Freshwater Habitats Trust

Monitoring Clean Water with the National Trust

National Trust

AGENDA

- National Trust surveys: A Monitoring Strategy
- Results of National Trust Baseline Monitoring (Year 1)
- Clean Water Monitoring: The State of Freshwater
- Clean Water….Why is it important?
- Monitoring Clean Water with the National Trust
- Testing the water for N&P: Kit demonstration

Freshwater Habitats Trust

Our aim: To protect freshwater life.

- We are an evidence-based conservation charity, with a strong science grounding.
- We are highly strategic – we target our work where evidence suggests it will be most effective.
- We are concerned with all freshwaters including those that are small and undervalued like headwater streams, ponds, flushes and ditches.
- We work in partnership with people, communities and organisations to get the best results for freshwater wildlife.

Important Freshwater Areas – Some of the most important areas for freshwater biodiversity in the UK.

Monitoring Clean Water with the National Trust

The Government's 25 Year Environment Plan sets out action to help the natural world regain and retain good health.

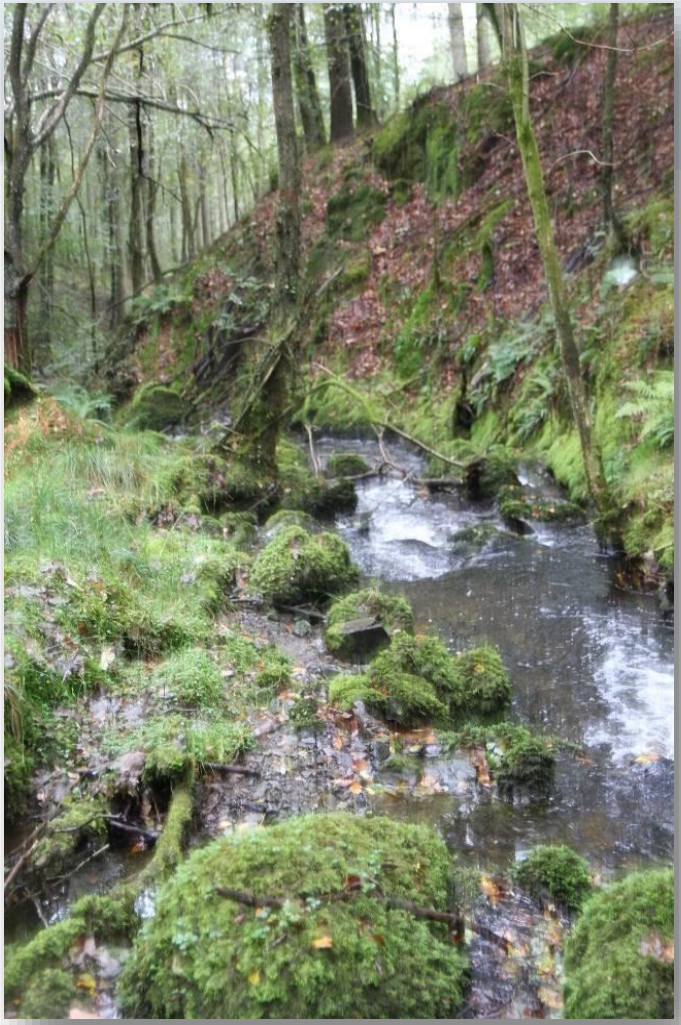
- The National Trust's own strategy outlines their ambition to play a part in achieving the plan.
- It's critical to provide evidence so that we can monitor impact.
- Freshwater Habitats Trust have developed a monitoring strategy for NT freshwater habitats:
  - To provide a baseline
  - To identify the best sites
  - To take stock and monitor change

A 25 year plan for Nature

Monitoring Freshwater with the National Trust

Levels of survey:

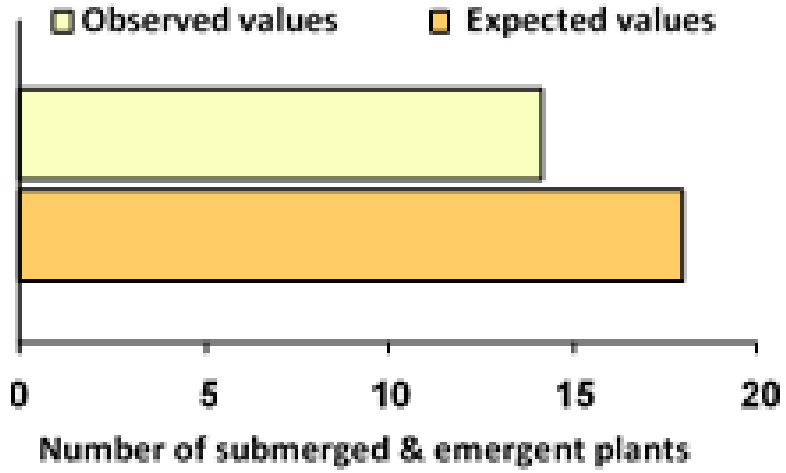
- **Tier 1**: Existing data from national monitoring programmes.
- **Tier 2**: Professional surveys of 100 ponds and 100 streams (5 year rolling programme).
- **Tier 3**: Citizen science monitoring using new technologies (eDNA, Clean Water for Wildlife), and species specific surveys.
- **Tier 4**: Bespoke monitoring of specific projects (e.g. natural flood management)



Little Langdale, Cumbria.
Rich bryophyte community

Tier 2: Summary of Professional surveys 2018

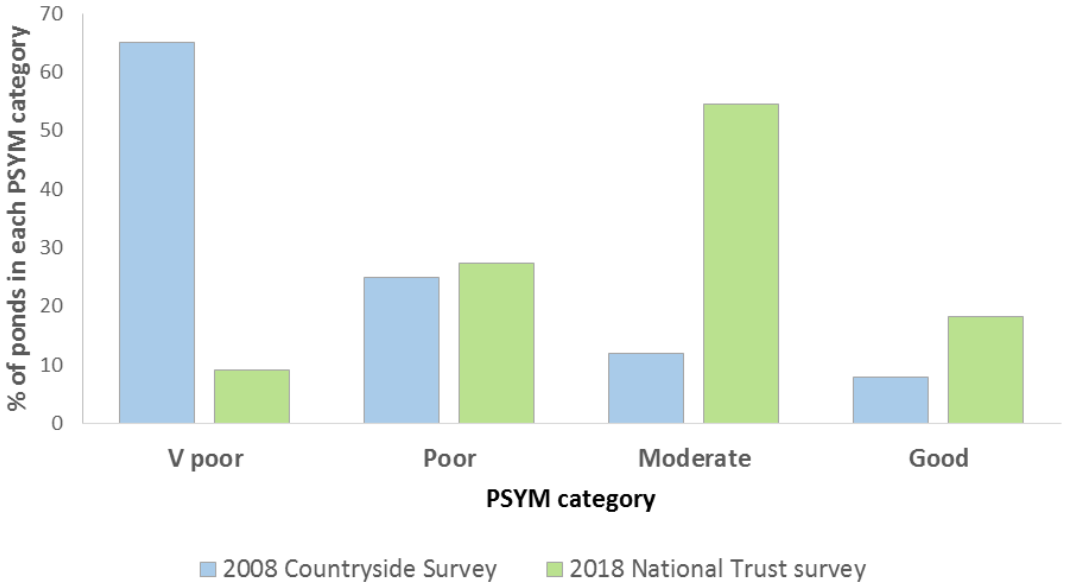
- NT ponds were 50% richer than wider countryside ponds.
- But still significantly less rich than if there were in good condition.
- Average richness n protected sites – 23 species



Blickling Hall
17 plant species –close to Priority Pond Status

Tier 2: Summary of Professional surveys 2018

- Better than wider countryside ponds (<10%)
- Only 2 NT ponds at Good Status (16%)
- But not as good as ponds in protected landscapes (60% for the New Forest)



Dyrham, near Bath.
Frying Pan Pond

Tier 2: Summary of Professional surveys 2018

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- A high proportion of the streams (65%) were heavily shaded by trees, which is fairly typical of the wider countryside.
- The richest were from the Long Mynd in Shropshire and Maidenhead & Cookham, with 21 plant species recorded at both sites.
- Little Langdale was particulary notable for its rich moss flora with 17 species recorded in the 100m section.
- Only two England Red List wetland species were recorded – Hopesay Hill and the Long Mynd
- Bryophyte species were generally common and widespread.

Darcy's Pond, Lyme

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22 species recorded, including Unbranched Bur-reed *Sparganium emersum*which which is a relatively uncommon species in the north of Britain.

Tier 3: Citizen Science Monitoring

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Freshwater habitats and species are in trouble……

…..but, clean water habitats can be identified and species and habitats restored

Our vision for Citizen Science Monitoring

We believe the best way to protect freshwater habitats is to increase people's enjoyment, knowledge and experience of them.

Citizen science approaches are of great interest for their potential to efficiently and sustainably monitor wildlife populations on both public and private lands.

BUT . . . the data people collet MUST be credible, reliable and robust.

Tier 3: Citizen Science Monitoring

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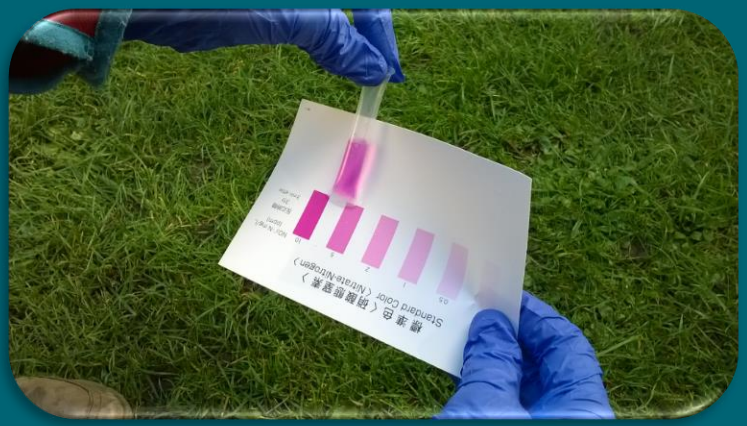
Citizen Science Monitoring using new technologies

Clean Water Kits



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Clean Water Monitoring : The State of Freshwater

National Trust

What is clean water?








Water without added pollution – pollution includes nutrients like phosphate and nitrate, but also a cocktail of various things in road run off, sediment, pesticides etc.

Just how bad is it?

- **Rivers:** there are no longer any undamaged rivers left in lowland England and Wales.
- **Streams:** 87% of headwater streams are biologically degraded east of a line from the Humber to the Dorset coast.
- **Ponds:** 92% of ponds in England and Wales are biologically degraded; plant richness has declined by 20% in the last decade.
- **Lakes:** there is just a single lake in England and Wales classified as undamaged (Burnmoor Tarn).

The picture given to the public doesn't always reflect how bad things are for freshwater biodiversity.

Assessment under the Water Framework Directive?

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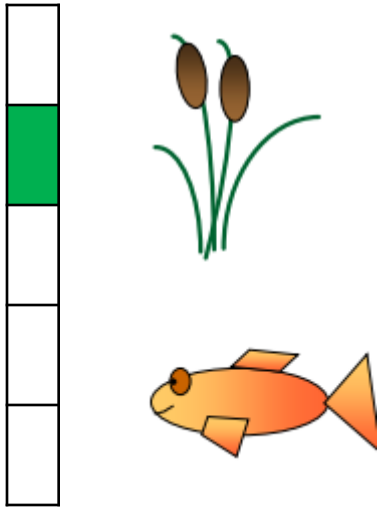
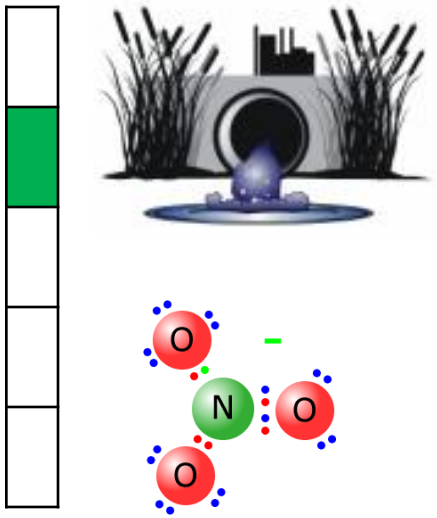
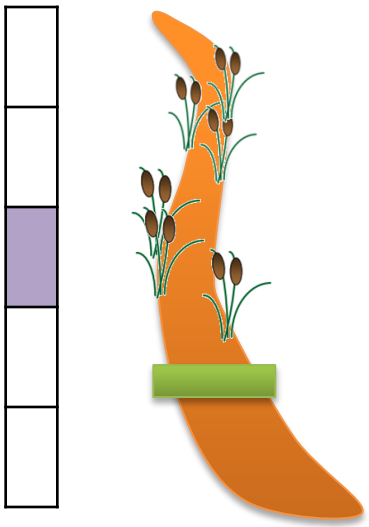
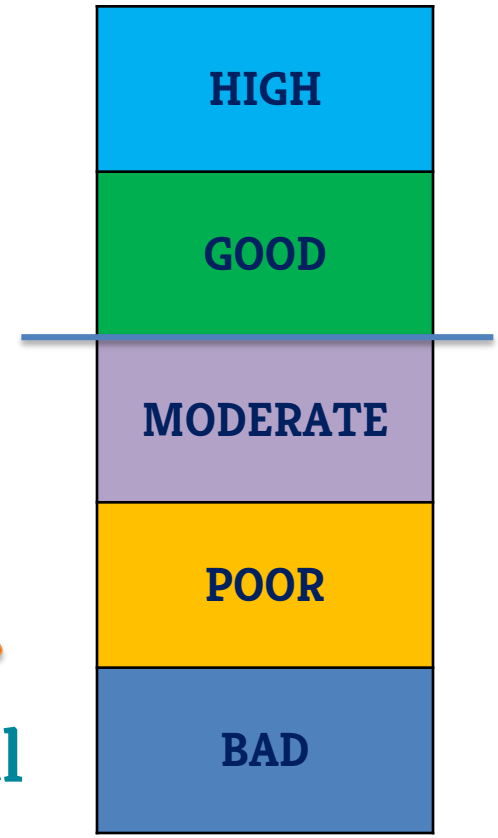
How are rivers and lakes assessed?





