



# DISCOVERING PRIORITY HABITATS FRESHWATER NATURALNESS FIELD GUIDE

## NATURALNESS SCORING SYSTEM

HIGHLY NATURAL

1

2

3

4

5

HIGHLY UNNATURAL

CONFIDENCE SCORE:  
HIGH - MEDIUM - LOW

This guide belongs to: .....

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FRESHWATER  
BIOLOGICAL  
ASSOCIATION

# ASSESSING RIVER AND STREAM NATURALNESS

**Physical - changes to the natural shape and form.**

This part of the assessment asks you to look for **artificial modifications**, **tree cover** and **variety of vegetation** on the banks, as well as note any changes that have been made to the river .

## SCORING

### 1 Highly natural

- No evidence of physical modifications
- >30% surveyed area has tree cover, roots interacting strongly with the channel impacting flow
- Patterns of erosion and deposition.
- Leaf litter & woody material left in the channel.
- Riparian zone (5m from bank) contains semi-natural habitats and a variety of vegetation.

### 2 Natural

- Some limited evidence of physical modifications (<5%).
- >30% surveyed area has tree cover, roots interacting in limited capacity in the channel impacting flow.
- Some patterns of erosion and deposition.
- Leaf litter & woody material left in the channel.
- Riparian zone contains some semi-natural habitats.

### 3 Semi-natural

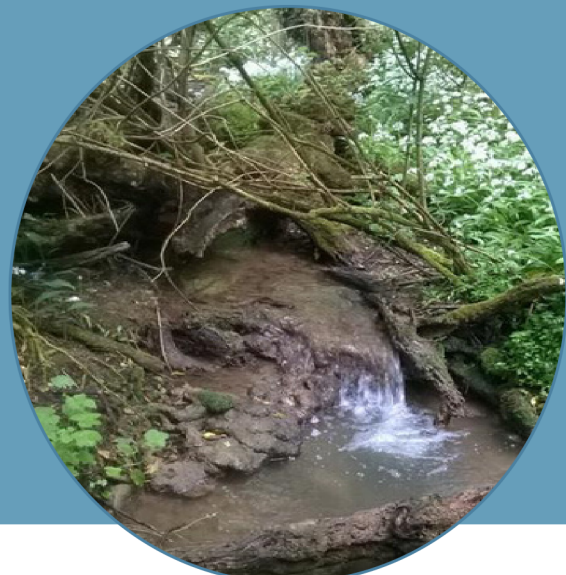
- Some evidence of physical modifications (<30% of survey area), Artificial impounding structures present but rare with limited impact on physical habitat and movement of species.
- Less than 30% tree cover.
- Riparian zone not semi-natural e.g. roads / tracks, moderate variety of vegetation

### 4 Unnatural

- Extensive physical modifications (>30% survey area), with some natural sections along the channel/banks, Artificial impounding structures, e.g. dams or weirs, are present and impacting habitat.
- Less than 30% tree cover.
- Riparian zone vegetation modified e.g. heavily grazed.

### 5 Highly unnatural

- Entire river is physically modified. River is straightened along length, with artificial or reinforced banks.
- <30% tree cover.
- Riparian zone vegetation heavily cropped or simple e.g. plantation, agricultural land.



Woody material in the channel

**Hydrological - changes to natural flow & obvious modifications.**

This part of the assessment asks you to look at the way in which the **river flows** and whether **water is impounded or abstracted** at any point along its stretch.

## SCORING

### 1 Highly natural

- No evidence of impacts on natural flow from abstraction, diversion, upstream impoundment or discharges.
- Headwaters may be dry in the summer (intermittent streams).

### 2 Natural

- Some minor impacts on natural flow from abstraction, diversion, upstream impoundment or discharges.
- Water diversions impacting natural flow may be present.

### 3 Semi-natural

- Moderate impact on natural flow from abstraction, diversion, upstream impoundment or discharges.
- Weirs or dams may create artificial lakes.

### 4 Unnatural

- Natural flow is heavily impacted by hydrological changes.
- Unnatural drying occurs.

### 5 Highly unnatural

- The river is dry for the majority of the year due to abstraction, impoundment or diversion of water.



