

The OPAL Water Survey Booklet



Please note: Online data entry for the OPAL Water Survey is now closed. However, you can still use the Water Survey to investigate water quality in your local area.

Introduction

Freshwater is vital to life on Earth. It is essential for people to drink and grow food, and clean water is very important for human health. Water quality is also important for the animals and plants that live in and around our lakes, ponds and rivers. Unfortunately, freshwaters like these all over the world have been polluted with chemicals from industry and farming and by waste and litter from our everyday lives.



The most common form of pollution in lakes and ponds is an increase in the amount of nutrients (such as nitrogen and phosphorus) in the water. This is called eutrophication. Nutrients provide food for algae. Too many nutrients make the water murky. This reduces light for plants growing on the bottom and may lead to low levels of oxygen in the water making it difficult for animals to live there too.



We can assess how healthy a lake or pond is by seeing which animals and plants are living in and around it. The OPAL Water Survey will help you do this for a lake or pond near where you live or work. Improving the water environment increases aquatic biodiversity (i.e. the number of plants and animals living in the water) and contributes to a healthy environment for all of us. So... thank you!



Finding a lake or pond

You can do the survey at any lake or pond. It could be a garden or school pond, a lake in your local park, or any other. If you don't know one already, look on a local map of your area and see what lakes or ponds are nearby. Alternatively, use Google Earth or go to www.opalexplorenature.org to discover how to find lakes through the Freshwater Habitats Trust website. Remember just because a lake is on a map or in a database, it does not mean that the public have access. Make sure you have permission to visit.



Survey preparation

There are three activities in the Water Survey

Activity 1: How clear is the water? (page 7)

Activity 2: Is the water acid or alkaline? (page 8)

Activity 3: How healthy is the pond? (pages 9-10)

Feel free to choose any of the activities or do all three. However, Activity 3 may disturb the bottom of the pond so do that one after 1 and 2.

Before you start the activities, record information about the pond or lake by answering Questions **1-10** on pages 5-6.

Essential equipment to take outside with you

- The OPAL Water Survey pack which contains this survey **Booklet***, **Freshwater Invertebrate Identification Guide**, **OPALometer** (white plastic disc), **pH strips** and **OPAL magnifier**



- A net.** You can use a net like one you may have used rock-pooling on the beach or you can attach a fine-meshed plastic sieve to a pole. See page 4 for some ideas on how to make a net. For garden ponds, a sieve on its own may be fine
- A shallow tray** to sort out your animals. You will see them best if the tray is white. You could use a large white ice-cream tub, or you could even make one by putting a piece of white plastic or paper in the bottom of a baking tray
- For Activity 1 you will need a large (2 litre) clear empty **plastic drinks bottle**, a 1p coin and some sticky tape



Useful items to take outside (if you have them)

- A map or GPS device
- A mobile phone
(in case of emergencies)
- A camera

The best time to carry out this survey is during the spring, summer or autumn. Remember to take everything home with you.



Safe fieldwork

Exploring ponds and lakes is great fun. However, it is important to take care when close to water.

- Young children must be supervised at all times when near water.
- Children must make sure that they get their parents' consent before participating in this survey and make sure that they have read these guidelines.
- Do not do this survey on your own. Children must be accompanied by an adult. Adults should take a responsible friend who can help if things go wrong. It is advisable that one or both of you are strong swimmers.
- Make sure you know what to do in an emergency and have means of summoning help if necessary. Carry a fully charged mobile phone in case you need to summon help. Ensure you have good mobile coverage.
- Make sure that the ground around the lake or pond is firm and not steep or overhanging.
- Choose a place to do the activities where you can safely and easily get close to the water. Remember, the areas around ponds and lakes may be slippery.
- If you find broken glass, litter with sharp edges like metal cans or discarded fish hooks, find somewhere else to do the survey.
- Cover any open cuts before starting the activities and wash your hands thoroughly afterwards and especially before eating.
- Dress appropriately for the weather and wear appropriate footwear.
- Do not try to walk on frozen ponds or lakes.

Please note that participation in the OPAL Water Survey is entirely at the participant's own risk. More water safety information is available from RoSPA: www.rospace.com/leisure-safety/water/advice/pond-dipping



Making a pond net

To catch aquatic invertebrates you will need a net. If you don't have a pond net, you can use a net like one you may have used rock-pooling on the beach, but make sure that it has a fine mesh or you won't be able to catch the smallest animals.

