Barnett's Wood Pond Education Pack

July 2008

Contents

Introduction 3
Information about Barnett's Wood 4
Health and Safety 5
Risk Assessments 5
Site Briefing 5
Activities 6
The Art of Pond Dipping 6
Method 6
Activity 1 - Identification 7
Activity 2 – My favourite bug 7
Activity 3 – Making Shapes 8
Activity 4 – Natural Sculptures 9
Activity 5 - Reflections 9
Activity 6 – How clean is my pond? 10

Appendix 11

Risk assessment 12
Tetanus and Leptospirosis Notes 15
Freshwater Invertebrate Field Guide 17
Freshwater Data Recording Sheet 22
Pond Diet Sheet 25
My Favourite Bug 27
Equipment List 28

Introduction

This pond dipping education pack is intended for use by teachers of children at key stages 1 and 2: Life processes and living things.

The pond is a hidden world and an environment we are not familiar with. There is a large and varied array of species which use ponds in their life cycles and where many of these species undertake a metamorphosis such as the frog, mayfly, dragonfly – leaving the water as adults to feed and reproduce. Pond dipping enables children to see this process at various stages within their catch.

Following a teacher-training day hosted by the Kent High Weald Project, the pack contains all the information required to carry out an educational pond dipping activity for up to 30 children at Barnett's Wood local nature reserve, High Brooms, Tunbridge Wells.

The content is designed to cover a range of activities, from just identifying and recording species through to interactive role-playing.

Information about Barnett's Wood

Barnett's Wood is a 10-hectare site, owned by Tunbridge Wells Borough Council and managed by the Kent High Weald Project and Friends of Barnett's Wood for the enjoyment of the local community and conservation of wildlife.

The site was designated as a Local Nature Reserve in 1998, and has open access at all times. The Reserve contains a variety of habitats such as ancient semi-natural woodland, wet woodland, meadows and ponds.

Ancient woodlands date back to at least since the 1600's when Charles I was on the throne. At this time first maps were being produced and recording areas of woodland, which are still in existence today.
The ancient woodland in the High Weald Area of Outstanding Natural Beauty (AONB), which includes Barnett's Wood, covers 16% of the AONB designated area, making it the greatest proportion of ancient woodland in the country.

Ancient Meadows (both marshy and neutral grassland) are other important habitats found at Barnett's Wood. These are becoming increasingly rare as less than 3% of grasslands in the UK have had no fertiliser or other inputs added to them. In spring and summer there are carpets of wildflowers, which are rarely found in improved (cultivated and fertilised) meadows.

Although the pond used for dipping in Barnett's Wood was created in 2005, generally ponds in the High Weald are a feature of its industrial and agricultural past. Many were created for the iron industry with the water from the ponds powering the bellows and hammers. Some were dug for mining and marling (soil structure improvement) whilst others were created for use as drinking ponds for farm animals, which may well have been the use of the nearby Dunners Pond.

Health and Safety

Risk Assessments

A risk assessment is an important tool as it helps to focus on those risks that have the potential to cause harm at any event or activity.

The purpose of the risk assessment is to take the organiser through a process of considering potential hazards, what effect they may have on participants in an activity (the risk), the likelihood or severity of them occurring and any steps that can be taken to minimise them.

A risk assessment for pond dipping at Barnett's Wood local nature reserve has been included in this pack. It includes general risks for pond dipping at this site and it is important to remember a site visit should be carried out shortly before the day of the event to take into account any risks not previously considered and to update the risk assessment accordingly.

This will reduce the number of 'surprises' that may be encountered on the day of the event, although there is a need to remain vigilant throughout the activity.

In addition to the risk assessment, reference sheets for diseases carried by animals and details on Tetanus and Leptospirosis have been included in the appendix.

Site Briefing

Before the activity starts, the teacher should emphasise the relevant risks as set out in the prepared risk assessment and advise the children against:

- Wandering off away from the main group on their own
- Walking off with strangers
- Eating berries, mushrooms, nuts etc which they may find in the vicinity
- Eating snacks and lunch without first washing hands
- Entering the water
- Standing unsupervised next to the pond edge
- Dropping litter

N.B. washing hands and covering open wounds is very important because of the possibility of infection from water borne diseases.

