THE WATER DETECTIVES FINAL REPORT: JULY 2019

'The Water Detectives'

In March 2019, **Southern Water**, in partnership with **Freshwater Habitats Trust**, piloted a unique STEM-based school project at four Primary Schools in Brighton and Worthing.

The **Water Detectives**, a willing bunch of over 120 Key Stage 2 pupils, used ground breaking science techniques to investigate the quality of their local ponds and discover the identity of the creatures living there.

Working in small groups, children from each class took it in turns to undertake two activities, giving them the evidence needed to plan their perfect pond for wildlife.

Activity 1: Quest for Clean Water

Using cutting edge **Clean Water Kits**, the Detectives collected water from their school pond to measure the amount of two naturally occurring nutrients, nitrate and phosphate, in the samples. At natural background levels these nutrients are essential for life. But, in today's intensively farmed and built environment, excess nutrients are entering the water cycle from fertilisers, detergents, waste water and livestock. Freshwater life needs clean, unpolluted water to survive, and sadly **it only takes a little nutrient pollution to damage habitats like streams and ponds**.

The Detectives' results were compared with water samples from a range of freshwater habitats, including: a stream flowing through ancient woodland; a river flowing through farmland where a crop of wheat was growing; a pond in a large area of natural uncultivated heathland; a fishing lake surrounded by roads, and rainwater collected from a water butt in a city garden.

Activity 2: DNA Discovery

The Detectives used state of the art **Environmental DNA Kits** to find out which freshwater species - amphibians, fish and birds - were living in their pond.

Some species can be hard to find – they may be very rare, they may only come out at night, or they may live their whole lives underwater. This means that traditional methods used to survey ponds, like using a pond net, can often miss them.

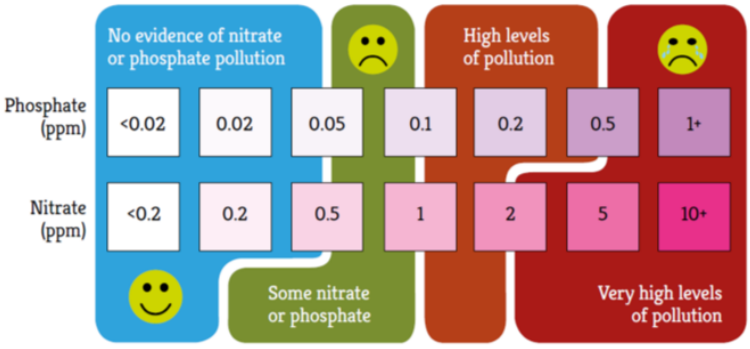
Environmental DNA (eDNA for short) is DNA, the genetic code of all living animals, shed into the environment as creatures go about their daily lives. The DNA is released into the water by animals in a host of different ways: from their skin, poo, mucous, eggs and sperm, or when they die. With these kits **it is now possible to monitor the freshwater species that live in ponds, streams and other waterbodies, simply by collecting a water sample, and analysing it for traces of DNA.**

What did our Water Detectives discover?

The Detectives' work revealed that all the school ponds were in pretty good condition, and mostly free from nutrient pollution. The best school ponds were in the school grounds, away from surface water drains, which could be bringing in nutrients from car park runoff or fields.

Most of the school ponds were similar to natural freshwater habitats, like the woodland river and the heathland pond. They were left to fill naturally with rain water, and as the Clean Water test shows, if you collect rain water in a water butt, you can use it to top up your pond during any dry months and this will keep it naturally free from nutrients.

WATERBODY	P	N
Laurel's Primary School Pond	0.05	0.2
Sompting Abbots School Pond	<0.02	0.2
Moulsecoomb Primary School Pond	<0.02	0.2
Coldean Primary School Pond	<0.02	0.5-1
Stream flowing through ancient woodland	<0.02	<0.2
River flowing through arable farmland (wheat)	0.05	2-5
Pond in a large area of natural uncultivated land	<0.02	0.2
Fishing lake surrounded by roads	0.5-1	0.2
Rainwater collected from a water butt in a city	<0.02	0.2