Alternatively, you can make one by securely attaching a fine-meshed plastic kitchen sieve to a pole. You could use electrical or duct tape or better still you can use cable ties. For garden ponds, a sieve on its own will usually be fine.



If you are going to more than one lake or pond, avoid spreading diseases or non-native plants by cleaning all equipment between sites. Equipment should be rinsed, washed with a mild disinfectant, rinsed again in tap water and allowed to dry.

Be gentle with all the animals and make sure that you return them to where you found them. Don't leave them in the sun as they will get too hot.



The survey starts here

Before you start: Describe the pond

1. Date of survey _____

2. Time of survey _____

3. Who are you doing the Water Survey with today?

Primary school

Secondary school

Youth group

Adult volunteer group

Friends or family

College / university

Other

4. Have you been pond dipping before you did the OPAL survey? yes no

5. How would you describe the weather today?









6. What is the name of the pond? _____

7. Record the location of your site (postcode / OS grid reference / GPS reading).

Further help is available on the [OPAL website](#) if you are unsure of the exact location.



8. Which of these describes the area immediately around the lake or pond?

Urban

Farmland

Garden

Grassland

Park

Wood or forest

School

Heath or moorland

9. What does the edge of the pond mainly look like?

Concrete / paving stone

Mown grass

Long grass

Trees

Bare ground

10. Can you see any of the following signs of pollution?



Industrial chimneys



Rubbish in the pond



Discharge pipes



Foam on the water surface



Road less than 20 metres away

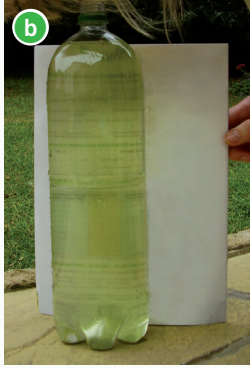


Algal bloom



Activity 1: How clear is the water?

Test how clear the water is by using the OPALometer disc.



- a** Tape a 1p coin to the back of the disc. Roll it up and push through the neck of your 2 litre bottle.
- b** Fill the bottle with water from the pond to about the height of an A4 sheet of paper. Make sure the disc is face up in the bottom.
- c** Wait a few moments then look in the top of the bottle and count the number of OPAL logos you can see.

11. How many OPAL logos could you see when you looked into the bottle?

0	1	2	3	4	5	6	7	8	9	10	11	12
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12. If the water appeared coloured, what colour was it?

brown	green	other
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If you answered 'other' describe the colour: _____



Activity 2: Is the water acid or alkaline?

Find out whether the water is acid, alkaline or neutral by using one of the pH test strips in your pack.

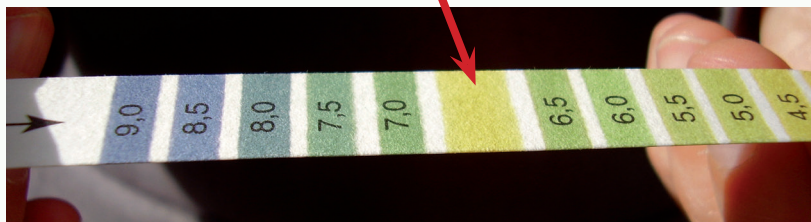
Holding the strip by the arrow, put the whole strip in the water for 3 seconds.

Remove the strip from the water and match the colour of the indicator zone (unprinted middle area) to the colour scale. Read off the printed pH value that matches the colour.



It takes up to 2 minutes for the pH strip to develop the final colour, so don't read it right away.

Indicator zone



Alkaline
pH 8-9

Neutral
pH 7

Acidic
pH 4-6

13. When you used the dip strip, what was the pH of the water?

-



Activity 3: How healthy is the pond?

Measure the health of the pond using freshwater invertebrates.

Look for animals skating about on the surface. You might not catch these in your net so look first to see what is there. Add some pond water to your tray so that it is ready for the animals you catch.



- a** Vigorously sweep your pond net using a figure-of-eight motion in and around the plants or other habitats for about 15-20 seconds. You will need to disturb the plants with your net, but try not to damage them. Try to avoid disturbing the bottom of the pond too much or you may get a lot of mud in the net.
- b** After each sweep, wash the net through with pond water to get rid of any mud and empty the contents of your net into the tray. Remove any large bits of plant, checking first that there are no animals attached. Repeat your net sweep several times in different places and habitats around the pond.
- c** Leave the tray to settle for about a minute. It will be much easier to identify the animals once you see them moving. Use the [Freshwater Invertebrate Identification Guide](#) to help you identify the animals in your tray.