Weir impounding structure

**Remember:** if you are unsure about your assessment, you can just lower the confidence rating you give!

**Chemical -Signs of pollution.**

This part of the assessment asks you to look out for the presence of **algal blooms, sewage fungus** and other evidence of **effluent discharge**.

**SCORING****1 Highly natural**

- No evidence of pollution.
- No sewage fungus or filamentous algae.
- No direct effluent discharge.
- No evidence of artificially enhanced input of fine sediment.
- Good water clarity.

**2 Natural**

- Evidence of low-level pollution.
- Small amounts of sewage fungus and patches of filamentous algae.
- Potential effluent discharge.
- Low-level evidence of enhanced sediment input.
- Good/okay water clarity.

**3 Semi-natural**

- Moderate levels of fungus and filamentous algae growth along the entire reach.
- Moderate evidence of enhanced sediment.

**4 Unnatural**

- High levels of fungus and filamentous algae growing along the entire reach.
- High levels of sediment.

**5 Highly unnatural**

- Major pollution issues, with thick mats of filamentous algae and extensive sewage fungus growth.
- Chronically poor water clarity. Major levels of sediment.
- Lack of invertebrates or dead aquatic animals.



Sewage fungus sign of effluent discharge

Water quality **test kits** can be used to indicate nutrient level and chemical make up of the river.

**Biological - direct biological factors that effect naturalness.**

This part of the assessment asks you to make note of the presence of **non-native species** in and around the watercourse. Assess for Himalayan balsam, Giant hogweed and Japanese knotweed as a minimum.

## SCORING

### 1 Highly natural

- No evidence of non-native plant or animal species present.

### 2 Natural

- One or more non-native species present but not extensive.
- Non-native plants take up 5% or less of channel length.
- Non-native animals should be only very rarely encountered.

### 3 Semi-natural

- One or more non-native species present, with a significant presence along the reach (up to 25%)

### 4 Unnatural

- One or more non-native species are a major component of plant and/or animal life in and around the river (up to 60%)

### 5 Highly unnatural

- One or more non-native species dominate the plant and/or animal life in and around the river.



Giant hogweed



iNaturalist



PlantNet



Seek

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forget  
your  
apps!**

# ASSESSING LAKE NATURALNESS

The Lake assessment uses sub-categories to break down naturalness. The **lowest-scoring** sub-category provides the **overall** category score.

## Physical - changes to the natural shape and form.

This part of the assessment asks you to consider the condition of the shoreline, the land use around the lake, and the shape of the lake (if artificial).

Please note: lake shape is only used for artificial lakes.

## SCORING

Shoreline	Riparian Land use	Lake shape
<p><b>1</b> No evidence of physical modification. Fringing wetland.</p>	<p>Land use around lake all semi-natural.</p>	<p>Lake edges slopes gently, allowing for plants to grow in the water.</p>
<p><b>2</b> No more than 5% of shoreline physically modified. Fringing wetland.</p>	<p>Majority of land use around lake is semi natural.</p>	<p>Plant growth possible up to 10m from lake edge.</p>
<p><b>3</b> No more than 1/3 of shoreline physically modified. Little wetland.</p>	<p>Around 2/3 of land use around lake is semi-natural.</p>	<p>Plant growth possible up to 3m from, lake edge.</p>
<p><b>4</b> Physical modifications across at least 2/3rds of shore. Little/absent wetland.</p>	<p>At least 1/3rd of the land use around the lake is semi-natural.</p>	<p>Edges may be steep, leaving little habitat for plants.</p>
<p><b>5</b> Physical modifications across more than 2/3rds of shore. Wetland absent.</p>	<p>Less than 1/3 of land use is semi-natural.</p>	<p>Artificial edges leave little habitat for plants. May be some marginal or floating.</p>



Shoreline modification



Fringing wetland

## Hydrological - Natural fluctuation and obvious modifications.

This part of the assessment asks you to note features such as water level, the presence of structures, as well as inflows and outflows.

Don't forget, your **lowest-scoring** sub-category provides the **overall score** for hydrological naturalness.

## SCORING

### Structures

- 1** No structures affecting water level/creating barriers.
- 2** Structures may be present, but are not unpassable to fish.
- 3** Structure is present that is impassable to most fish species, most of the time.
- 4** Large structure(s) present, impassable at all times to all fish species.
- 5** Very large, impassable structures present.

