claimed without considerable practice, but after only a little experimentation it should be possible to take pictures and even videos of even quite small creatures. The images can be magnified further using the picture edit feature on your computer.

See link 5.1. for more details on how to use your electronic microscope.

QUICK NAVIGATOR

Installation & maintenance ‖ Plants & planting
Creatures you may see ‖ Predators you may encounter ‖ index

Links to sections

Introduction
These links provide additional and detailed information related to the main sections. If you are viewing this document onscreen you will be able to navigate to the appropriate appendices via clearly marked links in the main text.

Link 1.2.1 Explanation of pH

Acidity and Peat – and what is pH?

pH is a measure of acidity and alkalinity on a scale of 1 to 14 and can be measured either electronically or using a liquid or strip indicator.

pH1>>>>>>>>>>pH7>>>>>>>pH8 >>>>>>>>>pH14

Very Acid Neutral Slightly alkaline Very alkaline.

Vinegar for example is very acid at pH 2.5 to 3.5. Tap water in most areas is either neutral or slightly alkaline; saturated limewater may have a pH of 12 to 13; caustic soda can be even higher.

For more details see for instance www.unitedutilities.com/Documents/phfactsheet.pdf and www.southernwater.co.uk/pdf/environment/drinkWaterQuality/YourDrinkingWater.pdf.

Because pH is on a logarithmic scale, pH 5 for instance is half as acid as pH4, and pH9 is twice as alkaline as pH 8. Therefore what may seem to be a slight numerical change, a shift from pH 8 to pH 9 can have a significant effect on most plants and animals.

Peat

Peat is formed over a long period from decaying vegetation, particularly sphagnum moss, in wet areas. The resultant product is harvested in various parts of the world and is widely used in garden composts. Peat is a component of the well-known John Innes range of composts. Because of the destruction to the environment, an increasing amount of garden compost is peat-free.

Peat has several interesting properties. One rather macabre property is the ability to preserve human remains – many bodies have been found in peat bogs.

Another interesting property of peat is the ion exchange capability. This means that peat is able to remove chemicals from the water and to replace them with other chemicals. For instance, peat can reduce calcium [hardness] in the water. See link 1.3.1

Of more immediate interest to gardeners is the use of peat as a major part of the growing medium for ericaceous plants due to its acid nature. Depending upon the source, the degree of acidity varies upwards from about pH4 but the pH of peat is seldom above pH 7 [neutral].

Bog plants generally prefer slightly alkaline medium [pH 7 to pH 8] and peat is an unsuitable medium for our purpose. Some peat-free compost may not have an acidic reaction and may therefore be suitable.

Link 1.3.1 Explanation of Hardness of Water

Copied from Maintaining a Healthy Aquarium by J N Carrington by permission of Interpet Publishing.

Water hardness
This is the most easily observed quality of water; hard water produces very little lather with soap, soft water seems to produce too much!

Two types of hardness are important to aquatic creatures, namely total or general hardness (sometimes designated as GH) and carbonate hardness (KH), which is also known as alkaline hardness or acid binding capacity (ABC) and, because it is easily removed by boiling, as temporary hardness.

Total hardness is a complex characteristic caused by the presence of various ions of calcium, magnesium, barium and strontium (in that order of importance) associated with sulphates, carbonates, bicarbonates, nitrates and chlorides.

When water is boiled, the bicarbonates of calcium and magnesium, which are quite soluble in water, are decomposed so that virtually all of the barely soluble carbonates are precipitated. This is the cause of the familiar white scale that forms in kettles and hot water cisterns. The presence of these bicarbonates acts as a reservoir for carbon dioxide in the aquarium and helps to stabilize pH [see link 1.2.1]

That fraction of the total hardness that cannot be removed by boiling is called permanent hardness, and is caused principally by calcium sulphate. Permanent hardness can therefore be determined by taking the figure for temporary hardness from the figure for total hardness.

Water hardness is expressed in a confusing range of units. One scaleis based on milligrams per litre of calcium carbonate (mg/I $CaCO_3$). This is equivalent to parts per million of calcium carbonate (ppm $CaCO_3$).
Some fishes, such as Carp, and most coldwater plants thrive in the hard water conditions found in their natural habitats. However, many organisms are sensitive to excessive hardness, particularly in their early life.

Testing for hardness
It is always a good idea to determine both total and temporary hardness. Various techniques are available for testing water hardness:
1. Using an electronic test meter.
This is an elegant, if relatively expensive, way of determining water hardness. The test meter measures the electrical conductivity of the water sample, which is generally in direct proportion to the hardness (i.e. the higher the conductivity the harder the water). This method is usually outside the realm of the amateur aquarist and the results are only relevant when considered with other information. Also, such a simple measurement does not separate total and temporary hardness.