If you are going to more than one lake or pond, avoid spreading diseases or non-native plants by cleaning all equipment between sites. Equipment should be rinsed, washed with a mild disinfectant, rinsed again in tap water and allowed to dry.



14. Record the different types of animals you have found. Use your results to calculate the Pond Health Score.

Type of pond animal	✓	Quality index	Score
Cased caddisfly larvae		Score 10 if you found cased caddisfly larvae	
Dragonfly larvae		Score 10 if you found dragonfly larvae	
Alderfly larvae		Score 10 if you found alderfly larvae	
Damselfly larvae		Score 10 if you found damselfly larvae	
Caseless caddisfly larvae		Score 10 if you found caseless caddisfly larvae	
Mayfly/stonefly larvae		Score 5 if you found mayfly/stonefly larvae	
Water beetles and/or larvae		Score 5 if you found water beetles	
Water bugs		Score 5 if you found water bugs	
Pond skaters		Score 5 if you found pond skaters	
Water shrimps		Score 5 if you found water shrimps	
Water snails		Score 1 if you found water snails	
Water slaters		Score 1 if you found water slaters	
Worm-like animals		Score 1 if you found worm-like animals	
Total Pond Health Score =			

What your results mean

Score 31 or more
This lake or pond is very healthy

Score 6-30
This lake or pond is quite healthy

Score 0-5
This lake or pond could be improved

Example: Suppose you found some dragonfly larvae, alderfly larvae, adult beetles and water snails.

Dragonfly larvae	✓		10
Alderfly larvae	✓		10
Water beetles	✓		5
Water snails	✓		1
Total score =			26

The Pond Health Score is **26** and therefore the pond is quite healthy



What do your results mean?

The activities in the OPAL Water Survey tell us about the health of ponds and lakes. You may have collected information from a lake or pond that has never been investigated before.

Activity 1 measures how clear the water is. A high number of 'OPALs' means more light can get through the water and that is important for plants that provide habitats for animals. A low number means that little light is getting into the pond and this affects where plants can grow. This can be due to many things such as soil washed in from around the edges, peat staining, waves disturbing the mud on the bottom (especially in large shallow lakes) or lots of algae in the water.

In Activity 2, the pH of the water measures how acidic or alkaline the lake or pond is. If the number is less than 7 then the pond is slightly acidic. If it is more than 7 then it is slightly alkaline.

Rainwater is naturally slightly acidic (around pH 5.6) because of carbon dioxide absorbed in it, but this is altered as the water moves through the soil into lakes, ponds and rivers. The pH is very important, because it controls many of the processes in a lake, and also affects the animals and plants that are able to live in the water. Acidic ponds and lakes can be especially good wildlife habitats and often need special protection.

Activity 3 uses the animals you have found to work out a Pond Health Score. A high score (more than 31) means the pond is very healthy. If it scores lower than this there may be ways to improve it. Visit the OPAL website to find out ways in which the health of a pond can be improved.

Visit the OPAL website www.opalexplornature.org to find out more about what your results mean and to compare them with others.



Invertebrate factfile

Facts about the invertebrates that you are likely to find in your pond are noted below. For more information on how to identify them use the **Freshwater Invertebrate Identification Guide**.



POND HEALTH
SCORE
10

Caddisflies

Caddisflies are close relatives of moths and butterflies, and winged adults look like thin moths, but with hairy wings. There are about 200 kinds in the UK. The underwater larvae are easier to find than the adult flies which are often nocturnal. Most caddisfly larvae have a case, but not all. **Caddisflies are often a sign of good quality ponds.**



Cased caddisfly larva

POND HEALTH
SCORE
10

Dragonflies

Dragonflies are quick colonists of new ponds and will also colonise ponds that dry out in some years. Dragonfly larvae and adults are ferocious predators on small animals. **Dragonflies are indicators of good quality ponds.**



Dragonfly larva

POND HEALTH
SCORE
10

Damselflies

Damselflies are related to dragonflies and ponds are important habitats for them. Damselflies quickly colonise new ponds. The adults have long thin bodies and close their wings over their body when resting. They lay their eggs on the stems of trailing grasses, land plants trailing in the water and on fallen leaves – don't pull these out if you want to encourage damselflies. **A good quality pond will nearly always have damselflies.**