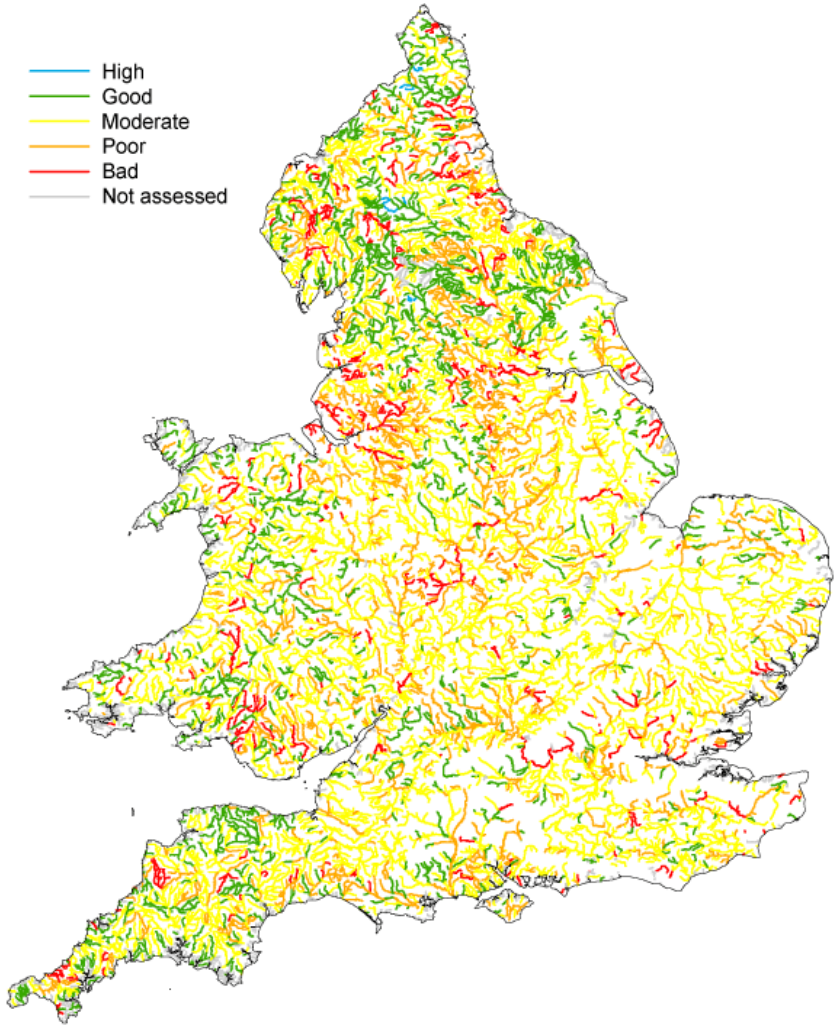


Biological Chemical Morphological



The Water Framework Directive

The state of our monitored freshwaters



- In England and Wales only 1 lake and 4% river sections *undamaged*, reaching 'High' status.
- c.20% of rivers fail minimum legal standard of 'Good' status
- 87% of headwater streams are biologically degraded east of a line from the Humber to the Dorset coast.

And, these data were only collected from a small proportion of the freshwater environment

99% of freshwater habitats fall outside of the statutory monitored network (e.g. 480,000 ponds)

Why is water quality so poor?

- In the UK a large part of the threat to freshwaters is due to pollution especially:

  - Intensive agriculture
  - Urban areas / roads
  - Sewage and other discharges

- Most of England's rivers and lakes are highly polluted – too many nutrients, heavy metals, pathogens, pesticides, sediment

- Waterbodies which drain large catchments, by their very nature will pick up these pollutants

- Extinction rates for freshwater species 4 to 6 times higher than terrestrial and marine

The English countryside on the Oxfordshire / Wiltshire border looks idyllic. Virtually all freshwaters in this landscape are seriously polluted

Public perception …

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theguardian

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Environment › Conservation

Freshwater wildlife thrives in cleanest rivers since Industrial Revolution

Otters, water voles and many species of freshwater fish m… dramatic re…

Ian Sample, s… The Guardian

The Telegraph

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Environment

Sea trout and otters return as British rivers im…

Sea trout, salmon and otters have returned to rivers after what the En… Agency hailed as the best decade for waterways since the industrial re…

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Britain's rivers come back to life

Wildlife flourishing as pollution is reversed, report reveals

By Michael McCarthy, Environment Editor

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31 December 2010 Last updated at 08:05

Water quality in rivers 'good for wildlife'

Cleaner rivers in England and Wales have helped many species of wildlife, the Environment Agency says.

The last decade has been the best for rivers since the industrial revolution, it said.

Record numbers of salmon and sea trout were found in the Mersey, Tyne and Thames, while otters returned to every region in England and Wales.

The decade also saw the return of the water vole after a dramatic decline in the 1990s.

Incidents of serious water pollution have more than halved since 2001.

The River Thames won the International Theiss River Prize for outstanding achievement in river management and restoration earlier this

The water vole has made a recovery after numbers declined in the 1990s

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Six wives, 13 kids

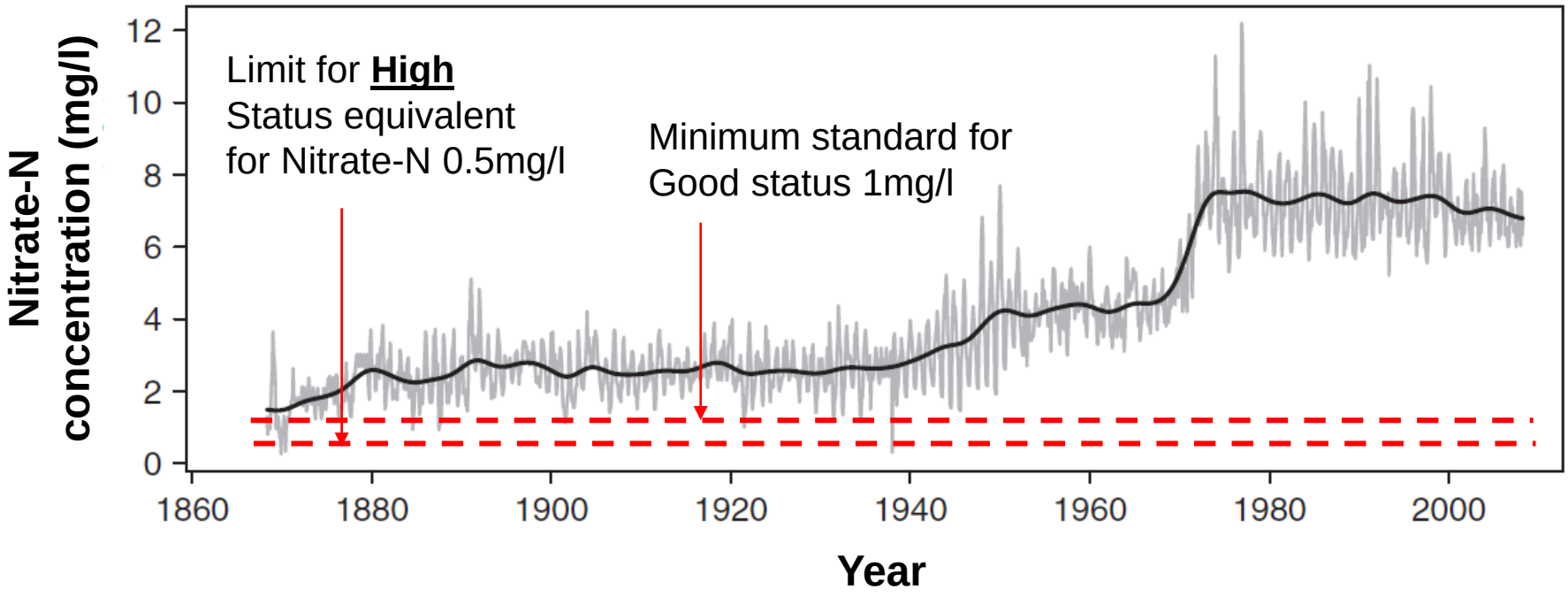
How Steve Ginger strives to be a 'good' father

Actual data shows little change in since early 1980s, and the base from which it has changed was very low to start with!

Nitrate in the Thames

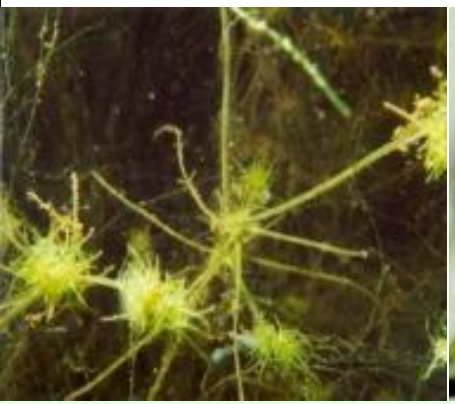
The world's longest water quality record

- 2012 the publication sawn of the worlds longest water quality record – in the Thames
- Nitrate is essentially at it's highest for the last 140 years



So, what about the ponds?

- 2/3rds of all freshwater plants and animals can be found somewhere in ponds
- Ponds support ~100 Priority Species under the England BAP (now S41/S42)
- 1 in 5 ponds in semi-natural landscapes support at least 1 Red Data Book species

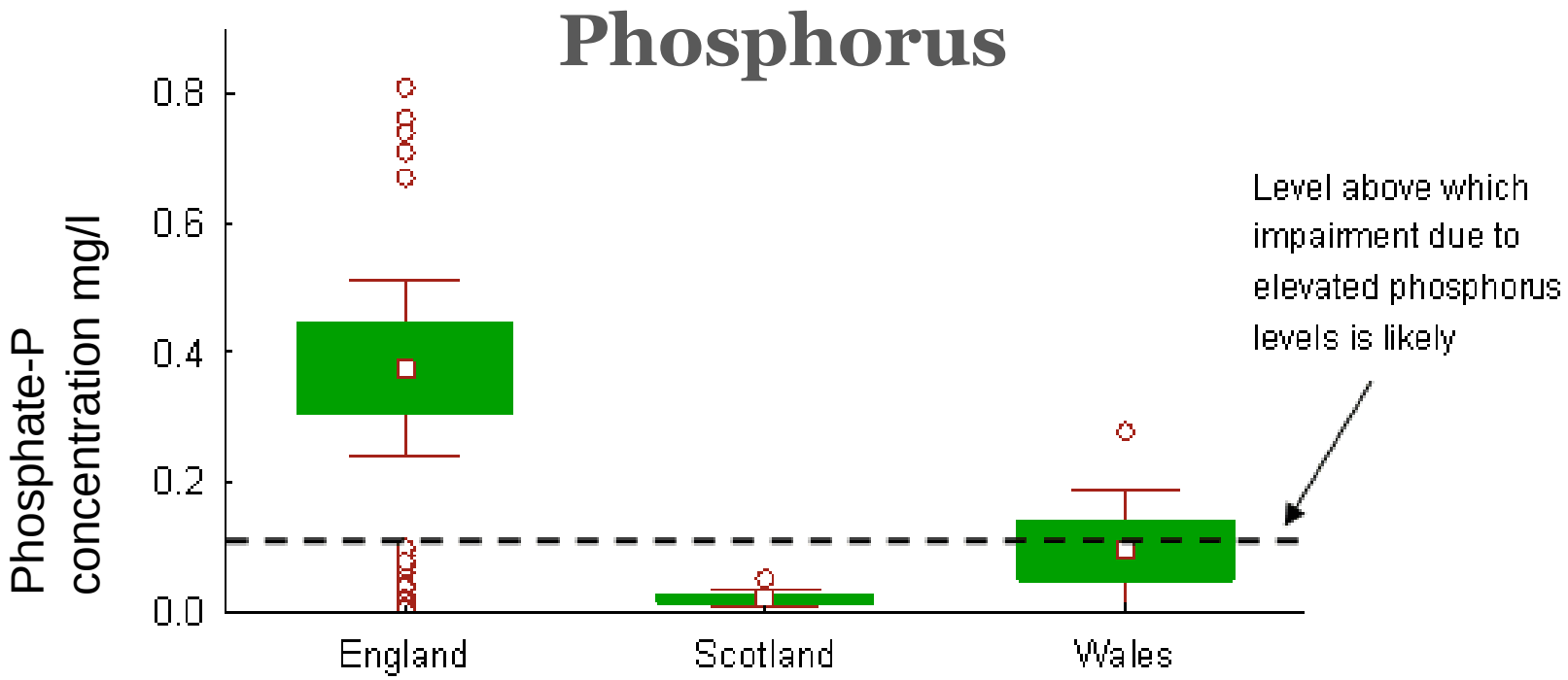



We know that ponds are threatened

- At GB level 2/3rds of ponds existing 100 year ago have gone – **currently c.480,000 ponds**
- Probably many millions more seasonal ponds, never recorded, have disappeared
- Better news is Countryside Survey data suggests the number of ponds is now increasing – **up by 12.5%**
- The real problem is pond *quality* …

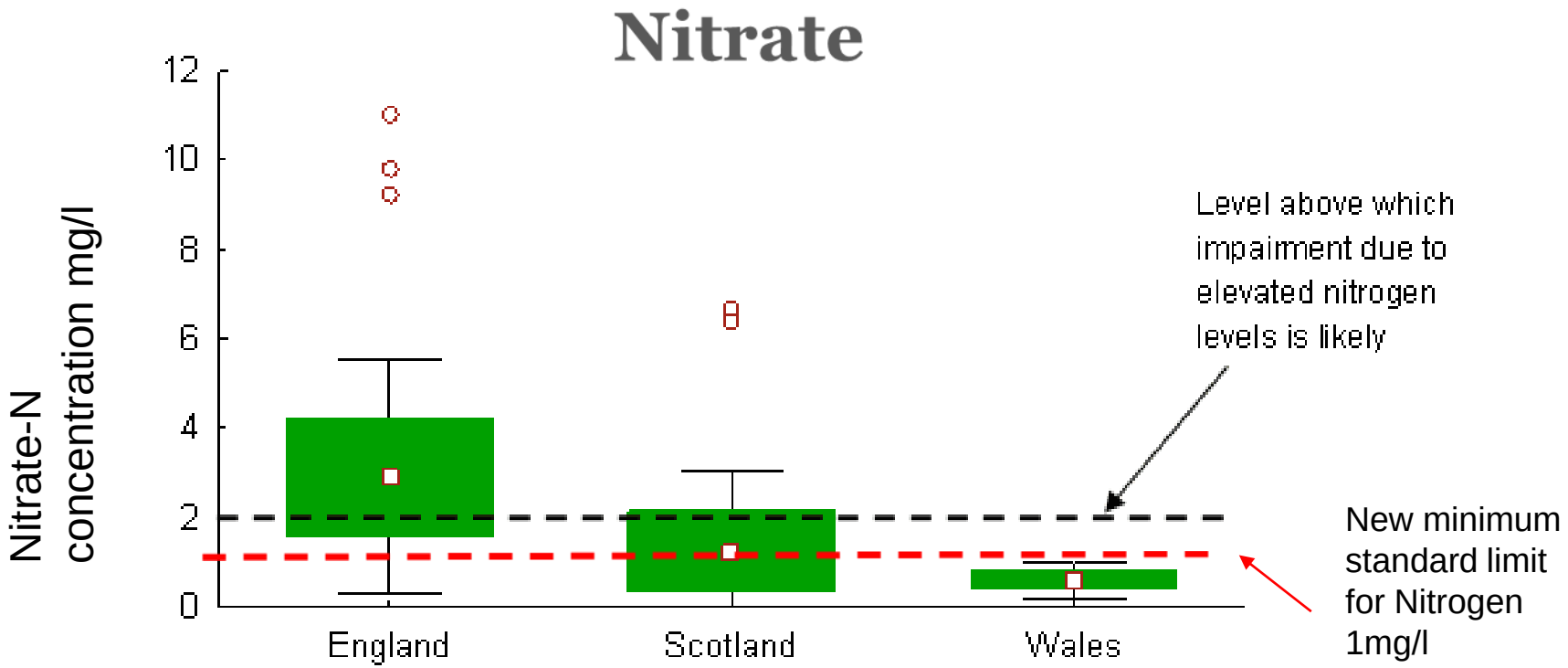
Pond water quality

Data based on Countryside Survey data of c.500 ponds in England, Scotland and Wales.



