# WATERY WILDLIFE RESOURCE PACK







Nidderdale Landscape





# THIS PACK CONTAINS:

nationaltrust.org.uk/ skellvalleyproject www.ydrt.org.uk Introduction to the **Skell Valley Project** Keeping safe at the river River key words River key words (Answer sheet) The journey of a river The journey of a river (Answer sheet) Water cycle Water cycle (Answer sheet) Healthy rivers River wildlife – Mammals River wildlife – Birds River wildlife – Fish River wildlife – Invertebrates My favourite river animal At the river... who eats what? At the river... who eats what? (Answer sheet) River minibeast hunt River art **River** poems **River** pollution **River pollution (Answer sheet)** Sustainable drainage systems Water friendly living Water friendly living (Answer sheet) Sample risk assessment Medium term lesson plan Freshwater invertebrate monitoring master sheet **River measurements master sheet** 







The National Trust and Nidderdale National Landscape are the lead partners of sixteen organisations who have come together to deliver the Skell Valley scheme, which will create a sustainable future for the Skell Valley.

Acknowledgements: Rachel Goss, Moorside Primary School Ripon, and Andrew Breckon, Grewelthorpe C of E Primary School, for their input and assistance with the curriculum links for the project pack.

The River Skell runs for 12 miles (19.3km), from the wild remote moorland of Dallowgill Moor to the historic city of Ripon in the Vale of York. The name of the river Skell may have come with the Vikings and their word skjallr, meaning 'resounding', from its swift and noisy course.

The upper and middle courses of the **River Skell are in the Nidderdale National** Landscape, a designated Area of Outstanding Natural Beauty, where, from its source on the moorland, the river runs through farmland before reaching the National Trust's Fountains Abbey and Studley Royal estate, a World Heritage Site. The lower course of the river flows through farmland, and the open grasslands and wooded banks of Hell Wath, before reaching Ripon where it joins the River Ure.

The Skell Project was created because the valley and its unique cultural and natural heritage were under threat from a number of forces:

 Extreme flooding events resulting from climate change, have caused irreparable damage to Fountains Abbey & Studley Royal and the high level of silt that is deposited in the river is threatening its ecology. Silt is also affecting the water features at Grantley Hall, Eavestone Lake and Ripon Canal.

- There is a decline in nature throughout the valley. Poor water quality due to the amount of sedimentation in the river threatens wildlife and there is an increase in invasive species such as Himalayan Balsam and Signal Crayfish.
- Due to neglect there is a significant risk of loss of built and landscape heritage features along the Skell Valley.
- Not many people are accessing nature, heritage and the outdoors in the valley.

One of the individual projects within the Skell Project is "Watery Wildlife", which will enable local school students, families and community groups to find out more about the river, its habitats, water quality and wildlife.

This information pack is designed to help you learn about rivers and their wildlife, and ways in which you can help to keep our rivers clean and healthy. There are lots of activities for you to try, information about the wildlife that you can find at the river and guidance about how to stay safe at the river.

#### Happy river watching!

# KEEPING SAFE AT THE RIVER

Rivers are great places to explore and have fun, but they can also be dangerous.

Please follow these simple guidelines to make sure you stay safe when you visit a river.



• Children should always be with a parent or responsible adult.

- Check the weather forecast before you set off and keep an eye on it while out and about.
- Avoid steep river banks. Don't scramble down steep banks to get to the river as there is a risk of slipping and falling in, and steep banks are difficult to get out of.
- Avoid deep or fast-flowing water. Only go in water that is lower than a pair of children's wellies. As water gets deeper, it appears darker. If you can't see the bottom of the river then it's too deep.
- Avoid cloudy or coloured water. If the water is brown and murky then it can be a sign that the river is in flood, or that it is polluted.

#### Be prepared when visiting a river

- Don't go in the river with bare feet there may be sharp objects like glass or metal that will cut your feet. Wear wellies, old trainers, or aqua shoes.
- Wear outdoor clothes appropriate for the weather conditions — warm clothing and waterproofs in cold weather and cool breathable clothing and a sunhat in warm weather.
- Take a towel and a spare set of clothes for children, and hand sanitiser to clean your hands after going in the river.

#### Leave things as you found them:

- It's great fun visiting the river but it's very important to make sure that we don't harm the river and the wildlife which lives there.
- Make sure you take your rubbish away with you, and don't drop litter.
- Don't take any river creatures home the river is their home and they need to live in the river water to survive.
- Remember: CHECK : CLEAN : DRY to protect our rivers from pests and disease.