Damselfly larva

POND HEALTH
SCORE
10

Alderflies

Alderfly larvae are predators of the pond bottom and are happy in silty, vegetation-rich environments. The adult alderflies emerge from ponds, rivers and lakes in spring and early summer. They are easy to see as they fly by day and have distinctive black-veined wings. There are only three different kinds of alderfly in the UK, and the most common, the mud alderfly (*Sialis lutaria*), is the one that is usually found in ponds. **Alderflies are often a sign of good quality ponds.**



Alderfly larva



POND HEALTH SCORE
5

Mayflies and stoneflies

About 10 species of mayfly can be found in ponds, but by far the commonest is the Pond Olive. Pond Olives are fast colonisers of new ponds. The underwater larvae hatch out into winged adults in the spring, with a second generation in the summer. **Some mayflies and stoneflies are quite tolerant of pollution, so they can be found in both high quality ponds and those which are not as good.**



Mayfly larva

POND HEALTH SCORE
5

Water beetles

Water beetles are one of the most diverse groups of animals in freshwaters. In the UK there are around 300 species. Many water beetles are great fliers. They quickly colonise new ponds, and also move between ponds and other water bodies during the year. **In a good wildlife pond there should be lots of different kinds of water beetles.**



Water beetle

POND HEALTH SCORE
5

Water bugs

Bugs are insects that have piercing mouthparts that they use to feed. There are many different kinds: water boatmen, water measurers, water crickets, water scorpions (which are not scorpions and are harmless) and water stick insects (which are not stick insects!). Most are predators, but lesser water boatmen also filter fine particles from the mud, which is why they are often found in muddy pools. **Water bugs alone are not indicators of a high quality pond, but will be found in all good quality ponds.**



Water bug

POND HEALTH SCORE
5

Freshwater shrimp

In most ponds, the shrimp that you will see is a small introduced American species called *Crangonyx pseudogracilis*. Unlike some other introduced species this doesn't seem to have done much harm in the UK. Shrimp don't fly so may take many years to arrive unless they are added by people. **Freshwater shrimp can live in good and bad quality ponds.**



Freshwater shrimp



POND HEALTH SCORE
5

Pond skaters

Pond skaters are predatory bugs that spear little animals just under the water surface. They also eat insects that fall onto the water surface and are trapped there. The common species are all good fliers so can easily move from pond to pond. **They are found on both good and poor quality ponds.**



Pond skater

POND HEALTH SCORE
1

Water slaters (or water hoglice)

Water slaters are relatives of the familiar garden woodlouse, and are often found living in rotting leaves in the bottom of ponds. **Water slaters can live in nutrient-rich waters and/or low oxygen conditions. When they are the only animals found, there probably isn't much oxygen in the water.**



Water slater

POND HEALTH SCORE
1

Water snails

There are about 40 different kinds of water snails in the UK. They vary in size when fully grown from the tiny Nautilus Ram's-horn (just 2 or 3 mm across) to the Great Pond Snail which grows up to 4 cm. Common water snails get from place to place as eggs carried by birds or amphibians or when people introduce plants. They graze on the abundant growth of algae stimulated by excess nutrients. **Snails will thrive in polluted ponds, but will also be found in good quality ponds.**



Water snail

POND HEALTH SCORE
1

Worm-like animals

This group includes all worms, fly larvae, leeches, flatworms and other worm-like creatures. There are more different kinds of these creatures living in freshwater – especially the larvae of flies – than any other kind of animal. **They are found in both good and poor quality ponds.**



Midge larva: a worm-like animal



Further information

Freshwater Habitats Trust: www.freshwaterhabitats.org.uk

British Dragonfly Society: www.british-dragonflies.org.uk

Buglife: www.buglife.org.uk

Amphibian and Reptile Conservation: www.arc-trust.org

iSpot: www.ispotnature.org



This activity is one of a series of nature surveys developed by the Open Air Laboratories (OPAL) programme to help you get closer to your local environment while collecting important scientific data. With funding from the Big Lottery Fund, our network of leading universities, museums and wildlife organisations has been developing citizen science activities since 2007 and our resources are available throughout the UK.



If you've enjoyed this survey, why not try another? You can find everything you need to get involved at www.opalexplenature.org/surveys

You can also see what your data has revealed so far and discover a range of ways to get more involved in studying the environment on our website: www.opalexplenature.org



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