Pond water quality

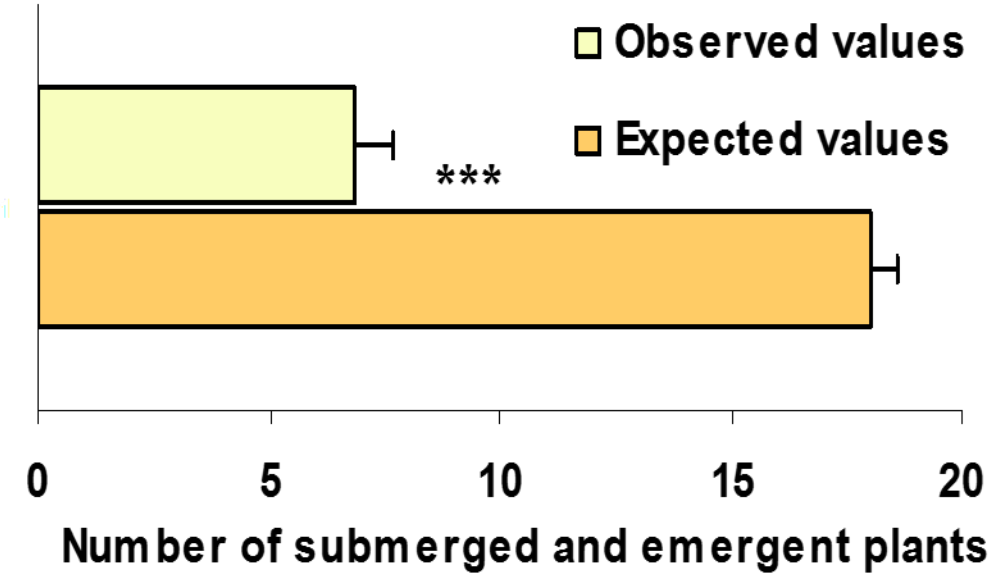
92% of ponds in England and Wales are biologically degraded



What are the effects : Plants

- Plants: submerged species most sensitive
- Very disturbing to see continued retreat under nutrient onslaught
- Marginal plants *also* affected, particularly uncommon species

Countryside Survey 2007 results (published Feb 2010)

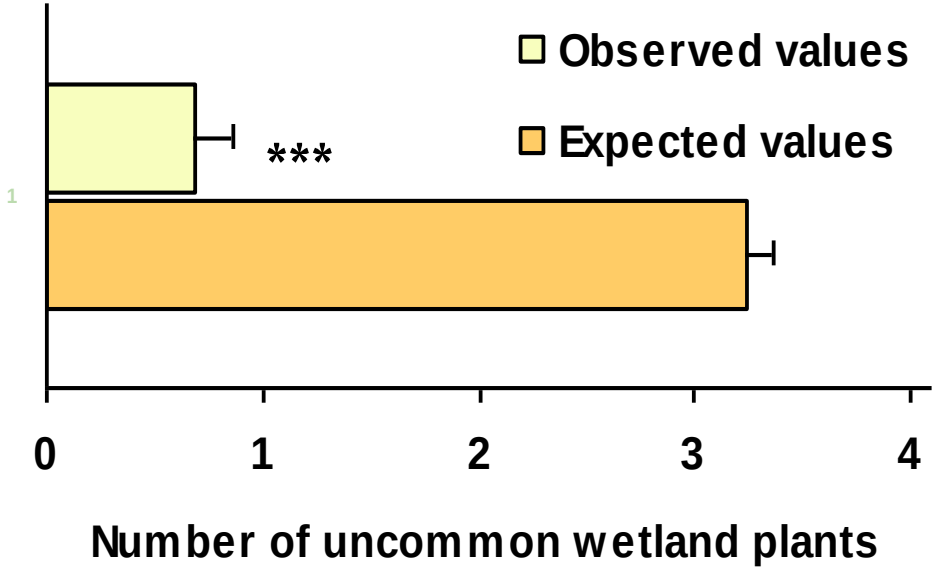


Should be 18 plant species/pond; in fact only 7 High quality sites in protected sites 25 spp. per pond

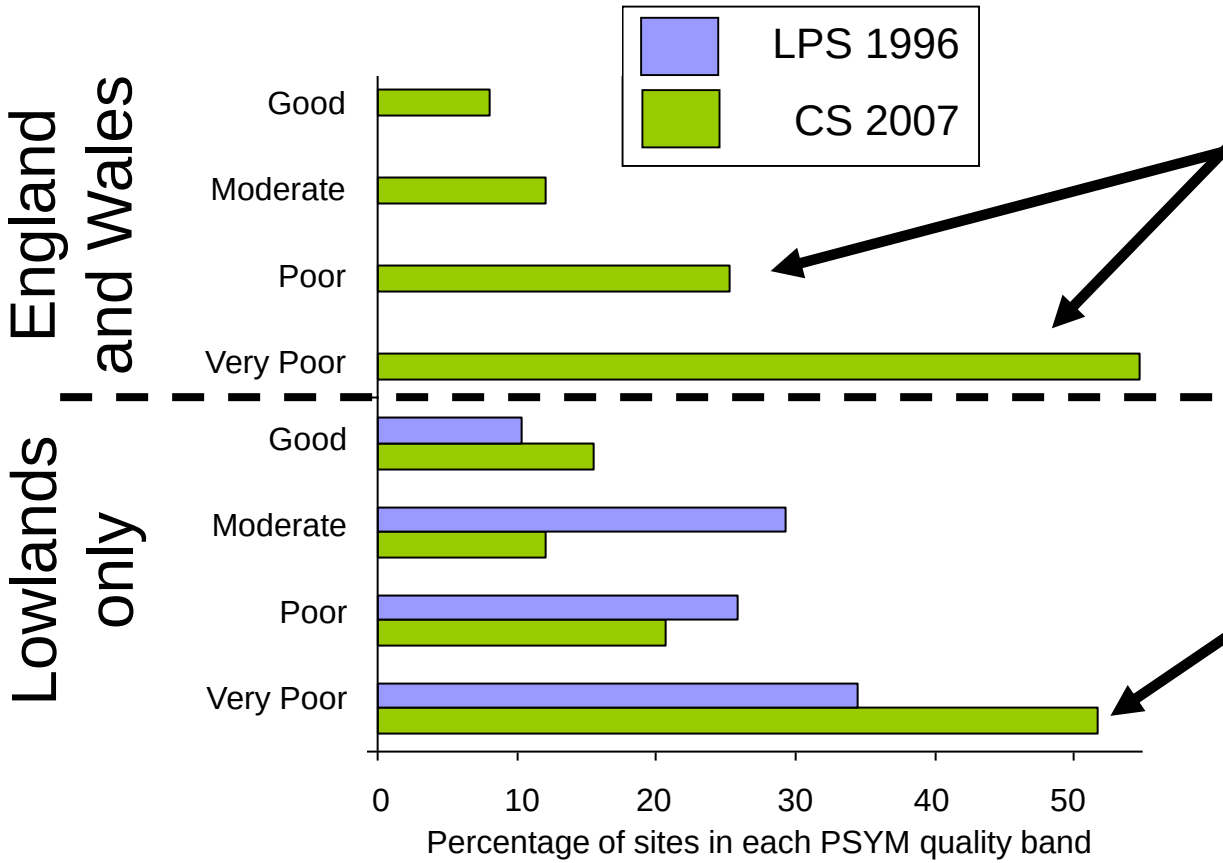
Uncommon Plants

- Uncommon plants: more pronounced effect
- Should be 3 uncommon plant species / pond; in fact only 0.7

Countryside Survey
2007 results
(published Feb 2010)



Changes over time



80% of ponds are in 'Poor' or 'Very Poor' condition

The number of 'Very Poor' ponds has increased by almost 20%

- **Most ponds in the England & Wales are severely degraded, and quality is declining**
- **And behind these data a 20% loss in wetland plant species**

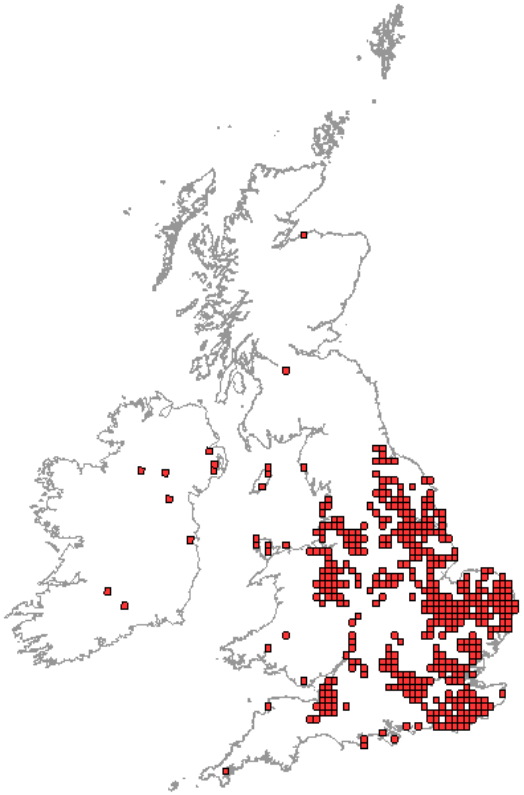
Why are countryside ponds poor and declining?

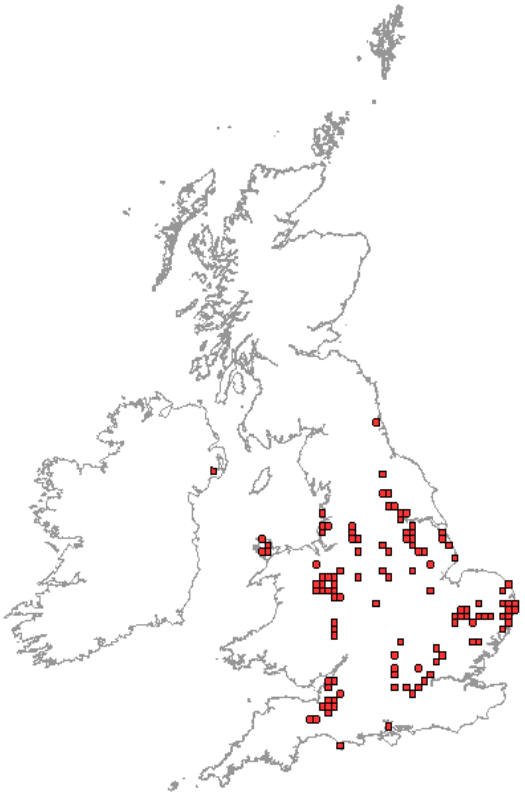
The same as the issues for running waters:

- Intensive agriculture, particularly arable land (nutrients and pesticides)
- High stream inflow volumes (bringing in nutrient rich sediments)
- Presence of road-runoff (nutrients and other pollutants), and
- Increasing tree shade

The effect of pollution

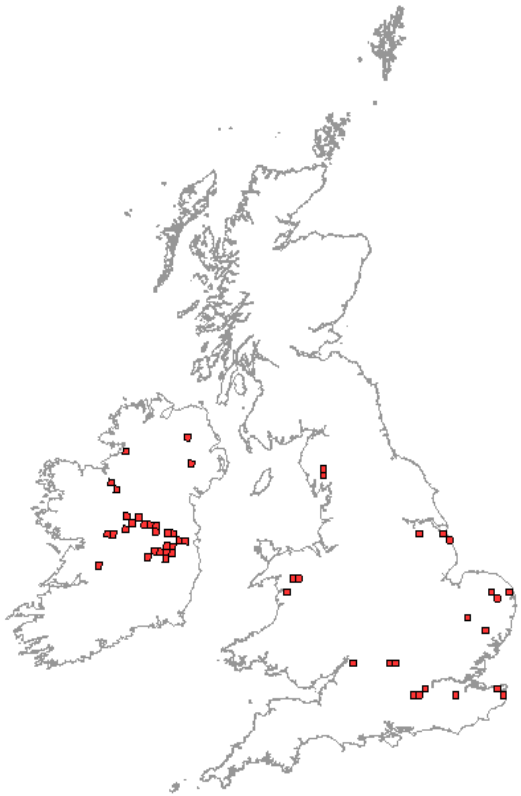
Water-violet





The effect of pollution

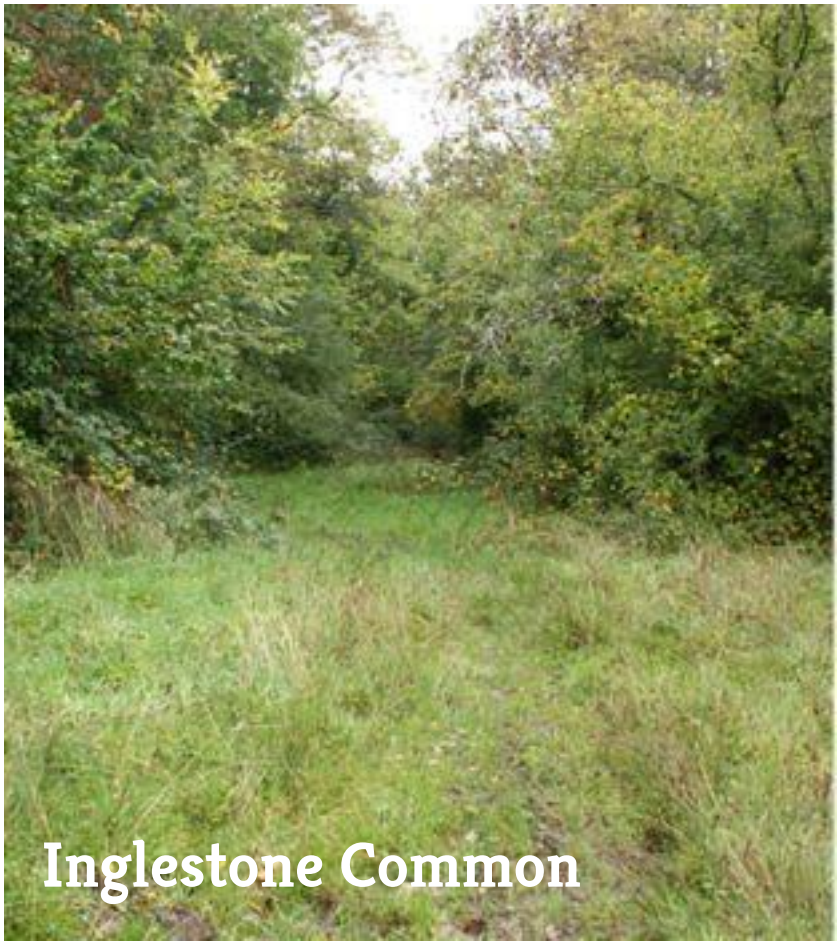
Glutinous snail



The effect of pollution

Arctic Charr

High quality also sites under threat



- 10% of the best pond sites (Flagship Ponds) support 70% of all freshwater species and more than 100 of the rarest freshwater species
- But, bespoke management is often needed to maintain suitable conditions for rare species
- And, knowledge about the best management for freshwater habitats is not well disseminated