Activities

The Art of Pond Dipping

Split the class of 30 into 6 groups of 5 children

Give each group:

- 1 net
- 2 white trays
- 2 sampling pots and some spoons.

Method

1. Fill the white tray with water from near the surface so it is fairly clean and weed free. Be careful not to over-reach, as the tray can be heavy to lift up.

2. Sweep the net through the pond back and forth three times to obtain one sample. You can collect samples from three different areas of the pond, for example, surface, middle and bottom as some pond creatures like to live at certain depths. Also, try dipping your net around the vegetation as many invertebrates like to shelter in and around it.

3. Only one person per group to dip at a time and try to let everyone have a go.

4. Turn the net inside out under the water in the tray (or as close to the surface as possible) and gently shake until everything is out of the net.

5. Using spoons gently look through the weeds and water. If you want to look at the creatures in more detail, carefully put them into the magnifying sampling pots filled with water. Some of the creatures in the tray will be very small and may be missed at first, and so the more you look the more you see.

6. If you find any adult or immature newts, please DO NOT TOUCH them as they are very easily stressed. Just record them.

7. When finished, please return animals carefully to the pond. You can do this by putting the tray under the water or pour slowly close to the surface.

Activity 1 – Identification

What you need per group:

1x Freshwater Invertebrate Field Guide (printed from this pack)
1x FSC Freshwater name trail leaflet
1x Freshwater data recording sheet (printed from this pack)
1x clipboard and pens/pencils

The creatures you are most likely to see are illustrated in the freshwater invertebrate field guide, the commonest being damselfly, mayfly and dragonfly nymphs, water boatmen and freshwater shrimps. Some of the dragonfly larvae in the pond are large compared to the other pond creatures – possibly over 5cm long!

Before carrying out this activity it may be useful for pupils to know about insect life cycles, as many of the creatures caught will be insect larvae or nymphs.

Hand out the freshwater invertebrate data recording sheets, one set per group. Each group can identify the animals caught in each sample dip from the pond by using the identification sheets and record their catch on the data recording sheets.

Through identification, pupils will gain an appreciation of:

- The variety of wildlife in the pond environment.
- The different stages in life cycles of pond creatures.
- How some creatures prefer to inhabit different depths or zones within the pond.
- The abundance of some creatures and relative scarcity of others.
- Adaption of minibeasts to their environment.
- The art of camouflage in the pond.

Activity 2 – My favourite bug

What you need per group:

1x Freshwater Invertebrate Field Guide (printed from this pack)
1x FSC Freshwater name trail leaflet
1x Freshwater data recording sheet (printed from this pack)
1x Clipboard per child and pens/pencils and crayons
1x My favourite bug sheet per child (printed from this pack)
1x Pond diet sheet (printed from this pack)
string and scissors

This encourages closer examination of the creatures found and finding out about how each is adapted to life in the pond.

Distribute the ‘my favourite bug’ sheets (from the appendix), one per child and have a set of crayons, pencils or pens accessible.

Each child within a group can select and draw a different creature from the pond dipping samples in the tray. It may help if the creatures are put in the sampling pots for closer inspection.

Use the drawing sheets provided and answer the questions for each animal drawn.

How do I move?
What do I eat?
Where do I live in the pond?
What will I turn into as an adult?

When everyone in the group is finished, create a food web with the pictures of the creatures drawn by the children, with help from the pond diet sheet at the back of the pack. The pictures can be connected together with string to illustrate the connections between predator and prey, producer and consumer.

Discuss the differences between the creatures and how they are adapted to live in the pond and their position in the food web

Activity 3 – Making Shapes

What you need:

1x Clipboard and paper
1x “Hat”

This is a good way to review the session and talk about what has been found.

1. Stand in a circle

2. Encourage the children to describe what creatures they found in or around the pond – for example, shapes of plants or animals, the number of legs, how it moved and anything else they found out about it.