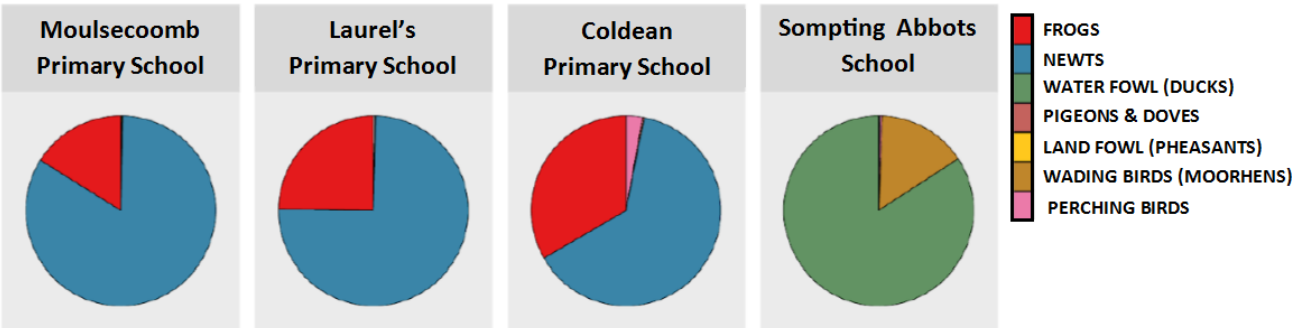
The clean water results from the school ponds, compared to the wider countryside samples

The eDNA results were really exciting. Across the four schools, a total of 14 animals were detected: 2 amphibians, 11 birds and 1 mammal (a squirrel!). The number of species detected ranged from 4 at The Laurel's Primary School, to 10 at Coldean Primary School.

Smooth Newt and Common Frog were the most abundant species detected, which is not surprising, as these amphibians are frequent visitors to small ponds in the early spring. We didn't find any evidence of amphibians at Sompting Abbots School using the eDNA. That doesn't mean they don't use the pond, but rather that there wasn't enough eDNA where we sampled to detect them.

No fish were detected in any of the ponds, which is good news for wildlife. In small ponds like these, fish can be serious predators of the other pond life, including amphibians and insects.

Bird visitors included typical pond residents like Moorhen and Mallard, but also a suite of other birds using the ponds to drink and bathe, including: Pheasants, Pigeons, Jays, Robins, Blackbirds, Thrushes, Finches, Tits and even a Raven! Our squirrel visitor would also be using the pond to grab a quick drink.



The proportion of different groups of animals found in four school ponds

Picture the Perfect Pond

Detective work completed; the Water Detectives were each asked to draw a picture of a wildlife pond. They could highlight the best features for wildlife, or make suggestions about how to improve the pond for wildlife. The drawings where then submitted to Southern Water and Freshwater Habitats Trust, and prizes were awarded for the best one from each school.

The Laurel's Primary **WINNER: Deano**

Moulsecoombe Primary **WINNER: Jenna**

Coldean Primary: Morning session **WINNER: Gioveda**

Afternoon session **WINNER: Dollie**

Sompting Abbots School **WINNER: Emily**

Small ponds are great!

The small school ponds which our Water Detectives investigated proved to be excellent havens for freshwater wildlife. Fed by clean, unpolluted rainwater, they provided homes for freshwater species like amphibians and ducks. They also provided vital freshwater for garden birds and mammals. When the wider countryside is under pressure from agriculture and developments, creating these small freshwater oases can provide an important home for wildlife.

School ponds are also brilliant outdoor classrooms. The use of traditional methods such as pond dipping can now be combined with new technologies, such as Clean Water Kits and Environmental DNA, to enhance the learning experience.

Feedback was positive from all the schools who participated in the Water Detectives pilot project. We hope this will be the start of more projects with schools in the future. For more details contact info@freshwaterhabitats.org.uk.

Get involved

Our Water Detectives found out how easy it was to discover more about the health of their ponds and the amazing animals living there.

Every creature that lives in freshwater needs your help to ensure they have a healthy habitat or home. There are lots of things that you can your family can do to help.

1. Use Water Wisely

- Don't leave the tap running while you clean your teeth – use a mug.
- Take the challenge and shower in just three minutes.
- Make sure the dishwasher and washing machine are fully loaded before using.
- Use a watering can instead of a hosepipe in the garden.

2. Beware of the Un-flushables

- When you go to the toilet only flush the Three P's – pee- poo and paper.
- Never put wet wipes, nappies or cotton buds in the toilet.
- Make sure all cooking fat, oil and grease ends up in the bin and not down the drain.

3. Help to look after your local Freshwater Environment

- Help us to find the best ponds and streams for freshwater wildlife so that they can be better managed and protected.
- Phosphates used in domestic cleaning products account for nearly a fifth of the phosphate from our homes, so being selective in your shopping can help to protect our local rivers.
- Never introduce plants, fish or other animals into ponds or rivers in the wider countryside - you can accidentally introduce diseases which might harm the local population of amphibians and some plants can take over small ponds, making them poorer for wildlife.