Isolated populations are under increased risk of extinction

Many protected sites fail to mention important freshwater species in the site notification

Deterioration of high quality sites

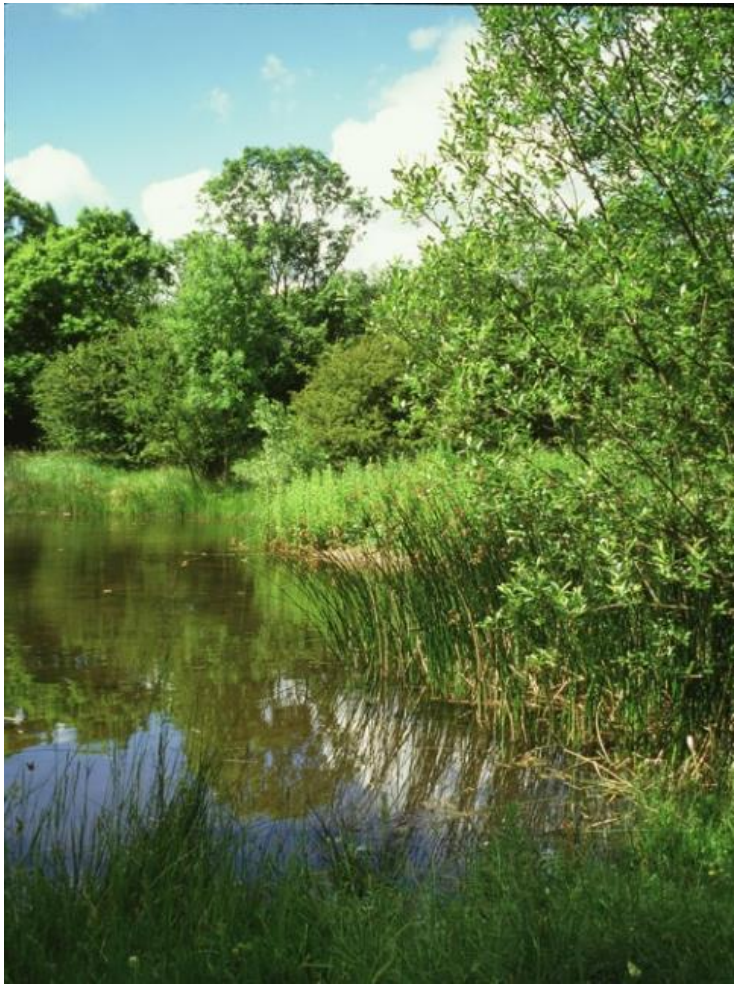
25 years after the first survey of the UK's best pond sites

Worrying **decline** in the number of plant species: 25 spp per pond in the 1990s, to 21 spp in the same ponds today.

Submerged aquatic plants were particularly vulnerable.

Uncommon and rare species have also been badly hit: many ponds losing their most uncommon plants like Water Violet, Frogbit and Tubular Water-dropwort.

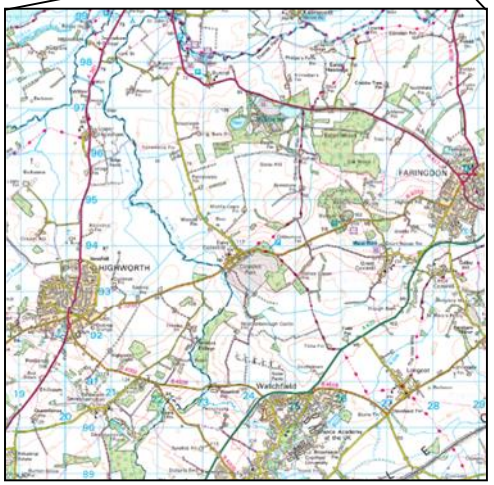
Pond quality is declining even in protected areas



Comparison of ponds with other freshwater habitats

2004: River Cole catchment …

One of first assessments to compare different waterbody types, and showed importance of ponds.



Comparison of (n=80 sites):

- **Rivers**
- **Streams**
- **Ponds**
- **Ditches**

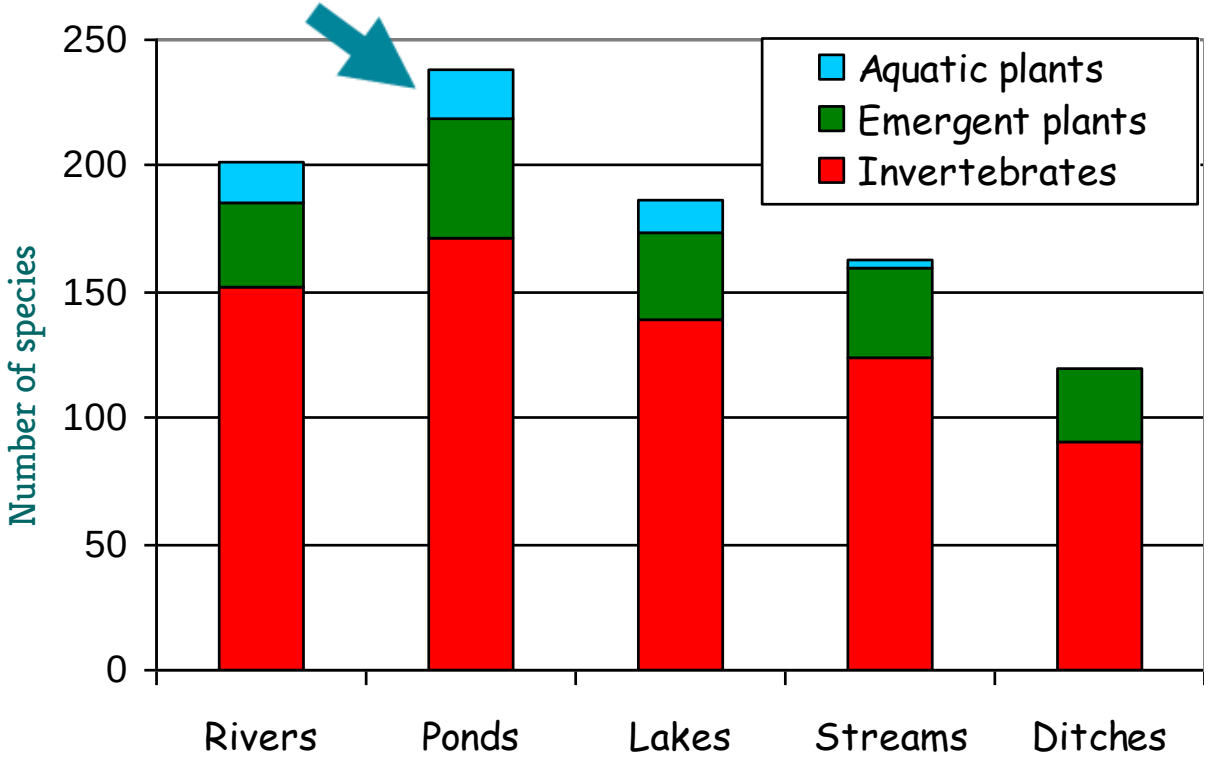
Lowland countryside with intensive farming

Survey of wetland plants and macroinvertebrates

Comparison of ponds with other freshwater habitats

2004: River Cole catchment …

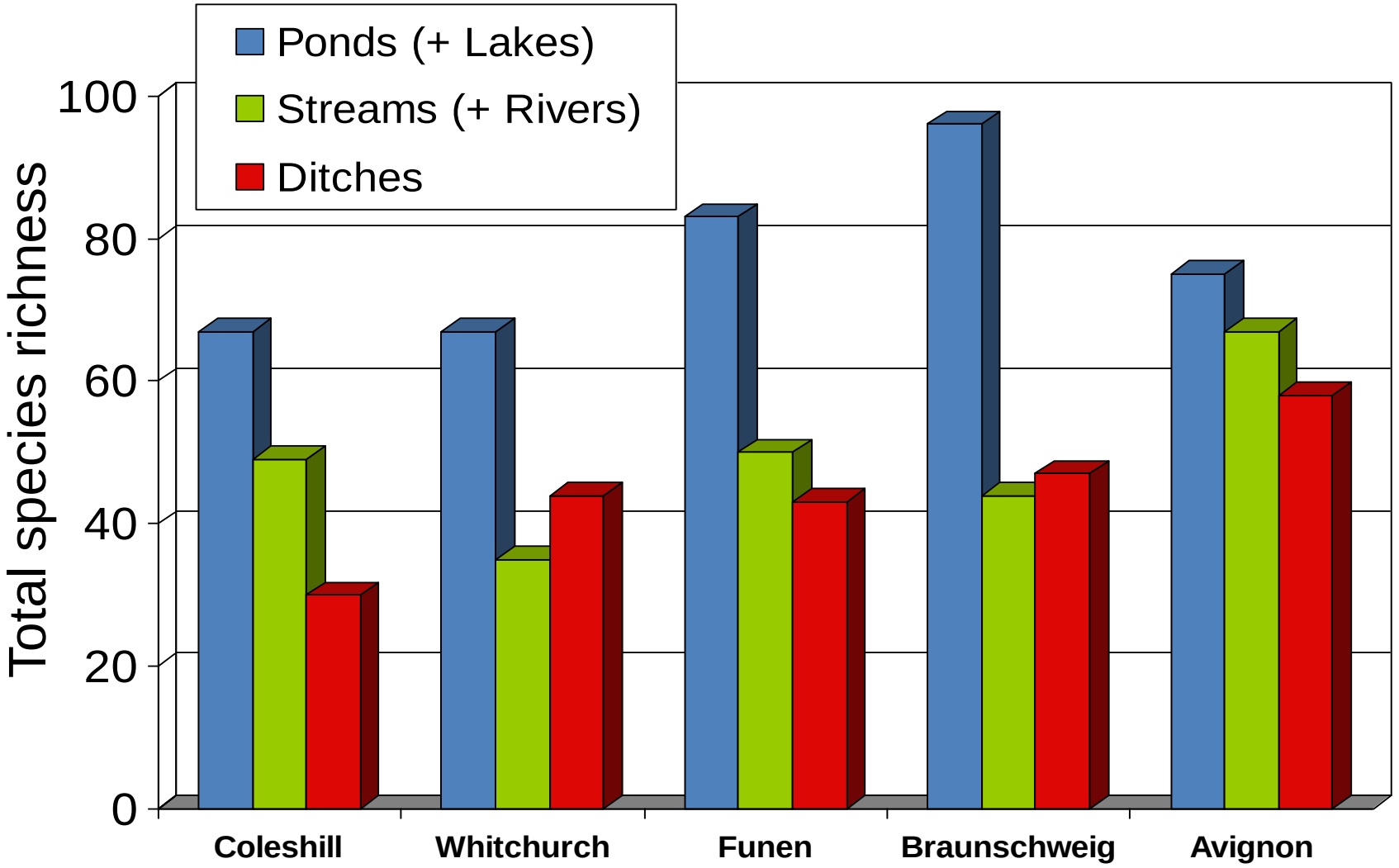
At landscape level, ponds were richest habitat, a result echoed across Europe, and perhaps beyond



Plant and animal species in freshwater habitats in the Coleshill landscape, Oxon/Wilts

Williams et al, 2004, Biological Conservation 115: 329-341

Total plant species richness (gamma diversity)



Williams et al, 2004, Biological Conservation 115: 329-341


clean water

variety

The biotic community will be influenced by……

- Underlying geology (water chemistry)
- Water source
- Hydroperiod
- Pond age
- Surrounding habitat
- Proximity to other wetlands
- Presence and intensity of grazing
- Isolation from sources of anthropogenic impacts

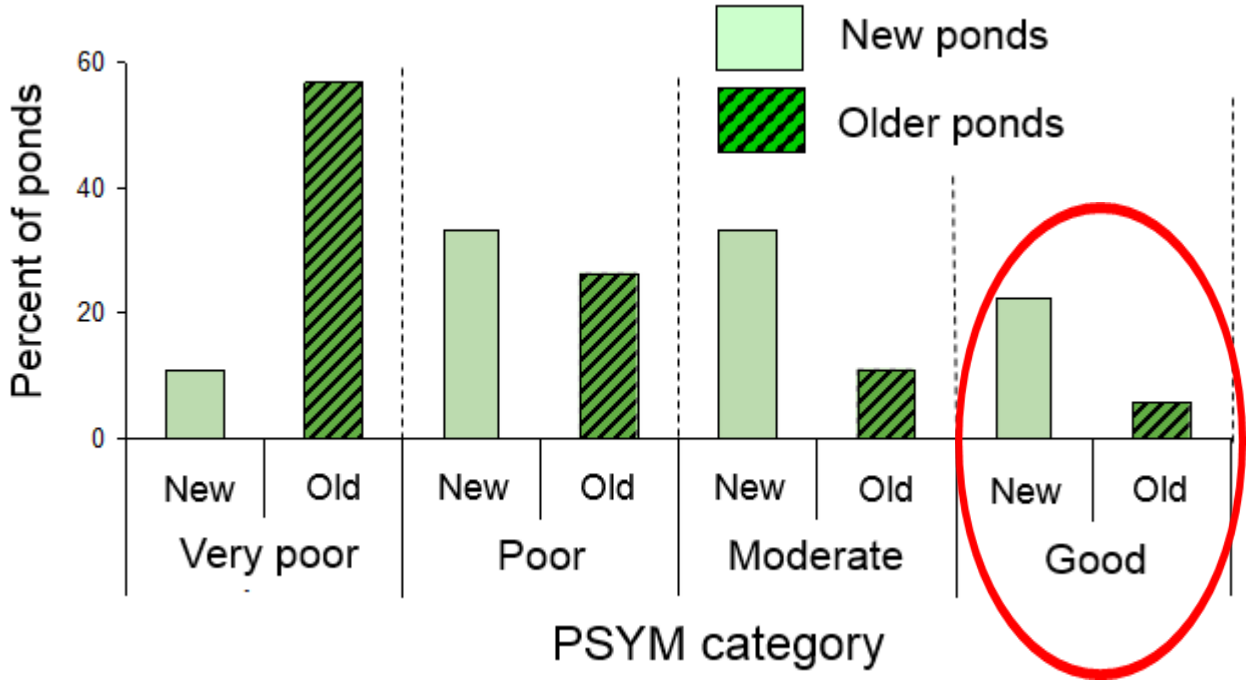
What about new ponds?