3. Choose 6 of these and write each onto a separate piece of paper – screw them up and put them in to a hat.

4. Then spilt the class of 30 into 6 groups of 5 children

5. Tell the group that a member from each group needs to come and collect a paper from the hat.

6. Then when each group has a paper tell them they need to act out the creature named on the paper and they have 5 minutes to think of ways of doing it. The group will have to work out the features that can be identified by others.

7. After 5 minutes come back to circle (theatre) and ask each group to perform in front of the quiet audience.

8. Can the audience guess what the group is?

Activity 4 – Natural Sculptures

The children use their imagination by creating a creature they have found in the pond dipping from nearby natural items

1. Split the class of 30 into 6 groups of 5 children.

2. Ask them to think of a creature they found in their pond-dipping sample and agree which one they would like to create a picture of.

3. Give them 10 minutes to find some nearby natural materials such as sticks, stones, leaves etc but nothing that is still living, ie plants.

4. Give them 5-10 minutes to create a picture from the collected material and then ask the other teams in turn to identify the creature.

Activity 5 - Reflections

At the end of the activities and before leaving the site, ask the children to sit quietly for 5 minutes and think about their visit to the pond.

What sounds can they hear?

What colours can they see?

How do they feel?

What was their favourite creature?

What shapes can they see?

Activity 6 – How clean is my pond?

What you need per group:

1x Freshwater Invertebrate Field Guide (printed from this pack)
1x FSC Freshwater name trail leaflet
1x Freshwater data recording sheet (printed from this pack)
1x clipboard and pens/pencils

Ponds contain a delicate balance of plants and animals that survive together in an ecosystem that can be altered by external factors such as pollution. Chemical or organic pollution to a pond will alter the communities that survive within it and so it is possible to assess the purity of a pond by examining the invertebrates that live in it.

Pollution can be caused by foreign agents such as fertilisers or chemicals entering the pond or by organic pollutants such as sewage or farm waste. Organic pollutants are a problem because they encourage the growth of bacteria and algae which thrive in enriched conditions. As they break down the pollutants they use up oxygen from the water and release carbon dioxide (CO_2) into it, thus making it more difficult for invertebrates to survive.

To assess the cleanliness of the pond, a score can be derived from some the creatures caught in the pond dipping samples. A number of the invertebrates have been given a ***Biotic Index*** score on the data recording sheets: Invertebrates sensitive to pollution have a high score and those tolerant to pollution a low score, the maximum being 10.

An overall score for the pond can be obtained by adding all the scores for each species in a sample and dividing by the number of different species identified. Each species is counted only once in the calculations

For example: Pond dipping sample 1

Damselfly nymph = 8
Freshwater shrimp = 6
Alderfly larva = 4
Stonefly nymph = 10

Total = 28

Biotic Index of the pond sample 1 = 28/4 = **7**

The higher the score (between 1 and 10) the less polluted the water is.

Score 10-8 = Excellent
6-8 = Good
4-6 = Fair
1-4 = Poor

Appendix

Risk assessment ……12

Tetanus and Leptospirosis Notes……..15

Freshwater Invertebrate Field Guide……17

Freshwater Data Recording Sheet……22

Pond Diet Sheet……25

My Favourite Bug……27

Equipment List……28

Primary School Pond Dipping Risk Assessment

Name of Assessor: Location: Barnett's Wood Local Nature Reserve, Powder Mill Lane, High Brooms, Tunbridge Wells, Kent	Date of activity: Date of R.A./Site visit:	Emergency information: Grid ref of site: TQ591421 Nearest A&E: Kent and Sussex Hospital Tunbridge Wells **01892 526 111**

Hazard	**Risk**	**Who might be harmed**	**Likelihood of risk taking into account the proposed actions**	**Proposed action**
Uneven ground, tree stumps and slippery paths in the event of rain	Slips trips or falls	Children and supervising adults	Low	Be aware of uneven and slippery ground. Advise participants to wear suitable footwear. Avoid the pond banks
Weather	Heat stroke, hypothermia	Children and supervising adults	Low	Monitor weather conditions and ensure participants are dressed appropriately. Apply sun-cream if required.
Moving vehicles on road	Being hit by vehicle	Children and supervising adults	Low	Ensure children and adults walk in an orderly way along pavements and footpaths
Deep water in pond	Drowning	Children and supervising adults	Low	Warn participants of danger, throw rope must be available and participants advised on how to use it.