### Water level

- Natural seasonal water level fluctuations.
- Natural water level fluctuations, or, artificial mimicking natural pattern.
- Water levels are fixed, unable to fluctuate naturally.
- Water levels heavily depleted by abstraction.
- Drawdown of more than 2m of water annually.

### In/outflows

- In/outflows natural, surrounding land not drained or with ditches.
- No additional ditches, but may be some modifications to in/outflows.
- Outflows modified, or, artificial inflows from land draining (ditches).
- Outflows modified, artificial inflows (if any).
- Lake likely to be a reservoir or part of hydroelectric scheme.



### River Obstacles

You can report obstacles found on a lake (or river) using this app.



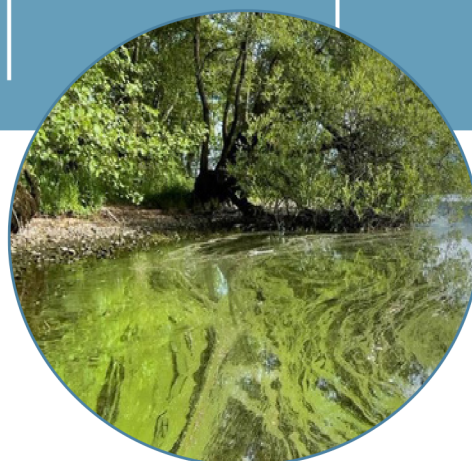
Stranded aquatic plants impacted by abstraction

**Chemical - visible signs of pollution.**

This part of the assessment asks you to look at **algal growth**, **water quality**, and **plants**. You may also wish to apply sampling methods such as **water sampling** and **biological monitoring**. You may use one or all methods to decide a chemical naturalness. Tick all that you use on your assessment form.

**SCORING**

	Water clarity	Algae	Plants	Sampling
<b>1</b>	Lake bottom or Secchi disc visible through more than 3m of water.	Very little algae- hardly noticeable or not visibly present	Plants growing at 3m depth, or as deep as the lake.	Water tests show no positive results. Biological sampling shows no pollution.
<b>2</b>	Lake bottom or Secchi disc visible through 1m to 3m of water.	Occasional noticeable growth, not persistent or widespread.	Plants growing at less than 3m depth, but more than 1m depth.	Water tests register low pollution. Biological sampling shows low level pollution.
<b>3</b>	Lake bottom or Secchi disc visible through 50cm to 1m of water.	Moderate filamentous algae, with algal blooms in spring and autumn.	Some plants present but not abundant unless adapted to high nutrients.	Water tests register moderate pollution. Biological sampling shows moderate water quality.
<b>4</b>	Lake bottom or Secchi disc visible through 25cm to 50cm of water.	May be frequent blooms and extensive filamentous algae.	Plants absent or sparse.	Water tests register high pollution. Biological sampling shows highly impacted water quality.
<b>5</b>	Water brown or green, unable to see bottom of the lake under 2cm of water	May be frequent blooms and extensive filamentous algae.	No submerged plants are visibly present.	Water tests and biological sampling represent very high levels of pollution



Algae bloom



**Biological** - here, we want to assess the biological naturalness of the lake. This part of the assessment asks you to make note of the presence of **non-native species** in and around the water.

A single biological class is needed for the assessment. If you only see plants, or only see animals, that is fine. As before, if you see both then base your class on the lowest score.

## SCORING

### Non-native plants

- 1** No evidence of non-native species in or around the lake.
- 2** Non-native plants occupy no more than 5% of shoreline/lake area.
- 3** Non-native plants occupy up to 25% of the shoreline.
- 4** Non-native plants occupy up to 60% of the shoreline.
- 5** Non-native plants occupy more than 60% of the shoreline.

### Non-native animals

- No evidence of non-native species in or around the lake.
- Non-native animals are rarely encountered, and have little impact.
- At least one non-native species found when searched for.
- Multiple non-native species found when searched for.
- Non-native species are numerous and found with little effort.