- Large number of new ponds are being made: 21/day, 8,000/year
- New pond quality- new ponds colonise quickly

Older pond plant richness =7.9 species/pond
New pond plant richness =10.2 species/pond

PSYM :
'Good' quality ponds
(Priority Ponds)

6% of older ponds
24% of new ponds



Do new ponds retain value?

Very limited evidence, but……

- New ponds located in semi-natural landscapes maintained or improved in value
- Ponds in intensive land use declined between 1996 and 2007.

AND most new ponds are in intensive land use – so expect these to decline as their pollutant burden builds up.

Carl Sayer has shown that in some wetland rich landscapes, management of nutrient rich ponds, taking away the nutrient rich sediments can sustain them if the management is rotated every few years.

New high quality sites can be created

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Conclusions (1 of 2)

- Pond numbers are going up in the UK: 12.5% in the last 9 years
- Pond quality is terrible (80% are in 'Poor' or 'Very Poor' condition)
- And…worryingly (though not unexpectedly), pond quality appears to be declining in the lowlands
- Factors implicated in the decline = usual suspects (intensive agriculture, nutrients, inflows, road runoff, shade)
- But wetlands nearby help = protective networks

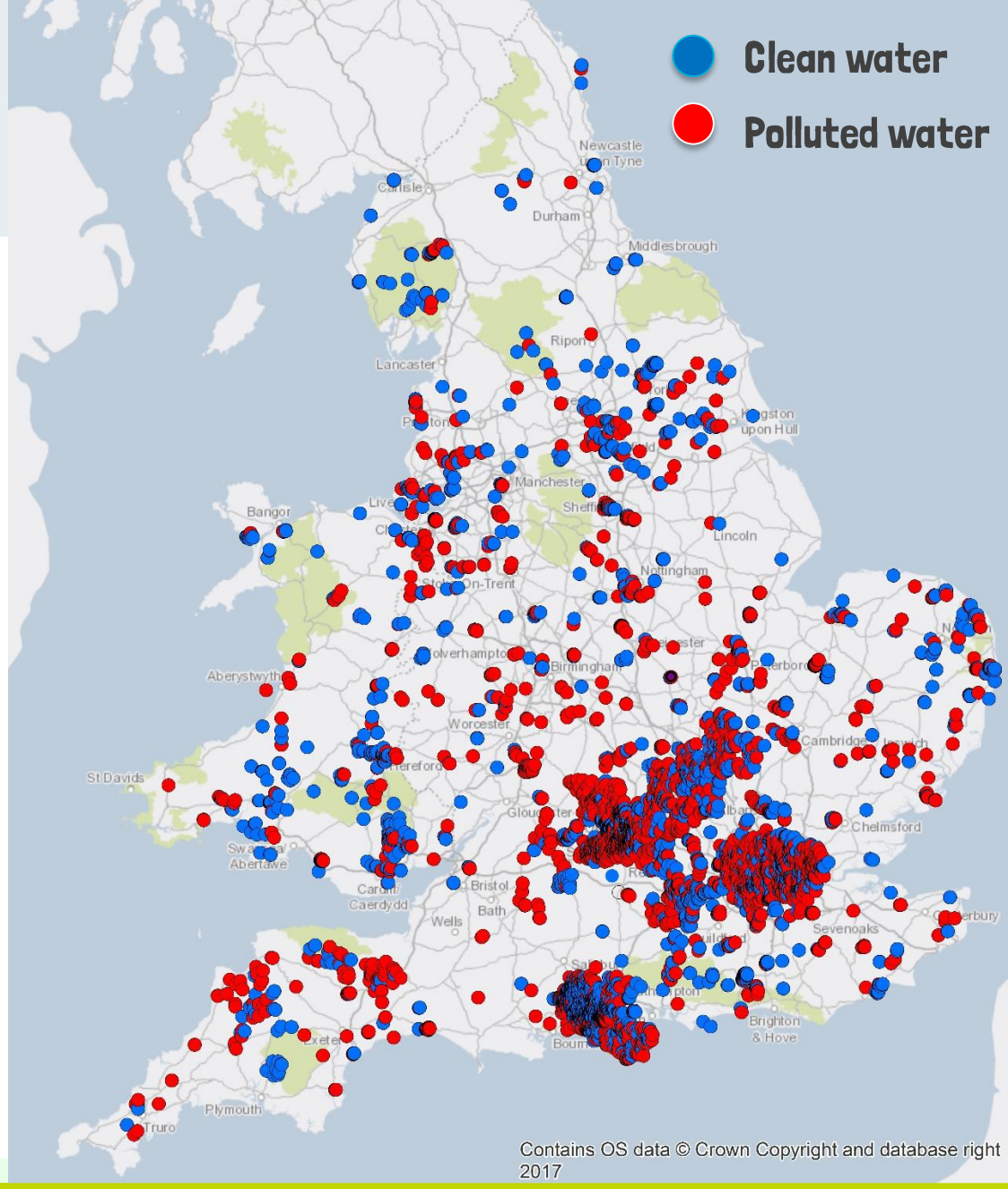
Conclusions (2 of 2)

- Many thousand new ponds are being created each year
- Their quality is high compared to existing ponds
- BUT – will it last – probably not as most new ponds begin to fill with pollutants
- Overall = bad news
- What's the answer? We need to identify the best, build out from the best areas – a Freshwater Network
- We need to create lots of new high quality ponds with clean catchments, and no inflows, no road-runoff – ponds that will help to enhance the protective network effect and maintain pond biodiversity.

Clean Water Monitoring…..

Clean Water for Wildlife

- **The bad news** - is the extent of nutrient pollution.
- **The good news** - people found clean unpolluted water in all the landscapes they tested.
- **More good news** - the results reveal for the first time the national importance of ponds in the clean water network.



The Ock Catchment

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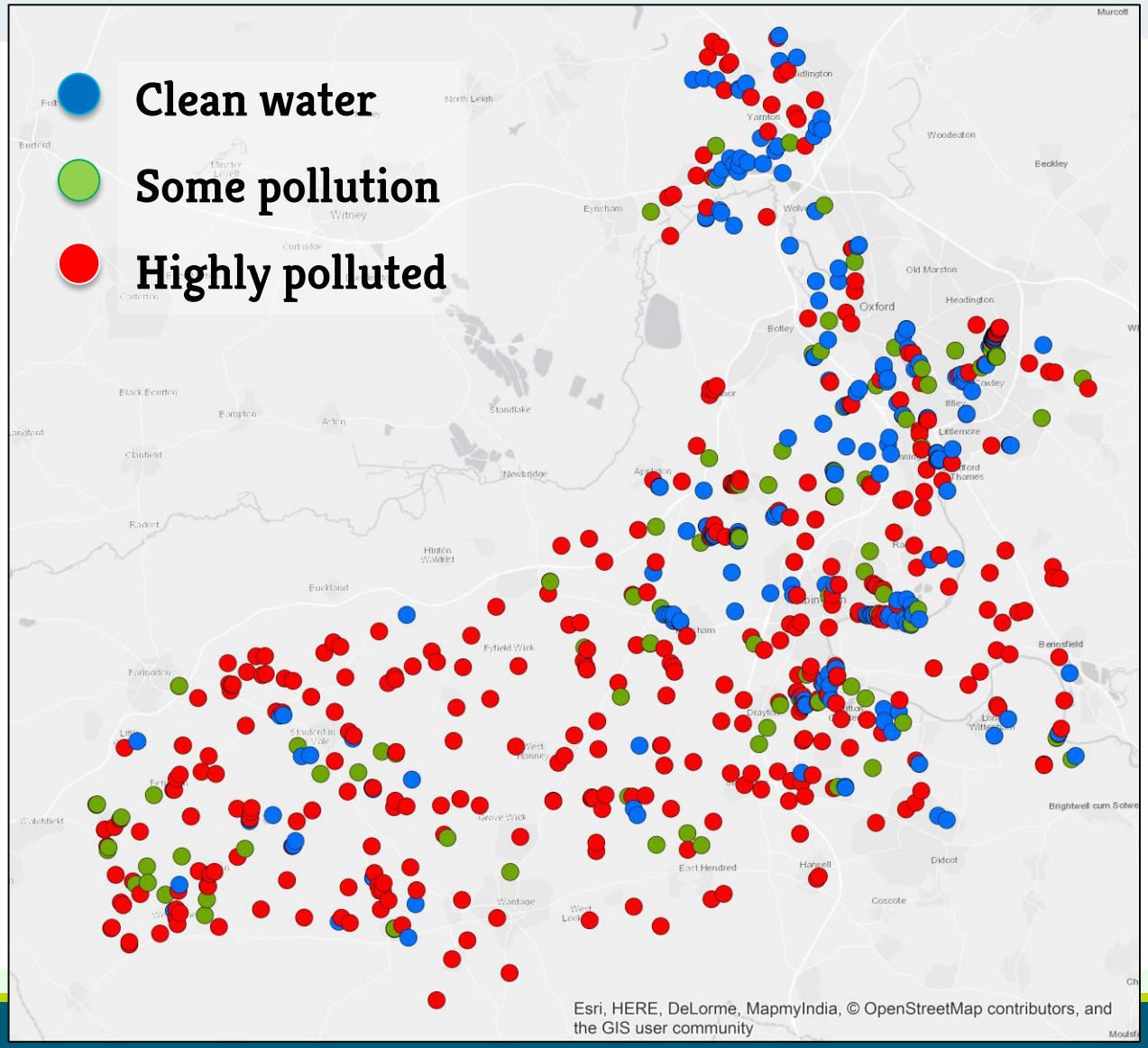
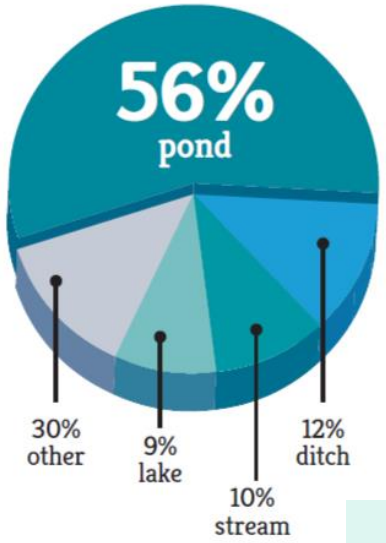
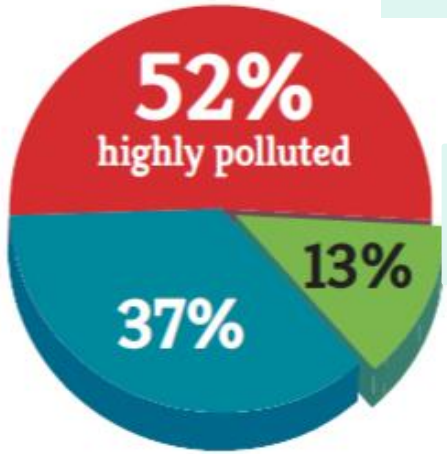
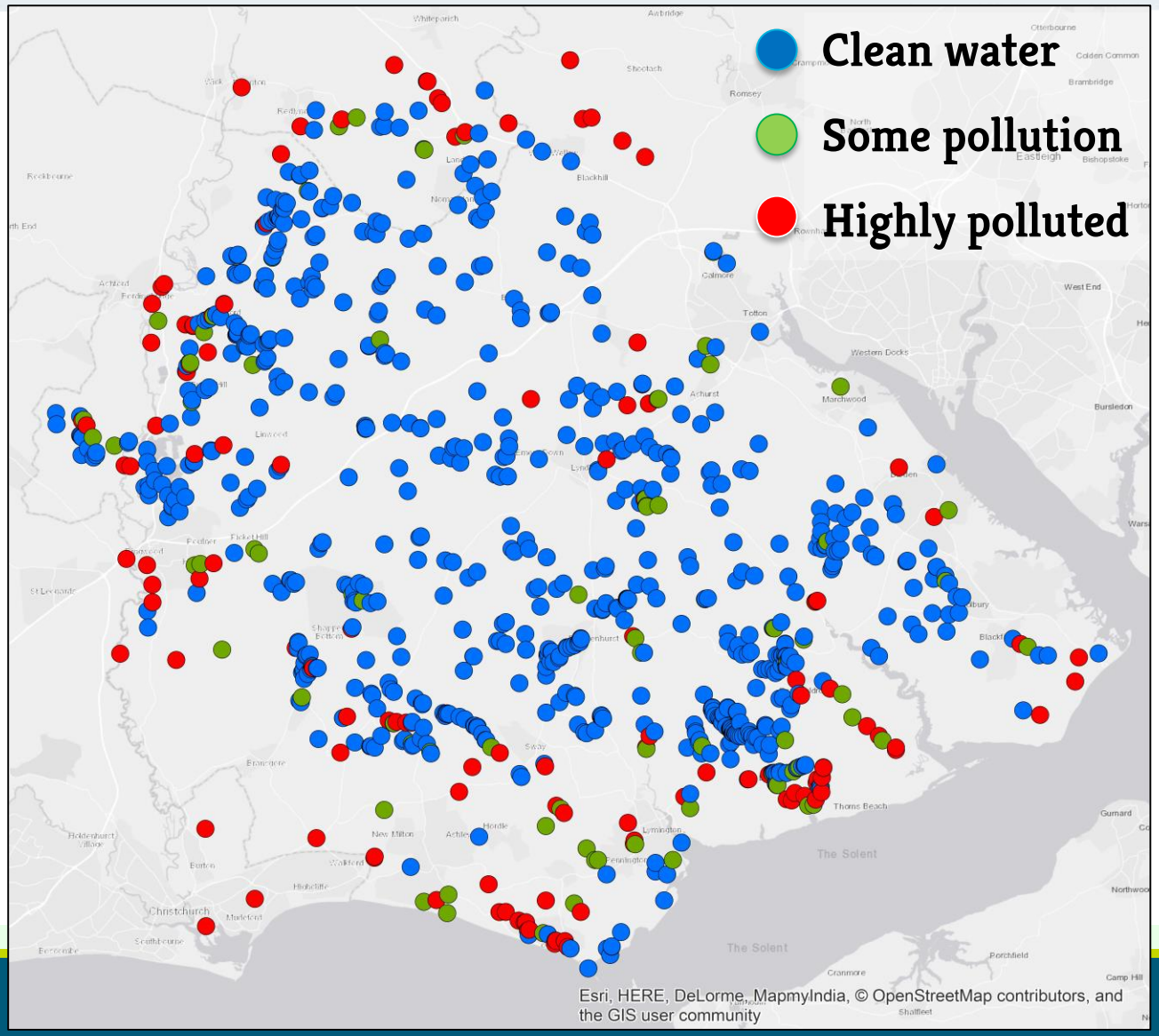
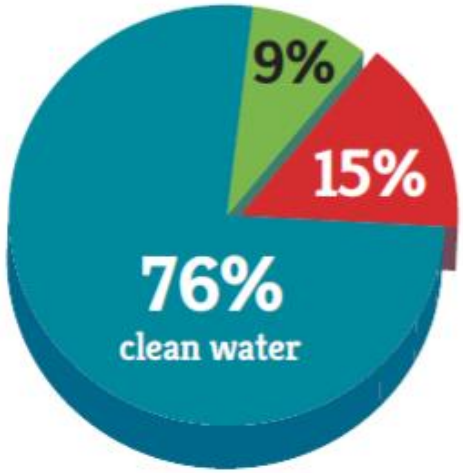