Animal borne diseases e.g Leptospirosis	Illness	Children and supervising adults	Low	Advise on hand washing before eating – Use alcohol had gel if eating on site. All cuts on hands covered with micro pore tape. Latex gloves as necessary. Anyone with a serious cut on the hands is not allowed to pond dip.
Cows Grazing in fields	Injury from or to cows from being chased	Children and supervising adults	Low	Participants warned of the risk and advised not to approach the cows.
Equipment misuse	Injury from equipment	Children and supervising adults	Low	Brief all on proper use of equipment and make participants aware of proximity of others when handling nets.
Getting lost or deliberately separated from the group	Panic, risk of injury to self	Children	Low	Warn participants to stay within a close proximity of the main area of activity and not to wander off. In the event of an incident at least one supervisor should remain with the group in one place whilst others go to find individual(s). If they have not been located within 30 minutes back up must be called.

Method Statement

Risk assessments and site visit complete.
A health and safety talk will be given covering the essential components of the risk assessments.
A local review will also be carried out on the day, before the activity commences which will take into account the current conditions.
First aid kits and trained first aiders present.
Throw rope available and all participants trained to use it.
Hand washing facilities – alcohol hand gel is useful.
Drinking water.
Mobile phone for emergency use.

Tetanus and Leptospirosis

Tetanus ("Lockjaw")

Tetanus is caused by the anaerobic bacterium, *Clostridium tetani*, which is present in the bowels of many vertebrates, including humans. Spores of the bacterium are present in dung or in soil contaminated by droppings. Infection can be through the minute cuts that routinely result from gardening or fieldwork.

All cuts should be cleaned and protected during fieldwork, and particular care is necessary when dealing with manured soils. Disposable gloves must be used when handling dung samples. Anyone involved in fieldwork must have been inoculated against tetanus and should have received a booster injection within the last 10 years.

Leptospirosis (Weil's disease)

Weil's disease is a rare but serious bacterial disease spread in water contaminated by rats' or voles' urine. It is one of the many types of leptospirosis, which also occurs in dogs, cattle and numerous other mammals. The causative organism of Weil's disease is *Leptospira icterohaemorrhagiae*, which many researchers consider to be a serovar (one of more than 200) within a more broadly defined pathogenic species, *L. interrogans*. Weil's disease is the most serious of these infections in humans, causing liver and kidney damage and, in 5-10% of cases, it is fatal. (Fatality rates in Britain a little lower than this.)

Humans become infected when their cuts or mucous membranes are exposed to contaminated water. Most cases seem to be associated with sewage workers, or with people who have fallen into urban water bodies and swallowed appreciable amounts. However, anyone working in such sites, or with water samples or water-weed material, must be aware of the risk. Project supervisors are *required* to draw this to the attention of project students carrying out such work. The disease is associated mainly with urban waterbodies and slow-moving lowland rivers. Higher levels of risk apply after heavy rain, when drains and other areas occupied by rats have been flushed out. The bacteria can survive in water or in wet areas for up to 45 days after leaving their host rat or vole.

The following precautions are required:

- Cover all cuts and abrasions with waterproof plaster.
- Wear waterproof footwear.
- Prevent water coming into contact with mucous membranes (eyes, mouth, nose, etc.).
- Wash hands before eating or handling food.
- Wash all body areas that come into contact with the water or samples.
- Wear disposable gloves when handling samples from high risk sites such as urban canals.
- Work upstream of any obvious sites of rat or vole activity.
- Be extra vigilant to avoid capsizing if boating on urban waterbodies.
- Do not encourage rats by leaving waste food at fieldwork sites.

Symptoms of Leptospirosis

If you suffer from any/all of the following symptoms after possible exposure, see your doctor immediately.