Japanese knotweed



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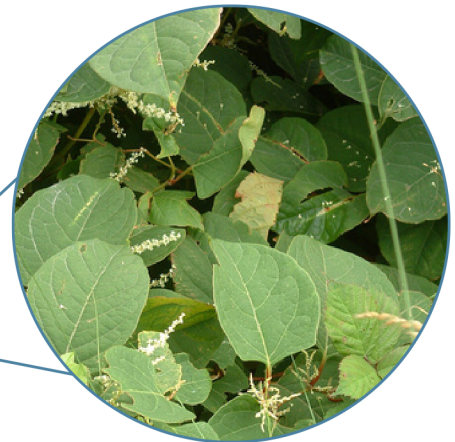
# NON-NATIVE SPECIES



**Himalayan balsam**



**Giant hogweed**  
**(do not touch me!)**



**Japanese knotweed**

# NON-NATIVE SPECIES



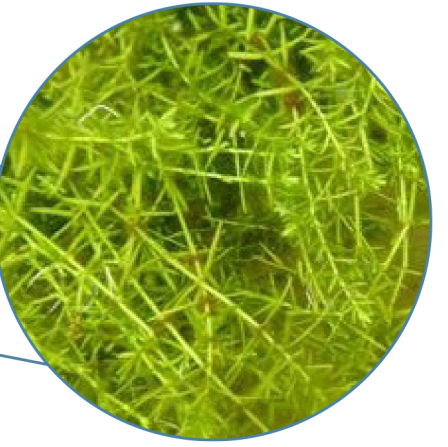
**Parrot's feather**



**Curly Waterweed**



**Water Fern**



**New Zealand pygmyweed**

Images © GB Non-Native Species Secretariat

Images © Habitats.org.uk & Biodiversityireland.ie

# NON-NATIVE SPECIES



Images © GB Non-Native Species Secretariat



**Signal crayfish**  
**(look for my red claws)**



Images © Environment Agency



**Killer shrimp**



Image © Paul Beckwith BWW



**Zebra mussel**  
Image © Anastasija Zaiko

**Remember!** You can see a list of the non-native species we are interested in on your assessment form.

# PLANT FUNCTIONAL GROUPS

## Rosette forming



Plants have **short, stiff leaves with pointed ends**. The leaves **join at the base** in a rosette e.g. shoreweed and water lobelia.

## Floating leaved and rooted



Leaves **lie flat on the water** surface but are rooted to lake bed e.g. water lily and floating bur reed.

## Free floating



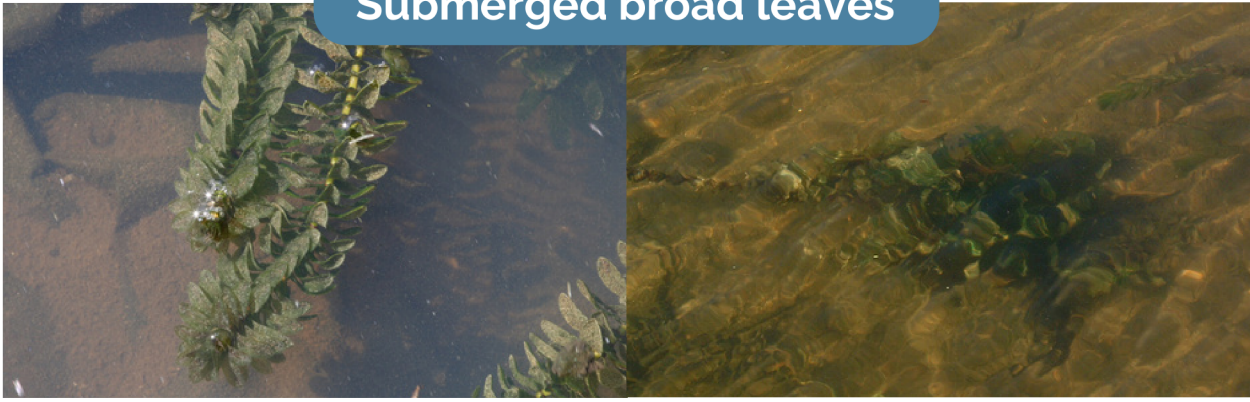
**Plants are not rooted**, but lay on the surface of the water e.g. duck weed.