2. Precise tests using indicator solutions, normally carried out in a laboratory. One particular test consists of first adding an indicator to a sample of water; hardness in the water turns the indicator green. The degree of hardness present is interpreted in terms of the volume of another reagent — the so-called titrant - needed to turn the sample to red.
3. Home test kits. These are less precise versions of the laboratory method described above, but sufficiently accurate for most fishkeeping purposes. Kits are available that measure permanent and temporary hardness separately.

Publis

Link 1.4.1 Blanket Weed and Green Water

The higher temperatures and increasing light in late spring contribute to increased activity in your pond. The plants will have entered a period of rapid growth. This applies not only to the higher plants but also to single celled plants such as the green algae which manifests itself as green water and as blanket weed, otherwise known as thread algae. This rapid plant growth particularly of algae can cause extremely unfavourable water conditions which can be lethal to aquatic life and can certainly cause stress as described below.

The **green water** which can often be seen in your pond is normally caused by single celled green algae such as Chlamydomonas. These minute organisms are around one-200th of a millimetre in size, and have hairs with which they propel themselves. Later in the season the green may be due to colonies of different algae such as Borticella.

These fascinating organisms and a myriad of others can be studied using an electonic microscope – costing less than £50 - connected to your computer. See section 5.

Just like any other plants the action of sunlight on the green chlorophyll in the cells causes photosynthesis to take place. This is a process whereby the plant takes carbon dioxide out of the water and produces oxygen which is released into the water as well as carbon-containing material such as cellulose which is retained.

Green water has the beneficial effect, firstly of producing oxygen and secondly of providing food for newly hatched fish and for other small organisms in the pond. Unfortunately it also has one very damaging effect. Because of the vast amount of photosynthetic action which can take place due to the very large number of green cells suspended in the water the pH balance of the water [see link 1.2.1] can be upset by taking out too much carbon dioxide so that the water becomes highly alkaline.

This can be illustrated by the chemical equation as follows:

$Ca(HCO3)_2$ -> $Ca(OH)_2$ + $2CO_2$

Calcium bicarbonate Calcium hydroxide Carbon dioxide

Most pond water contains hardness in the form of calcium bicarbonate and the equation shows that the removal of carbon dioxide produces lime water which can be very alkaline and this alkalinity is what can cause the stress on the fishes.

Acidity and alkalinity of water is measured on the pH scale. pH 7 is neutral. Please see link 1.2.1

Numbers lower than this are acid and numbers higher are alkaline_ The scale runs from 0 to 14. The scale is logarithmic so that pH 8 for instance, is ten times as alkaline as pH 7 and pH 9 is 100 times as alkaline. The acceptable pH level for most aquatic life is between about pH 6.5 and

pH 8.5, that is very slightly acid to moderately alkaline. The photosynthetic action of the green water cells can force the pH to above pH 10 which is 1000 times as alkaline as neutral rather like strong oven cleaner! These highly alkaline conditions are the major cause of stress and of fish deaths in the Spring.

Blanketweed otherwise known as **Hair Algae** is a very common problem which not only can cause the water to come out of balance in the same way as described above for green water but it can also choke the plants and even aquatic creatures in extreme cases. Blanketweed consists of strings of single celled algae which are joined together into threads. As with green water algae there are several different species and some blanketweeds have rather a coarse texture whilst others are very slimy in nature.

Fortunately both green water and blanketweed can be controlled although the methods of control for each product are very different.

A very effective short-term solution to the green water problem is to add a coagulating agent to the pond which causes the free-swimming cells to clog together and sink to the bottom of the pond or enables the sludge to be filtered out. If the dead cells are left in the pond then they will gradually rot due to bacterial action and consequently use up some of the oxygen in the water. If the pond is not overcrowded and if the water is not too warm then this is not too much of a problem but in adverse conditions where the pond is fully stocked with fish and then there is a heatwave, then the fish may be starved of oxygen. The best solution is to siphon out or otherwise remove the precipitated algae but the situation can be very much alleviated by aerating the pond using an airpump and air release in the pond in addition to any fountain or other water movement which is present. At all events, in a fish pond I always advocate using a pond aerator to maintain a high oxygen level and to help to avoid any stagnant areas in the pond.

There are environmentally safe products on the market which are excellent for removing green water.

A more permanent method of avoiding green water is by the use of an ultraviolet treatment unit. This works by contacting the water with a strong ultraviolet light in a dosed container so destroying the green cells. This system also reduces the overall level of small organisms in the pond, so helps to make the water very much clearer. However, it will also reduce the number of organisms available for feeding pond creatures. Ultraviolet is suited to larger ponds and would be quite expensive to apply to your Lifepond.