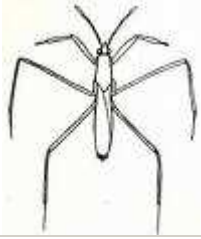
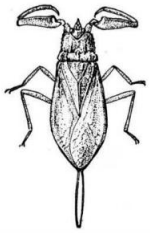
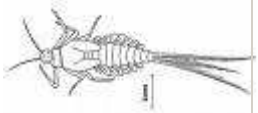
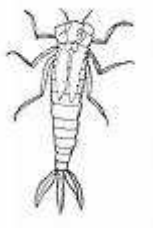
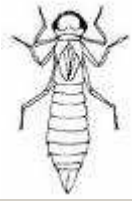
- Raised temperature and/or chill feeling.
- Pains in joints and muscles, often more pronounced in the calf muscles.
- General feeling of an influenza-like illness.

Tell your doctor that you have been in contact with possibly contaminated water and specifically mention Weil's disease. The disease is readily confirmed by an ELISA blood test and is easily treatable with antibiotics in its early stages.

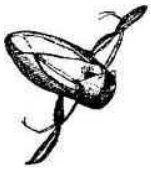
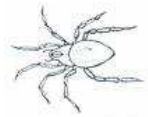
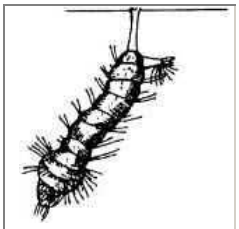
If an ELISA blood test is unavailable locally, samples can be sent to the Leptospirosis Reference Unit, Public Health Laboratory, County Hospital, Hereford, HR1 2ER.

A general web site on Leptospirosis, with useful further links and references, can be accessed at: http://www.sunbeach.net/comp/lepto/pnllepto.htm

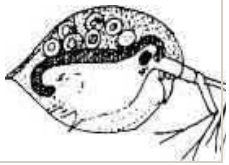
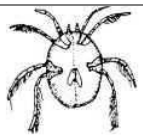
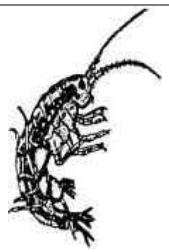
Freshwater Invertebrate Field Guide

Name	Illustration	Where found In pond	Key Features
Alderfly nymph		Bottom	One tail, long filaments along the abdomen
Pond Skater		Pond Surface	Long legs which support this water bug on the pond surface
Caddisfly larva		Bottom	Most species build a cylindrical case for protection, each species makes a distinct case from different material
Water Scorpion		Amongst submerged vegetation	Front legs adapted to catch prey. Long breathing tube extends from the abdomen.
Stonefly nymph		Bottom and amongst submerged vegetation	Two jointed tails
Mayfly nymph		Bottom and amongst submerged vegetation	Three jointed tails, leaf-like 'gills' on its sides
Damselfly nymph		Bottom and amongst submerged vegetation	Three leaf-like tail appendages (gills), extendable jaws
Dragonfly nymph		Bottom and amongst submerged vegetation	Robust, no tail appendages, extendable jaws. Shape varies with species. Hawker dragonfly larvae are large and long bodied, darter dragonfly larvae have more rounded bodies

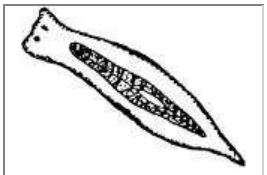
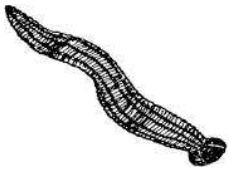
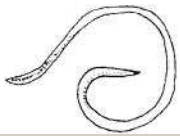
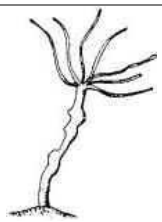
Freshwater Invertebrate Field Guide