## Submerged linear leaves



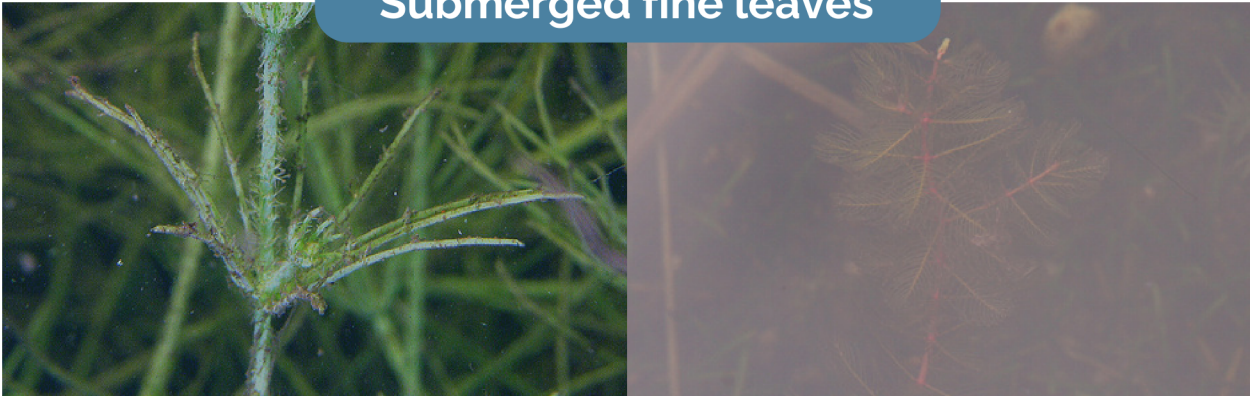
**Grass-like leaves**, mostly submerged underwater, and rooted to the lake bed e.g. horned pondweed.

## Submerged broad leaves



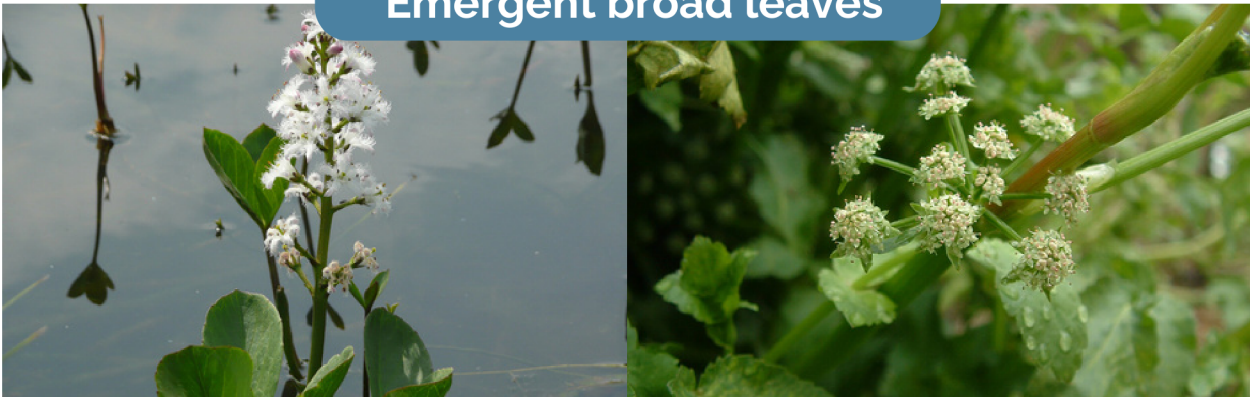
**Broad leaves**, mostly submerged underwater, and rooted to the lake bed e.g. waterweed and claspingleaved pondweed.

## Submerged fine leaves



Very **fine, branched 'leaves'**, mostly submerged underwater, and rooted to the lake bed e.g. stoneworts and water milfoils.

## Emergent broad leaves



**Broad leaf** plants rooted to the lake bed, with **flowers and leaves above water** e.g. bog bean and fool's watercress.