A third and much cheaper method is to find someone with a pond which does not suffer from green water and to take a bucket of water from this pond and add to yours. Hopefully the other pond will contain other organisms which will ingest the green water cells and so achieve a very satisfactory biological balance.

There are also three methods commonly used for removing blanketweed and these are all very different to those for treating green water.

A time honoured method is to remove blanketweed mechanically using a stick. Special sticks are available which will help you to collect the blanketweed more quickly but a simple bamboo cane, for instance, is reasonably effective. This method can remove vast quantities of blanketweed but it is fairly tedious and can disturb the higher plants in the pond just when they are really beginning to take proper hold. It can also disturb the inhabitants of the pond.

The second method which has become very popular in the last few years is a modern discovery of a harmless chemical treatment which changes the balance of the pond water in such a way that it is unfavourable to the blanketweed which then disintegrates. This product appears to work by causing the links between the algae cells to break. This system has the advantage in ponds where it is acceptable that a layer of stubble is left on the side of the pond on which the creatures can browse, so finding valuable food. A third method which has achieved some popularity is the use of barley straw. This can be used either by dumping a quantity of straw into the pond preferably contained in some kind of netting, or a bag of powdered barley straw is available. The mechanism by which this works is uncertain but once the straw starts to rot it appears to release some chemicals which are effective against the blanketweed but harmless to other life in the pond.

Both chemical methods have the disadvantage that the rotting blanketweed can take oxygen out of the pond in the same way as described above for green water.

Presumably the problem of increased oxygen demand is accentuated with barley straw because of the additional oxygen required during the rotting process for the straw. However, since all these methods are available to counter two of the major problems you are likely to find in your pond there is now no need for either green water or blanketweed to detract from your enjoyment of your pond or from the health of the inhabitants.

Because of the importance of pH on the health of your fish, it is wise to check this regularly throughout the season. Kits are available with full instructions which will enable you to carry out this and other water checks.

Modified from a previous article by J N Carrington © 2011

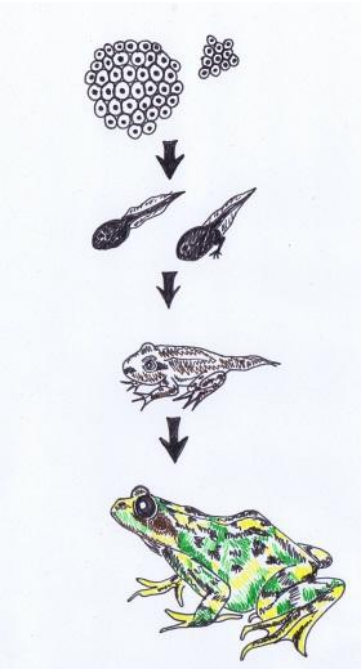
Link 3.6.1. Lifecycle of frogs

Adult frogs come out of their hibernation period as soon as there is any sign of spring. Depending upon the weather, frogs in southern counties will lay the familiar frog spawn in late February or March.

At breeding time, frogs do prefer to return to their place of birth, but they can spawn in even quite a small new body of water such as a Lifepond. Frogs lay very large numbers of eggs since the survival rate is very low. Whilst laying their eggs, the male frog will grip the female firmly in what is called the *Amplexus* and this position may last for a few days. Toads adopt a similar position, sometimes on land as well as in the water.

Male on Female in Amplexus position

Picture M.Deane



The jelly-like mass containing the eggs may take 2 to 4 weeks to hatch depending upon temperature. Frost is the first hazard to the tadpoles. If the top layers of eggs become frozen, then those eggs will die. You can help to increase the frog population by covering the mass with a protective layer such as bubble pack if a frost is expected.

The baby tadpoles may be eaten by all sorts of aquatic and other predators but you can help by providing an environment with some protection. The green algae and small organisms provide the first food for the babies, but after a few days they can browse on chopped up boiled lettuce. Eventually, about May or June, the tadpoles develop legs and very quickly turn into fully formed froglets. The next hazard comes when birds and other creatures come to pick off the small tasty snacks! It is essential to provide as much shelter as possible at this stage.

The second year enables the frogs to reach maturity ready for breeding .

Drawing by Hannah Stebbings

When winter comes, frogs can generally find suitable undergrowth where they can hibernate in the winter, although many males particularly prefer to settle at the bottom of a pond. Frogs have the amazing ability to breathe through their skin so that they can stay under water for months at a time provided the water is clean and well oxygenated. They cannot survive when covered in mud.