Name	Illustration	Where found In pond	Key Features
Water bug nymph/adult		Usually seen near the Surface.	No jaws, like all water bugs they possess a tube-like beak, the nymphs don't have wings. Some common forms: Backswimmer and water boatman.
Water-beetle larva		Bottom and amongst submerged vegetation	Strong jaws, long segmented body, short legs
Water beetle adult		Swimming throughout the pond	Strong jaws, tough shield, many water beetles are fierce predators
Water Spider		Amongst submerged vegetation	Two parts of the body, 8 legs. Construct a web under water which trap air.
Springtail		Pond surface	The grey spring-tail (the most primitive insect group) Podura aquatica lives on the surface of the water, often in large numbers, 0.5-2.5mm.
Mosquito larva		Pond surface	Long slender body, often moves in S-shaped curves,
Dronefly larva		Bottom	This so called rat-tailed maggot has a long tubed tail for breathing

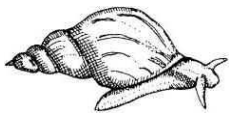
Freshwater Invertebrate Field Guide

Name	Illustration	Where found In pond	Key Features
Cyclops (Crustacea - Copepods group)		Swimming throughout the pond	Long antennae, tiny eyespot: 0.5 - 3 mm
Water fleas 'Cladocera' (Crustacea)		Swimming throughout the pond	Antennae, large compound eye 0.3 - several mm
Water mites		Swimming throughout the pond	8 legs, round body 0.5 - 5 mm
Water Louse or Hoglouse		Bottom	Water louse (isopod) 10 mm. Fairy shrimp 10 mm and tadpole shrimp (branchiopods) 10 mm
Freshwater shrimps (not true shrimps but amphipods)		Swimming throughout the pond	Curved, compressed body. 25 mm

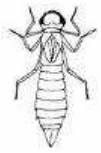
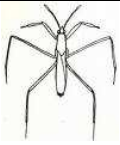
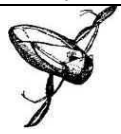
Freshwater Invertebrate Field Guide

Name	Illustration	Where found In pond	Key Features
Flatworms (Platyhel-minthes)		Usually attached to stones at the pond bottom	Flattened, 2 or more eye spots, move in gliding fashion 1 - 15+ mm
Segmented worms (Annelids)		Free swimming or attached to vegetation or other pond creatures	Leeches: characteristic 'leech-like' motion, suckers each end >1 cm
Roundworms (Nematodes)		Bottom	Move very frantically, often in 'S' curves, 0.2 - 10 mm
NOT to be mistaken for worms:		Attached to submerged vegetation or rocks	Hydra, has tentacles extended: 2 cm
		Swimming throughout the pond	Larger ciliated protozoa like Spirostomum (has very fast contraction)
		Pond surface or swimming throughout the pond	Insect stages like mosquito larva, these have a more distinct head than the worms above, also antennae/legs

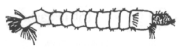
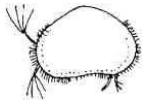
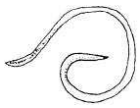
Freshwater Invertebrate Field Guide

Name	Illustration	Where found In pond	Key Features
Molluscs		Attached to stones or submerged vegetation	Great pond snail - Lymnaea stagnalis Large conical shell up to 45mm long
Molluscs		Attached to stones or submerged vegetation	Ram's horn Snail. Simple flat shell up to 25mm.
Molluscs		Bottom	Pea mussel Sphaerium corneum 6mm A tiny, fingernail-sized bivalve mollusc
Amphibians		Swimming throughout the pond	Tadpole. Larval stage of frogs and newts, gradually growing limbs and lungs.

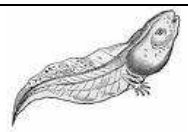
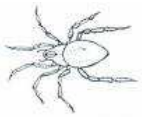
Freshwater data recording sheet

Pond Animal	Biotic Score	Features	Number in sample	Where found in pond
Alderfly nymph 	4			
Caddisfly larva 	7			
Damselfly nymph 	8			
Dragonfly nymph 				
Mayfly nymph 	4			
Pond Skater 				
Stonefly nymph 	10			
Water Scorpion 				
Water bug adult 	5			
Water-beetle larva 	5			
Water beetle adult 	5			