## Emergent narrow leaves



**Narrow leaf** plants rooted to the lake bed, with **flowers and leaves above water** e.g. reeds and horsetails.

# KEY FEATURE

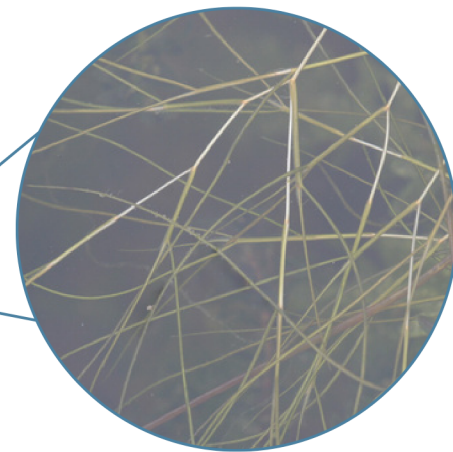
## Drainage ditches



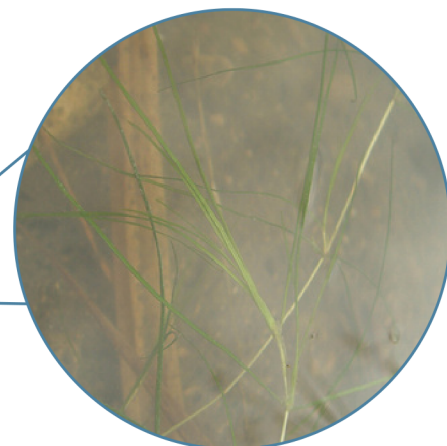
A straight channel dug for **land drainage purposes**. Natural stream channels can also be **artificially extended** into natural wetlands to drain the land for agricultural or forestry purposes. They may be assessed as **inflows into lakes** or as a separate river/stream survey.

# NUTRIENT ENRICHMENT

These plants can be indicators of nutrient enrichment in still water bodies.

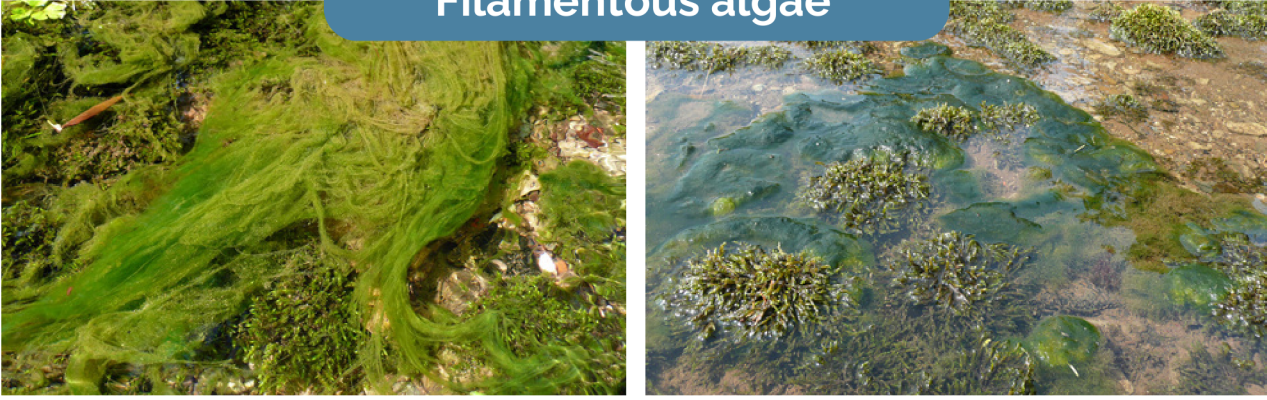


**Fennel pondweed**



**Horned pondweed**

## Filamentous algae



Algae that **grow in threads** that interweave. This forms a mat that **looks like wet wool**. May be attached to substrate or free-floating.

## Surface algal blooms



**Algal blooms** are another indicator of poor nutrient quality in **lakes**. They can be a variety of **colours and intensities**.