Picture:- Tadpoles in Lifepond April 1st 2011

Picture D. Carrington

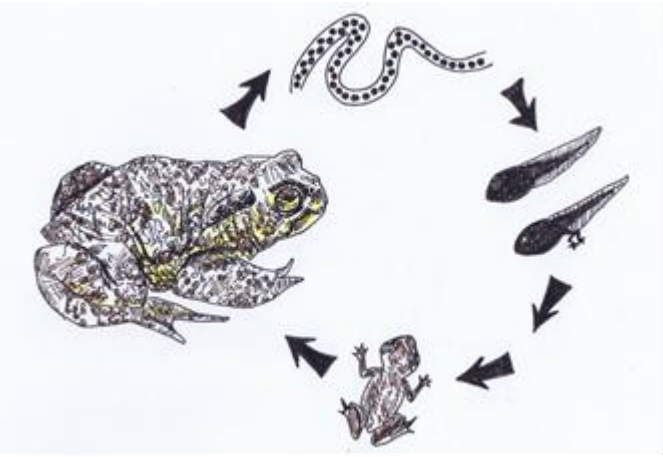
The mild weather we have experienced this year is not beneficial to most hibernating species including reptiles since they have they have not 'shut right down'. Consequently less energy will be available for breeding and the number of eggs produced is likely to be less.

Picture: - adult frog in Lifepond – and pond skater

Link 3.6.2 Lifecycle of toads

Toads are in many ways very similar to frogs, and sometimes it can be difficult to tell them apart . Particularly as adults, toads look less 'streamlined'; they are not so good at jumping and have a skin which seems to be covered in warts. Nevertheless they are quite endearing creatures.

During the daytime, toads will seek any dark corner and will often make home in a suitable gardening boot for instance! The refuge under Lifepond is ideal for them



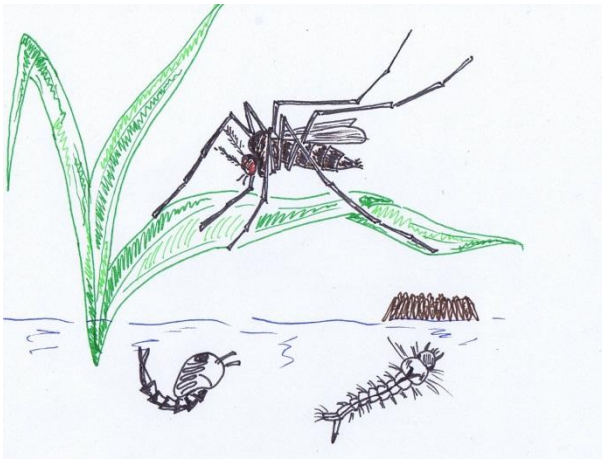
Drawing by Hannah Stebbings

Toads do not hibernate under water but they look for suitable holes or thick undergrowth. They tend to emerge later in the spring than do frogs. During the summer months, you can often find toads hunting in the dark for worms and insects. Frogs do the same but tend to stay in more moist places and frogs have the well-known habit of shooting out their tongue to catch flies.

Toads adopt the same amplexus breeding posture as do frogs, but this tends to be more land based.

The eggs are laid in water in strings and not in a jelly-like mass as is frog spawn

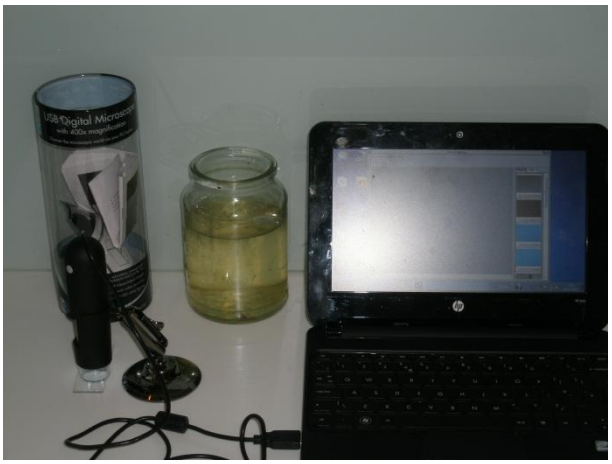
Link 3.7.1 Mosquito Life Cycle



Drawing by Hannah Stebbings

Link 5.1.1 How to use an electronic microscope.

Electronic microscopes are readily available from Amazon and electronic stores such as Maplins.



The comments below apply particularly to the Veho model which appears to be the most popular.

Most reviews are very favourable. I have found that quite a lot of patience is needed to achieve results in the beginning but the rewards are considerable.

I had no problem in downloading the software from the mini CD and it is easy to take both photos and videos of both land based and water based creatures.

The microscope can be turned sideways to take examine creatures such as Cyclops in water but the magnification which can be used whilst keeping the creature in focus is limited.

The Lifepond Garden Guide Index

Click on section to link. You may need to 'Ctrl' and click if link doesn't activate.