Freshwater data recording sheet

Pond Animal	Biotic Score	Features	Number in sample	Where found in pond
Cyclops 				
Dronefly larva 	1			
Flatworms 	5			
Freshwater shrimp 	6			
Great pond snail 	3			
Leeches 	3			
Mosquito larva 				
Ostracods 				
Pea mussel 	6			
Ram’s horn snail 	3			
Roundworms 	1			
Springtail 				

Freshwater data recording sheet

Pond Animal	Biotic Score	Features	Number in sample	Where found in pond
Tadpole 				
Water fleas 				
Water louse 	3			
Water mites 				
Water Spiders 				
Other				
Other				
Biotic index score for sample				

Pond Diet Sheet

This list provides information on how some of the common pond residents get their energy. All types of animals get their energy from the food they eat and plants get their energy from sunlight.

SPECIES	ENERGY SOURCE
Adult Damselfly	Other adult insects
Adult Dragonfly	Other adult insects
Adult Frog	Insects, water worms, snails, slugs, worms
Adult Mayfly	Does not eat since it only lives for a day or two, it uses the energy gained when it was a nymph
Adult Newt	Water fleas, water worms, caddisfly & mayfly nymphs, freshwater shrimp, midge larvae, pond snails
Caddislfy Larva	Microscopic plants, algae, microscopic fungi, small particles of dead plants
Cyclops	Microscopic animals and microscopic plants
Damselfly Nymph	Tadpoles, young fish, cyclops, waterfleas, freshwater shrimps, water lice and beetles
Dragonfly Nymph	Tadpoles, young fish, cyclops, waterfleas, freshwater shrimps, water lice and beetles
Flatworm	Water lice, waterfleas, cyclops, water mite, microscopic animals, tadpoles and caddisfly larva
Freshwater Shrimp	Microscopic fungus, small particles of dead plants
Frog Tadpole	Microscopic plants, algae, water worms, midge larvae, cyclops
Great Diving Beetle	Cyclops, Water fleas, midge larvae, pond snails, nymphs, tadpoles, flat worms, leeches, water boatmen
Leech	Insect nymphs, tadpoles, flat worms, water lice, pond snails, midge larvae
Mayfly Nymph	Microscopic fungi, microscopic animals and plants, small particles of dead plants

SPECIES	ENERGY SOURCE
Microscopic Animals	Microscopic plants, small particles of dead plants
Midge Larva	Microscopic plants, small particles of dead plants
Newt Tadpole	Microscopic plants, algae, midge larvae, cyclops, fresh water shrimps, water worms
Pond Skater	Remains of dead plants and dead animals
Pond Snail	Large water plants and algae
Sticklebacks	Tadpoles, young fish, cyclops, water fleas, freshwater shrimps, water lice and beetles
Water Boatmen	Tadpoles, freshwater shrimps, water worms, midge larvae, water fleas, cyclops
Water Flea	Microscopic plants, small particles of dead plants
Water Louse	Microscopic plants, fungi, small particles of dead plants
Water Mite	Body fluids of beetles, water boatmen, pond skaters and insect nymphs
Water Worm	Microscopic fungi, small particles of dead plants

My Favourite Bug

My Name:……. My Bug's Name:…….

How do I move?……..

What do I eat?……..

Where do I live in the pond?…….

What will I change into as an adult?…….

Equipment List

Equipment List for 2 hour visit

- 6 nets
- 9 fresh water name trail ID charts
- 15 white trays
- 15 sampling pots
- Spoons
- String and scissors
- Photocopied sheets as required for activities selected (Data recording sheets, identification sheets, pond diet sheets and My Favourite Bug)
- A “hat”
- Paper
- Clipboards – one per child
- 1 Throw rope

Web Based Resources

1. This website gives you more details about the creatures in the pond from a “virtual pond dip”http://www.naturegrid.org.uk/pondexplorer/pondexplorer.html

2. Go pond dipping with Gaby and examine what she catches – great fun although the game requires time, skill and patience.
   http://www.rspb.org.uk/youth/play/dipping.asp

3. This website from the Cornwall Wildlife Trust gives some more information on pond dipping and what you may find.
   http://www.cornwallwildlife.org.uk/educate/kids/ponddip.htm