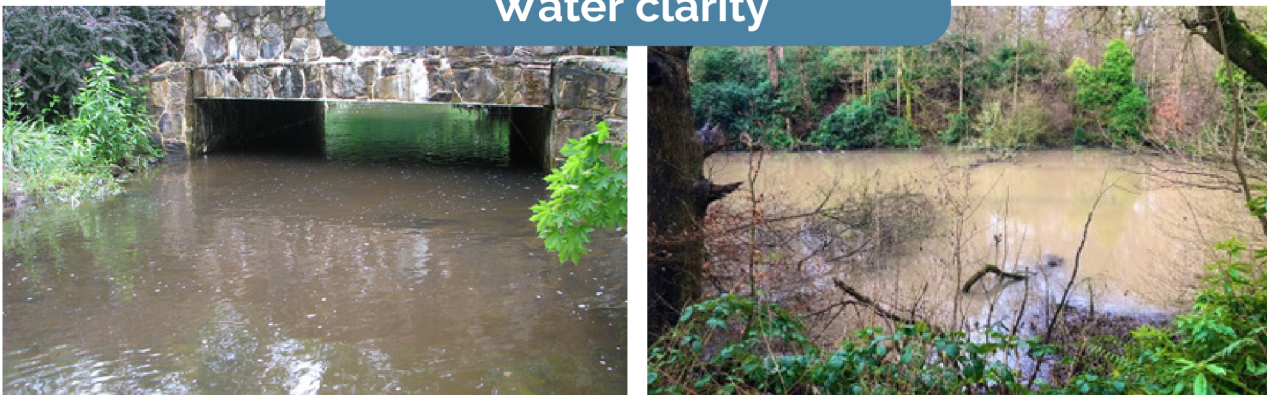
## Sewage fungus



Image © Andrew C Singer 2019

Sewage fungus is a **mass of bacteria** that grows in threads in response to organic nutrients in the water. It grows most commonly in **slow-flowing** polluted waters.

## Water clarity



**Cloudy, opaque** water indicates excessive inputs of **nutrients and sediments** that reduce water quality.



# RIVER & STREAMS

Remember to take note (if you can) of any of these key habitat features on your river or stream stretch:

- **Bankside flushes and springs** - areas where groundwater is seeping into the system.
- **Trees interacting with channel** - trees along the river bank extending their roots or branches into the channel.
- **Waterfalls and cascades** - often form in the upper reaches of streams, where the land gradient is changing more steeply.
- **Woody material** - Discarded woody material such as fallen branches or trunks often make their way into undisturbed channels.
- **Natural mire-stream transitions** - these occur where the wetland and stream are connected to each other.
- **Sinuuous and multiple channels** - meandering stretches of river, as well as rivers that have split into several distinct channels.
- **Riparian wetlands** - wetlands (bogs/mires/marshes) which form on the land immediately adjacent to the river or stream channel.
- **Exposed cobble/gravel/sand** - naturally deposited sediments from high or low flow events.
- **Moss-covered boulders** - these provide extra complexity to the river habitat.
- **Fern-filled ravines/gyhlls** - well-developed fern vegetation along steeper-sided river banks.

# LAKES

Remember to take note (if you can) of any of these key habitat features on your lake:

- **Shoreline modification** - this includes any changes to the shoreline such as reinforcing the banks or adding artificial structures.
- **Riparian zone up to 10m from bank** - the area around the lake and semi-natural habitat.
- **Perimeter trees** - note of the percentage of lake perimeter that has trees.
- **Fringing marginal emergent vegetation** - note the percentage of the lake perimeter that has emergent vegetation.
- **Number of ditches** - ditches may drain into the lake from the land surrounding, you may see these as you walk around, or on aerial maps.
- **Presence of outflow structures** - can include sluices, weirs or dams.
- **Plant functional groups** - keep an eye out for: rosette forming, floating leaved and rooted, free floating, submerged linear leaves, submerged broad leaves, submerged fine leaves, emergent broad leaves, emergent narrow leaves and filamentous algae.

# GLOSSARY

**Abstraction**- artificially removing water from natural freshwater sources such as groundwater, rivers, streams and lakes for various human uses.

**Algae**- a simple, non-flowering and typically aquatic plant of a large group that in freshwater includes many different filamentous (stringy) and single-celled forms. Some species attach themselves to stones or plants whilst others live freely in the water. They come in many different colours, forms and sizes.

**Biodiversity**- the natural variety of plant and animal life in a particular geographic location. It includes genetic variation within species, the variety of species and the variety of habitats and ecosystems.

**Biological**- relating to biology or living organisms.

**Biosecurity**- in terms of nature conservation this means procedures or measures designed to protect wildlife against non-native species or diseases.

**Citizen science**- the practice of public participation and collaboration in scientific research to increase scientific knowledge. Through citizen science, people share and contribute to data monitoring and collection programs.

**Conservation**- in the context of this initiative, protection or restoration of wildlife, habitats, ecosystems and associated natural resources to prevent damage, destruction, or neglect and promote a healthy and vibrant natural environment.