The New Forest





The best sites for freshwater wildlife are free from nutrient pollution

The Lower Windrush Valley

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A outstanding mosaic of wetland habitats of different ages, including lakes, ponds, rivers, ditches, streams and seepages - very rich in plants and animals, of *national* importance for stoneworts

http://www.oxfordshire.gov.uk/lowerwindrushvalleyproject

Level of nutrient pollution in the LWV 2016

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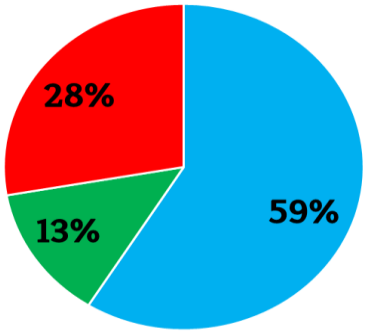
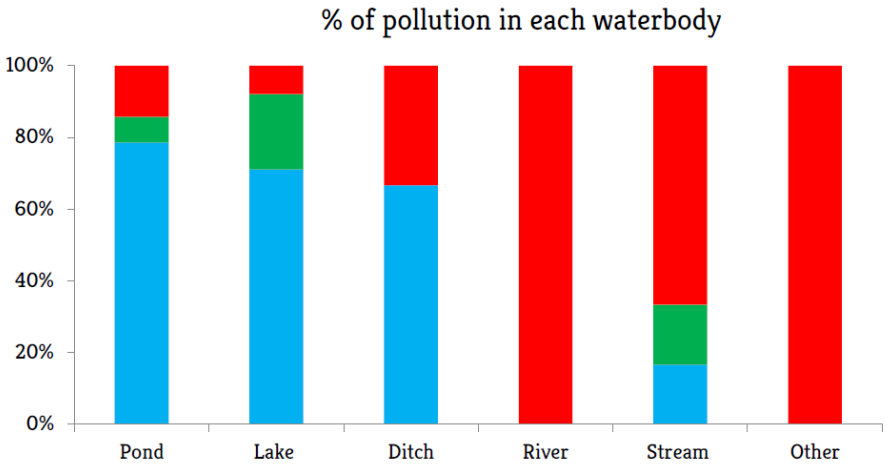
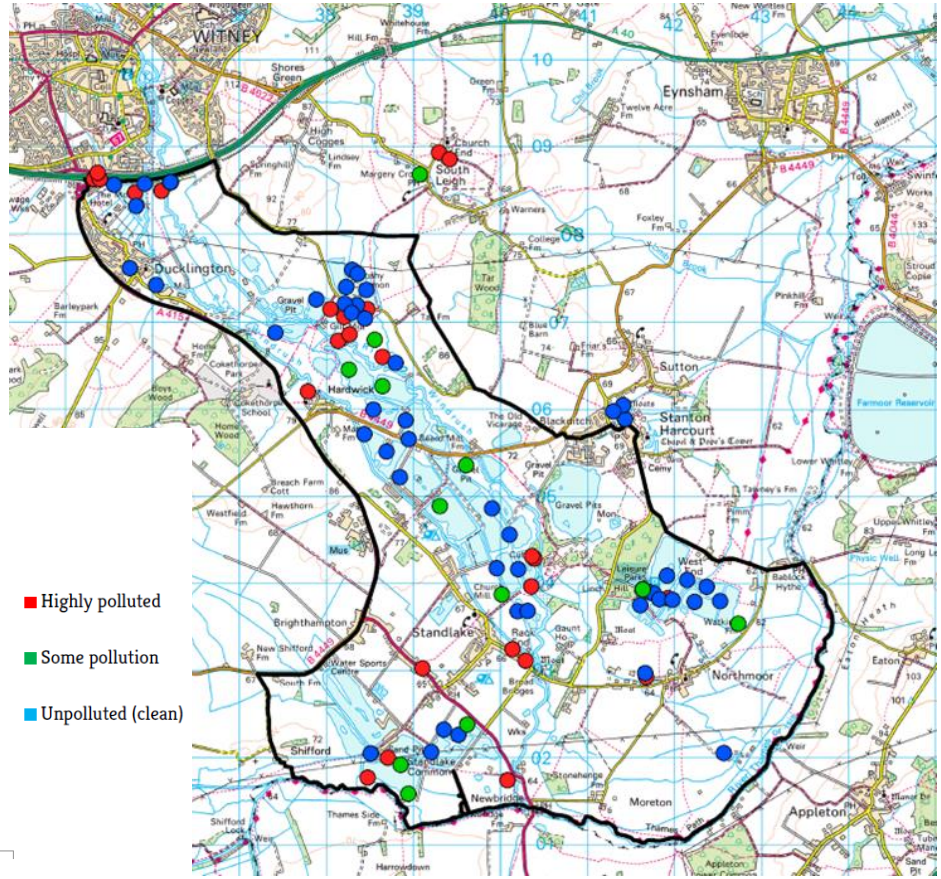






LWV Results 2016

Freshwater Habitats Trust

Table 1: Level of nutrient pollution

	Unpolluted (clean)	Some pollution	Highly polluted	Total
Ponds	22	2	4	26
Lake	27	8	3	38
Ditch	2	0	1	3
River	0	0	8	8
Stream	2	2	8	12
Other - well	0	0	1	1
TOTAL	53	12	25	90

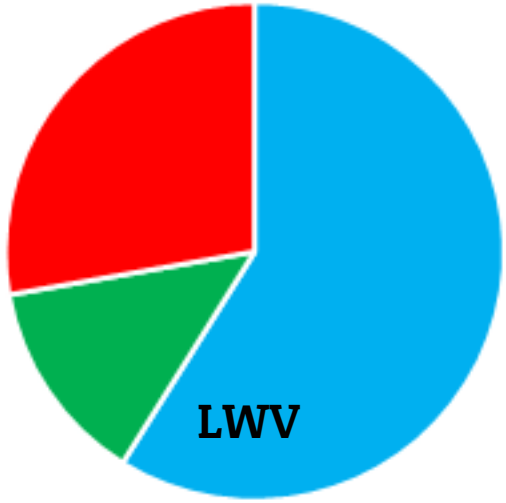
c. 40 volunteers collected 90 samples over 1 month

FHT supplied the nutrient kits, LWV coordinated the volunteers and the collation of results

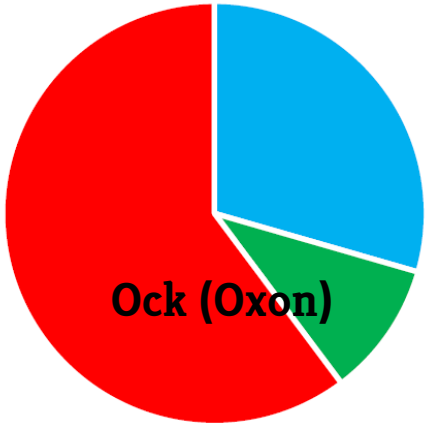
Understanding LWV Results 2016

- **Clean water is concentrated in ponds and lakes.**
- **The majority of streams and all the rivers suffer serious nutrient pollution.**
- This is not surprising because the river networks drain water from large areas of land with multiple sources of pollution from urban and agricultural areas.
- In contrast, many ponds can collect water from locally clean sources and the gravel pit lakes in the LWV also tend to have unpolluted land around them.
- Both lakes and ponds in the LWV are often fed by groundwater flowing very slowly through gravel, which helps keep the water clean and free from nutrient pollution.

How does the LWV compare?



Highly polluted
Some pollution
Unpolluted (clean)



Where is the clean water?

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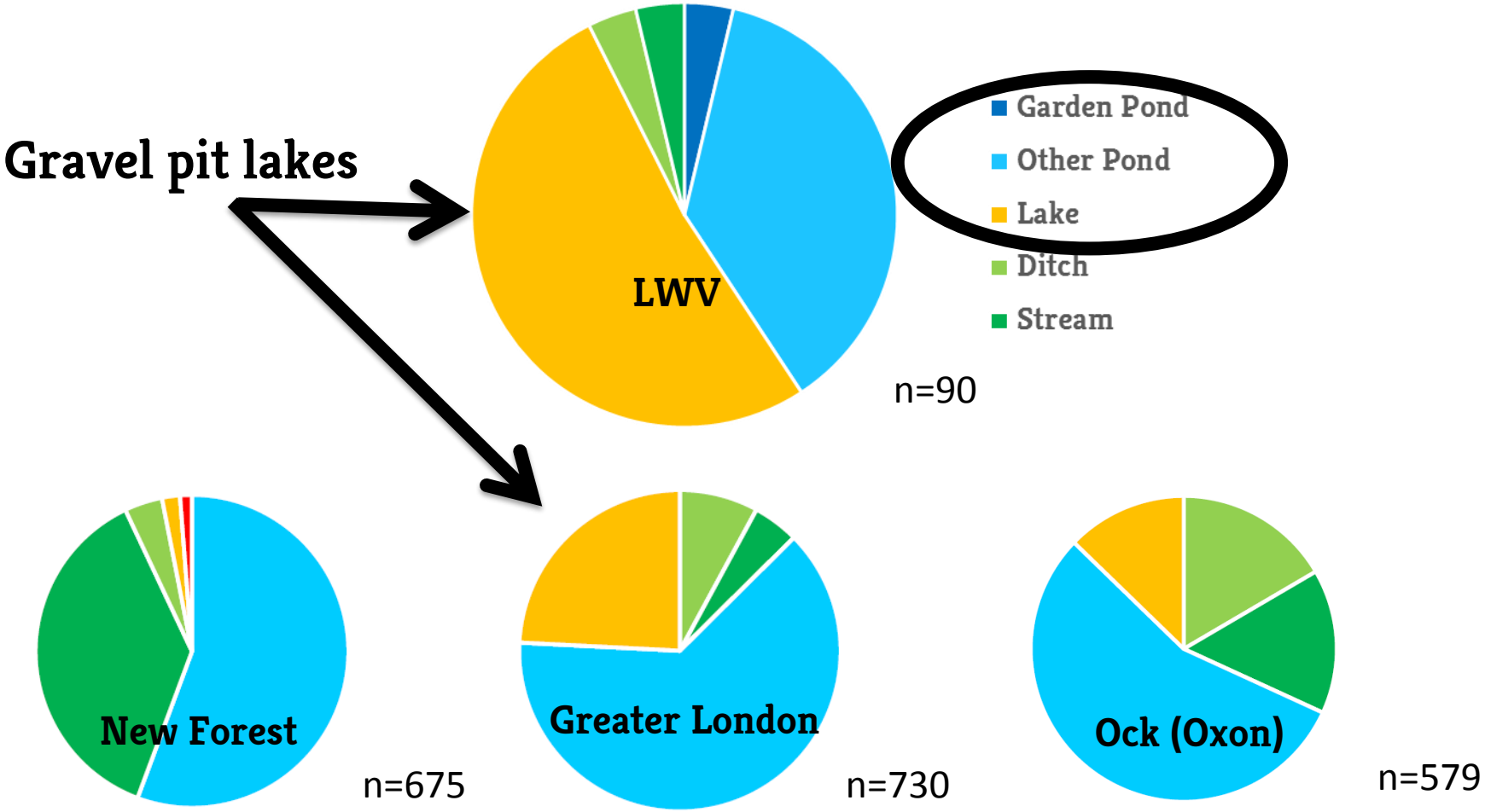


Clean Water Monitoring…..