**Deposition**- The settlement of material on the bed of rivers, streams, lakes or ponds. Of particular concern is the excessive deposition of fine sediment from artificially enhanced erosion of soil and channel banks in the catchment, as well as physical modifications to river and stream channels that reduce the transport of fine sediment downstream.

**Discharge** - In the context of rivers and streams the total volume of water transported through the channel in a given time. This includes any suspended solids (sediment), dissolved chemicals, or biological material (e.g. diatoms) in addition to the water itself.

**Ditch** - a straight channel dug for land drainage purposes. Natural headwater streams may be channelised and take on the appearance of a ditch. Natural stream channels can also be artificially extended into natural wetlands to drain the land for agricultural or forestry purposes.

**Effluents**- sewage or other liquid waste discharged into a river, stream, lake or sea.

**Erosion**- the wearing away of materials by water or wind. On land, this relates to the erosion of rocks and soils, much of which is deposited as sediment (silt, sand, gravel, pebbles, cobbles) in rivers, streams, lakes and ultimately coastal waters. These sediments are then themselves eroded and re-deposited within freshwater and coastal habitats.

**Ghyll**- a small deep ravine, especially a wooded one, in headwater stream systems.

**Hydro-electric scheme**- an installation that generates electricity from turbines that convert the potential energy of falling or fast-flowing water into mechanical energy.

**Hydrology**- the study of the properties and behaviour of water e.g. flow.

**Impounding structure**- a man-made installation used to retain or store water in river and stream systems or store artificially enhanced amounts of water in natural lakes. They transform river and stream sections into lake-like environments which 'drown out' in-channel habitat mosaics and artificially increase fine sediment deposition. They also artificially stabilise water levels in river, stream and lake margins, creating impacts on the plants and animals that naturally inhabit these areas.

**Inflow** - water entering a river, stream, lake, pond, wetland or other habitat.

**International Convention on Biodiversity**- the international legal instrument for 'the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources'. It has been ratified by 196 nations including the UK.

**Intermittent flow**- water flow in streams (and sometimes rivers) that is only present at certain times, signified by drying of the channel. It is a natural phenomenon, particularly in headwater streams where the natural water supply from the catchment is insufficient to sustain flows all year round. Intermittent flow can also be artificially created by abstraction, water diversion, and land drainage.

**Lake**- a body of standing water of over 2 hectares in surface area. Lakes may be a natural feature of the catchment or may be generated by impounding structures or the excavation of soils and rock.

**Marginal fringing wetland**- Wetland habitats that occur on the fringes of rivers, streams and lakes.

**Mire-stream transition zone**- naturally swampy or boggy ground in headwater areas and valley sides within which very small hydrological pathways form and erode small channels (rivulets, runnels) that join together to form a natural stream channel. Trees, fallen wood and bedrock obstruct the flow of water and create dynamic complexity within the transition zone. These areas are typically drained for agriculture or forestry.

**Morphology**- the physical form, shape or structure of something, in this case, rivers, streams and lakes.

**Non-native species**- an organism that is not indigenous or native to a particular area. Some of these species are particularly invasive and cause major disruption to natural ecosystems.

**Organism**- an individual animal, plant or single-celled life form.

**Outflow**- the location where water leaves a lake or pond or the downstream end of a river system.

**Priority Habitat**- covers a wide range of semi-natural habitat types that were identified where action to protect and restore biodiversity is a priority.

**Reservoir**- a large natural or artificial lake used as a source of water supply.

**Restoration**- the action of returning something to its former condition.

**River**- a large natural stream of water flowing in a channel to the sea, a lake or another river.

**Ravine**- a deep, narrow gorge with steep sides.

**Riparian zone**- the land/wetland adjacent to rivers and streams.

**Secchi disk**- an opaque disc, typically white, used to gauge the transparency of water by measuring the depth, known as the Secchi depth- at the which disc ceases to be visible from the surface.

**Semi-natural**- modified by human influence but retaining many natural features.

**Shoreline**- the line along which a large body of water meets the land.

**Species**- a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.

**Water diversion**- the removal or transfer of surface water from its natural pathway through the catchment, either within the catchment or between catchments.

**Water Framework Directive**- EU and UK legislation aiming to prevent deterioration of the water environment and improve water quality by managing water in natural river basin districts, rather than by administrative boundaries.