Monitoring Clean Water with the National Trust

Freshwater Habitats Trust

Clean Water for Wildlife Monitoring Aims

- 1,000 waterbodies over next 4 years
- 400 samples this year – focussed on 8 Riverlands Catchments
- c. 50 kits per property

Properties can buy extra kits

- Landscape scale monitoring
- Join the survey outside of Riverlands areas

Where should you survey

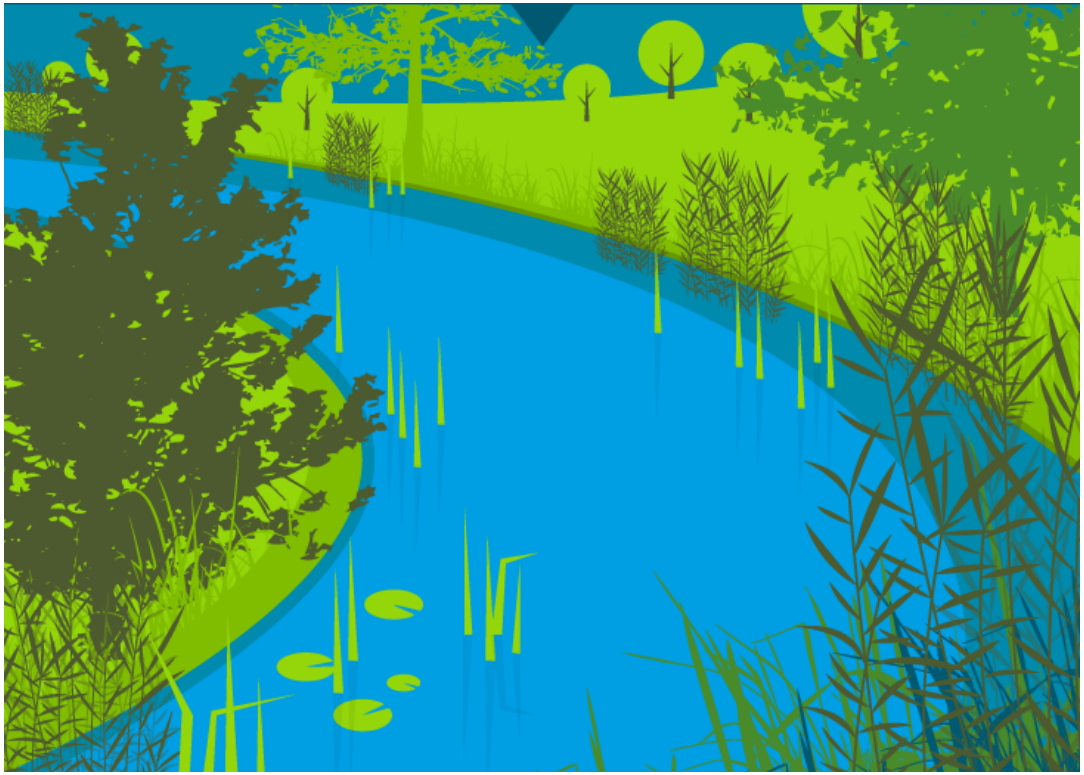
Freshwater Habitats Trust

Running water: Streams

Streams are small running waters mainly formed by natural processes, although they are often substantially modified by human activity.

Mostly unmonitored, pay particular attention to getting at least one sample from every stream on the property.

Running water: Rivers



Rivers are large running waters created mainly by natural processes but often greatly altered by centuries of human activity.

A lower priority for this survey. But collecting one sample from any main rivers which flow through the property will provide context for the other results.

Running water: Ditches

Ditches are man-made waterbodies that are used mainly to drain the land.

Collect samples from ditches - they can be amongst the most biodiverse freshwater habitats, if they are part of historic drainage systems in semi-natural wetlands.

Standing water: Ponds

A pond can be defined as a body of water (normally fresh water, but occasionally brackish), which can vary in size between 1 square meter and 2 hectares (this is equivalent in size to about 2.5 football pitches), and which holds water for four months of the year or more.

A priority for the National Trust surveys.
Aim to collect one sample from every pond on the property.

Types of Ponds: Field Pond

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Loddington in Leicestershire

Types of Ponds: Dune Slack Pond

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Winterton Dunes, Norfolk –

breeding habitat for Natterjack Toads (*Epidalea calamita*)

Types of Ponds: Turf Pond

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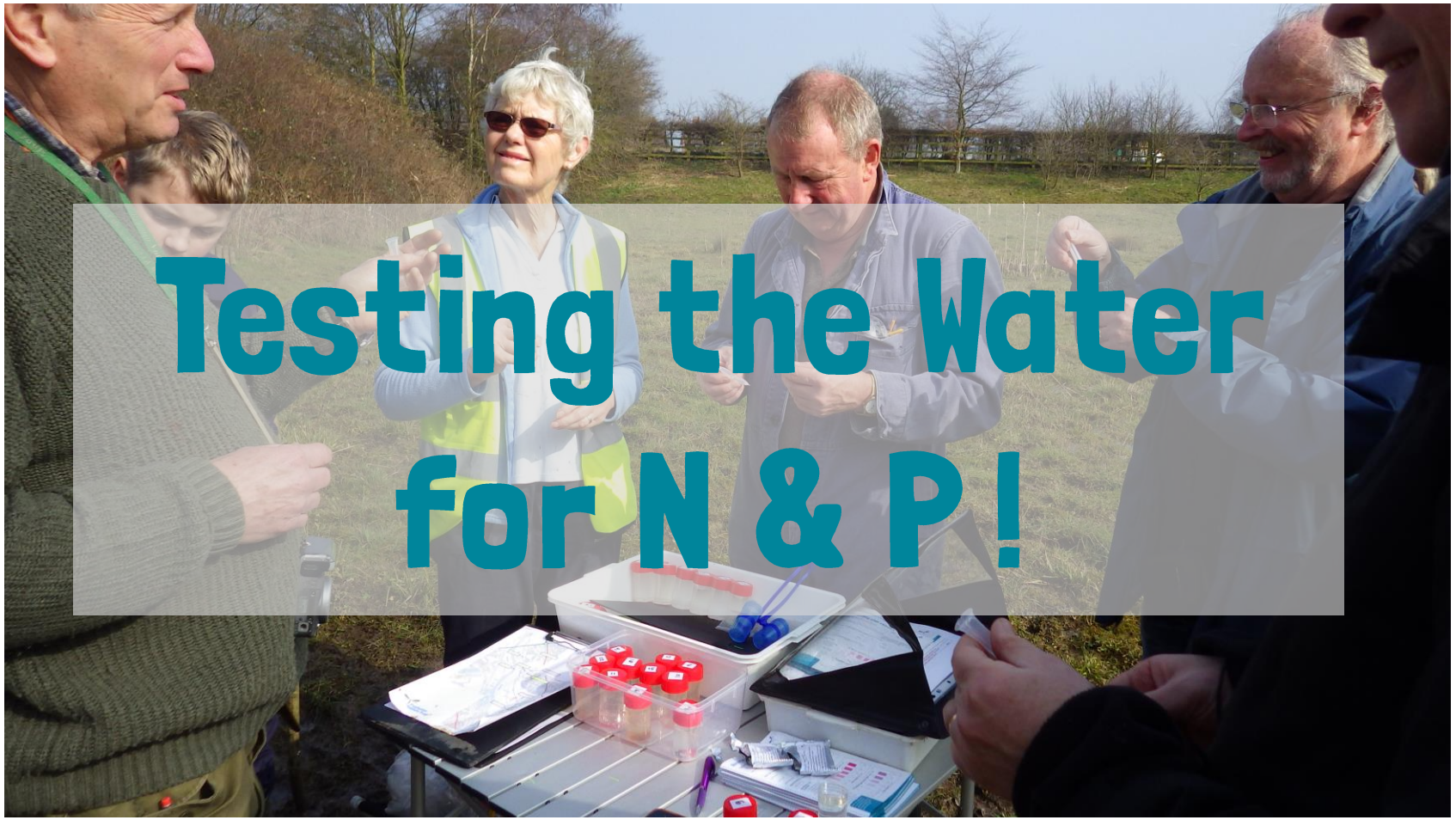
Redgrave and Lopham Fen (Suffolk)
hunting ground for Fen Raft Spider *Dolomedes plantarius*

Types of Ponds: Tree Fall Pond

Freshwater Habitats Trust

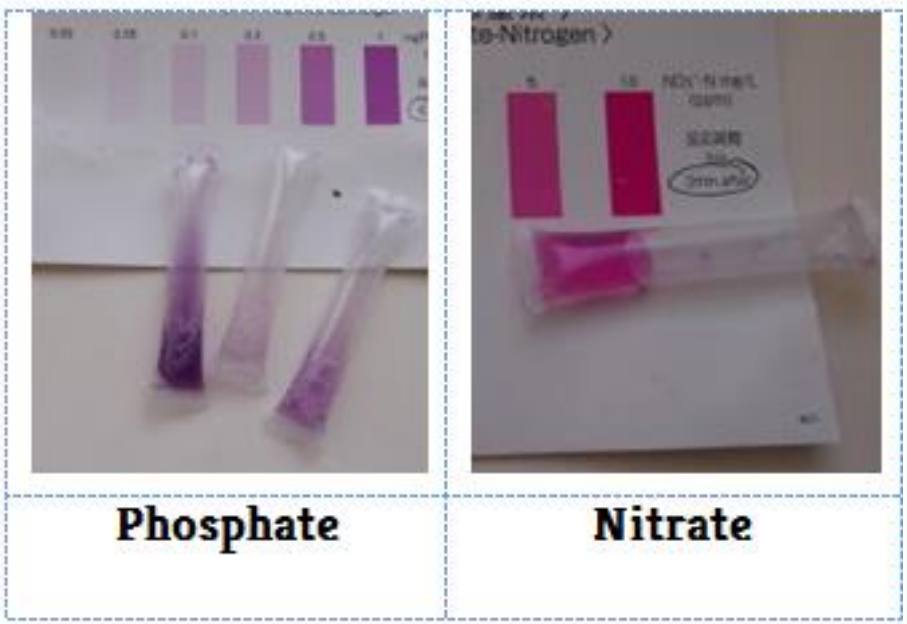
New Forest in wet woodland –
inhabited by Pond Mud Snail*Omphiscola glabra*

Clean Water Monitoring…..



Clean Water for Wildlife

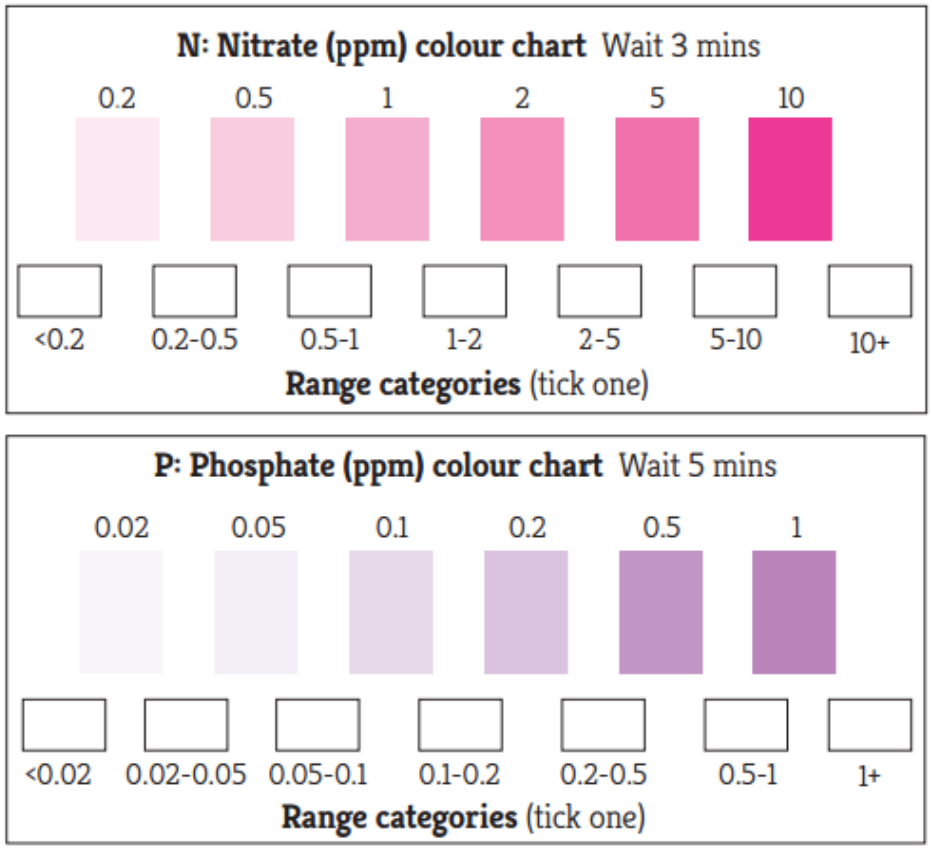
- Nutrient pollution is invisible so often doesn't seem 'real' to people.
- Quick kits makes it possible for people to easily 'see' pollution for the first time.
- Opportunity to get data from sites which would not otherwise be monitored – cheaply.

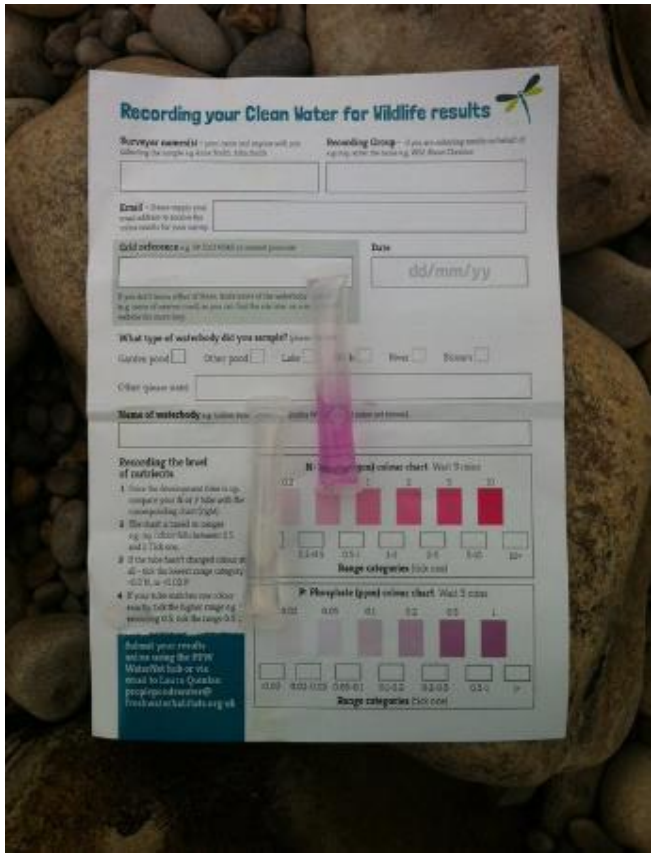


Phosphate

Nitrate

Clean Water for Wildlife

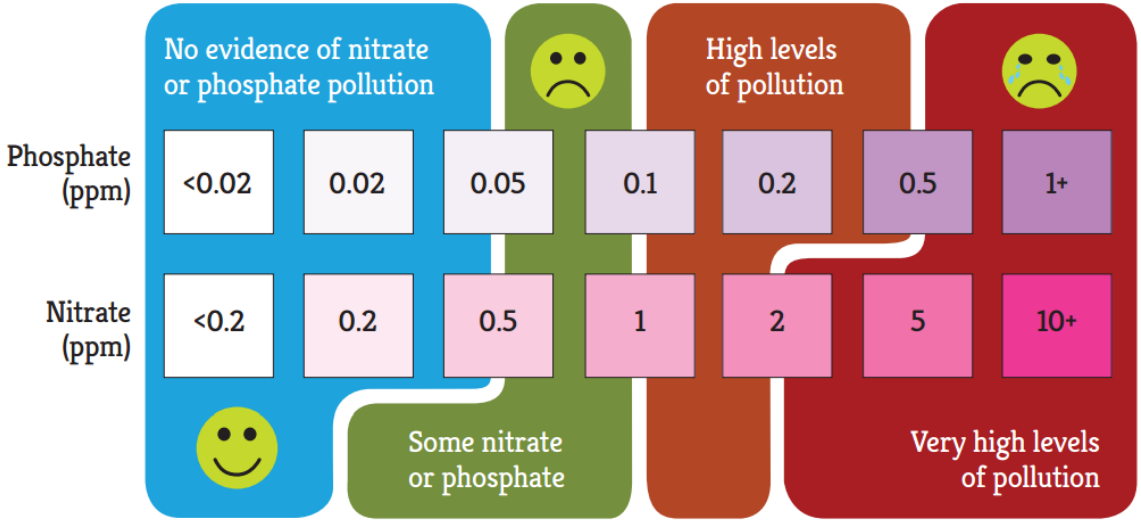




Classifying sites

Three categories:

- No evidence of nitrate or phosphate pollution
- Some nitrate or phosphate pollution
- High or very high level of pollution



P: Categories intended to match 'High' (blue) and 'Good' (green) Water Framework Directive status

N: categories reflect literature values for High status

Demonstration …

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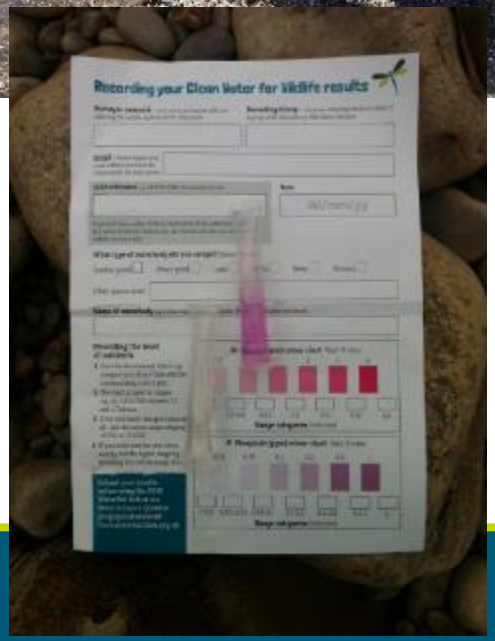
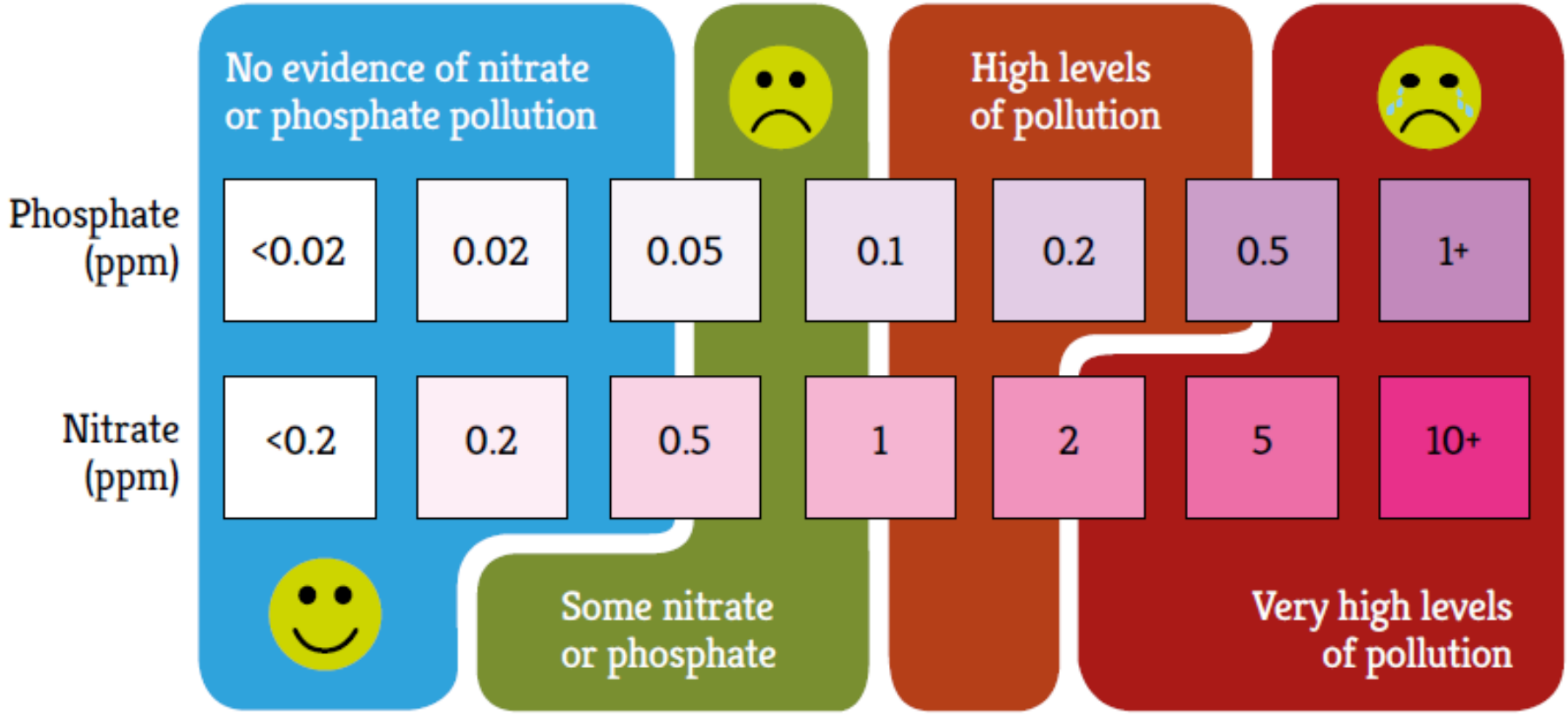


Demonstration …

Freshwater Habitats Trust



CWW Demonstration video

https://freshwaterhabitats.org.uk/projects/clean-water/

Protect yourself - protect the site

Freshwater Habitats Trust

Clean Water for Wildlife
Health and Safety Guidance Note

LOTTERY FUNDED

This guidance note provides an outline of best practice in terms of health and safety when collecting your Clean Water Samples. This includes the use of the PackTest nitrate and phosphate water testing kits and considers the risks you should be aware of when collecting samples from a variety of freshwater habitat types – incl. ponds, lakes, rivers, streams and ditches.

In an emergency please contact the emergency services - 999

Your responsibility

Whilst taking part in the Clean Water for Wildlife survey you have the responsibility of ensuring that you undertake the sampling considering you own health and safety and the health and safety of others around you. You should not put yourself in a position that could place you, or others, in danger. You are under no obligation to participate in or continue with the survey if it is not safe to do so. You are under no obligation to visit a particular site, even if the survey organisers have suggested it. If you have any health and safety concerns about the survey, you should stop the survey and raise your concerns with Freshwater Habitats Trust peoplepondswater@freshwaterhabitats.org.uk.

Risk assessment

Before undertaking the Clean Water for Wildlife survey, you should consider the health and safety hazards associated with the site where you plan to collect your water sample and whether individual circumstances or any medical conditions expose you to particular hazards. Generic areas of risk when undertaking the Clean Water for Wildlife survey is given below. However, you should identify the potential risks specific to the site you are visiting and apply practical precautions to minimise the level of any risks. You should also pass this health and safety information on to anyone else who is helping you undertake the Clean Water for Wildlife survey.

Access permission

Permission to visit your field site will have been sought from relevant landowners/ managers in advance of your visit. Always obtain permission from the landowner or tenant to enter any private land not subject to open access legislation, before collecting your clean water sample. You may not need permission to collect a water sample where the pond, river, lake, stream or ditch can be accessed from a public footpath, or where the waterbody is within open access land. If you can contact the landowner to explain what you are doing and why, this is always the best option. Do not continue with the survey if access permission is refused. In all cases, please abide by The Countryside Code www.countrysideaccess.gov.uk.

Parking

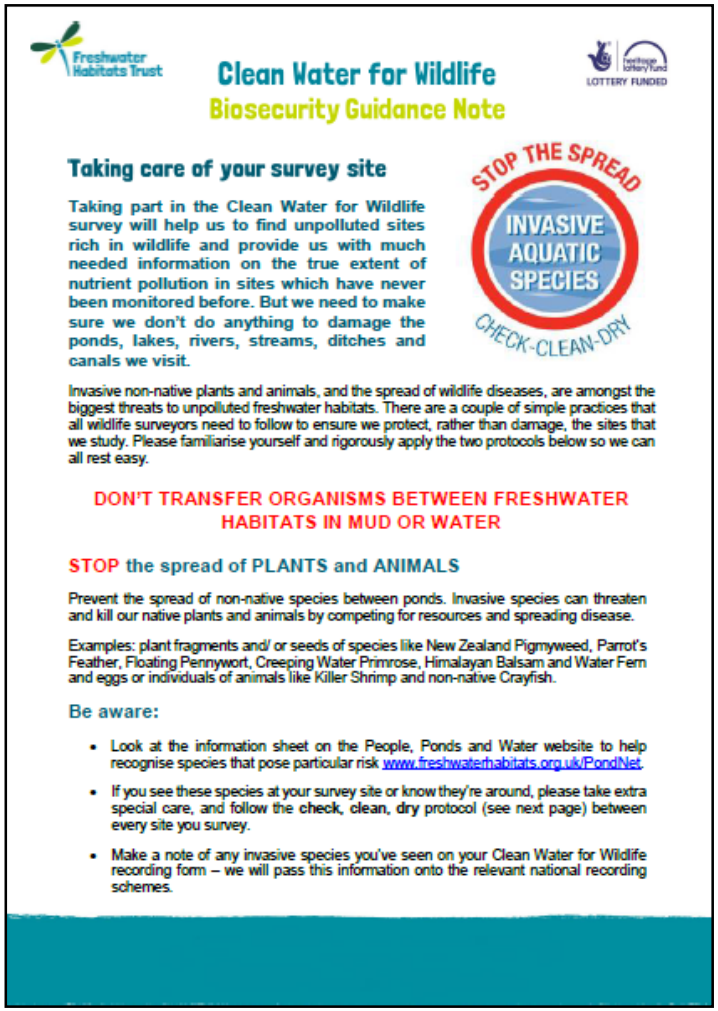
When visiting a site take care to park cars sensibly, preferably off-road, and do not block entrances. A notice in the car window can be useful to alert locals to your purpose and contact details (a car windscreen sign can be downloaded from our website).

Mobile phones

It is advisable to carry a mobile phone, as they may be useful in case of an emergency. Please note that mobile phones may not work in some remote areas. In case of an emergency you can use either the European Emergency Number (112) or 999 (see www.eena.org for more information). 112 can be dialled even if the keypad is locked.

Contact

Clean Water for Wildlife is one of three projects within Freshwater Habitats Trust's 'People, Ponds and Water Project', funded by the Heritage Lottery Fund
Project Administrator
T: 01865 595502 e: peoplepondswater@freshwaterhabitats.org.uk



Freshwater Habitats Trust

Clean Water for Wildlife
Biosecurity Guidance Note

LOTTERY FUNDED

Taking care of your survey site

Taking part in the Clean Water for Wildlife survey will help us to find unpolluted sites rich in wildlife and provide us with much needed information on the true extent of nutrient pollution in sites which have never been monitored before. But we need to make sure we don't do anything to damage the ponds, lakes, rivers, streams, ditches and canals we visit.

STOP THE SPREAD
INVASIVE AQUATIC SPECIES
CHECK-CLEAN-DRY

Invasive non-native plants and animals, and the spread of wildlife diseases, are amongst the biggest threats to unpolluted freshwater habitats. There are a couple of simple practices that all wildlife surveyors need to follow to ensure we protect, rather than damage, the sites that we study. Please familiarise yourself and rigorously apply the two protocols below so we can all rest easy.

DON'T TRANSFER ORGANISMS BETWEEN FRESHWATER HABITATS IN MUD OR WATER

STOP the spread of PLANTS and ANIMALS

Prevent the spread of non-native species between ponds. Invasive species can threaten and kill our native plants and animals by competing for resources and spreading disease.

Examples: plant fragments and/ or seeds of species like New Zealand Pigmyweed, Parrot's Feather, Floating Pennywort, Creeping Water Primrose, Himalayan Balsam and Water Fern and eggs or individuals of animals like Killer Shrimp and non-native Crayfish.

Be aware:

- Look at the information sheet on the People, Ponds and Water website to help recognise species that pose particular risk www.freshwaterhabitats.org.uk/PondNet.
- If you see these species at your survey site or know they're around, please take extra special care, and follow the **check, clean, dry** protocol (see next page) between every site you survey.
- Make a note of any invasive species you've seen on your Clean Water for Wildlife recording form – we will pass this information onto the relevant national recording schemes.

https://freshwaterhabitats.org.uk/projects/clean-water/

Protect yourself - protect the site

We advise that you always work in pairs

Find a safe place to access the water to collect your sample

Regard all water as a potential source of disease. There are several pathogens that can be contracted from water.

- Do not immerse open cuts in water
- Do not ingest pond or river water
- Do not consume food or drink or smoke cigarettes during survey work
- Wash hands thoroughly after a survey.

Protect yourself - protect the site

Freshwater Habitats Trust

Prevent the spread of non-native plants, animals, fungi and diseases, e.g. Chytrid, Ranavirus , etc.

CHECK – CLEAN – DRY and stop the spread

- **CHECK** your equipment and clothing for live organisms, plant fragments or seeds, even the difficult to see spots.
- **SCRAPE** wet/dry mud off all footwear and equipment with a stiff brush (a screwdriver may be useful to clean shoe treads).
- **CLEAN** and wash all clothing, equipment and footwear thoroughly.
- **DISINFECT** equipment (nets and footwear) in bleach solution, 1 part bleach (from a supermarket bottle containing 5% bleach – check the bottle label) to 16 parts water (e.g. for 5 litres of solution; add 300 ml of bleach to just under 5 litres of water).
- **DRY** all clothing and equipment, as some species can survive for days in damp environments. UV from sunlight can help to kill organisms, leave equipment to air dry completely in a sunny location before using at the next site.

INVASIVE SPECIES AND DISEASE ARE A THREAT TO ALL FRESHWATER SITES