## Pick a safe place to visit. Safe areas include:

- A gravel beach area, which gives you a safe place beside the water to carry out your activities. A riffle is an area of shallow water which is ideal for carrying out any activities in the river.
- Shallow, sloping river banks so you can get in and out of the water safely.
- Clear water you should be able to see your feet when standing in the water. Brown water tells us there has been a lot of recent rainfall and you shouldn't enter the river.

Invasive species can be small and hard to spot so are easily spread on damp equipment and clothing. You can help protect the environment and activities you enjoy by keeping your kit free of invasive plants and animals, whenever you leave the water remember to:

## CHECK

Check your equipment, boat, and clothing after leaving the water for mud, aquatic animals or plant material. Remove anything you find and leave it at the site.

## CLEAN

Clean everything thoroughly as soon as you can, paying attention to areas that are damp or hard to access. Use hot water if possible.



Dry everything for as long as you can before using elsewhere as some invasive plants and animals can survive for over two weeks in damp conditions.

# RIVER KEY WORDS

Draw lines to match each river word to its definition

**MEANDER CHANNEL FLOODPLAIN EROSION** MOUTH TRIBUTARY **DEPOSITION ESTUARY** CATCHMENT SOURCE **RIVER BED BANK** 

The end of the river, where it meets the sea

The process that wears away the river banks and bed

A stream that joins a main stream or river

The path of the river

A bend in the river

The land that is drained by a river and its tributaries

Where a stream or river begins

The ground over which the river flows

The place where the river meets the sea

The land at the side of the river

When the material being transported by the river is dropped

A flat area of land next to the river, which naturally floods

#### **ANSWER SHEET**

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# THE JOURNEY OF A RIVER

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#### **ANSWER SHEET**

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# WATER CYCLE

The Water Cycle is how we describe the continuous movement of water around the earth, from the land to the oceans to the atmosphere.



Use these words to label the Water Cycle diagram:

WATER CYCLE

evaporation precipitation ocean river clouds sun condensation groundwater zone surface runoff infiltration

#### Find out what each of these terms mean:

Precipitation	
Evaporation	
Condensation	
Surface runoff	
Infiltration	

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# HEALTHY RIVERS

## Why is it important to have healthy rivers?

Over 97% of the water on Earth is salty seawater, and of the remaining less than 3%, two-thirds of that is frozen in ice-caps or contained in groundwater. Less than 1% of the Earth's surface is made up of freshwater ecosystems, but all living things need water to survive, and our rivers aren't as healthy as they should be.

#### What is a healthy river?

A healthy river is one which flows naturally, provides a habitat which supports numerous animals and plants, has good quality water with no chemical pollutants, no rubbish, no sewage and no agricultural run-off.

Sadly, none of our UK rivers are currently in good overall health, which is bad news for nature and for us.

#### Pollution

Pollution is the introduction of harmful materials into the environment. River pollution can include rubbish such as plastics, sewage (both human and animal waste), harmful chemicals and excessive nutrients washed off the land such as pesticides, manure and fertilizers, livestock trampling river banks and increasing erosion, and also sediment from unhealthy and exposed soils being washed into the river. Roads and transport, towns, industry, past mining works, and more recent pollutants such as microplastics and pharmaceutical waste along with the impacts of climate change – all contribute towards poor river health.

### WATER QUALITY – WHAT WE CAN ALL DO TO HELP

- Reduce, reuse and recycle waste.
- Never drop litter!
- Only flush pee, poo and toilet paper down the loo!
- Make sure only rain goes down the outside drains.
- Use ecologically friendly products in the kitchen and bathroom.
- Don't wash fats or oils down the sink or drain.
- Don't waste water it takes a lot of energy to clean water for our use.
- Make an effort to use less water. Check for household leaks, turn the tap off when you're cleaning your teeth, take short showers rather than baths.
- Reduce food waste. It takes a lot of water to produce all of our food.
- Catch and store rainwater so you can use it to water your garden when it hasn't rained.

Vertebrates are animals which have a backbone inside their body. The major groups of vertebrates are mammals, birds, fish, amphibians and reptiles.

#### MAMMALS







#### Otter

The European otter, Lutra lutra, is a rare but widespread animal which you might spot living along our rivers, although they are very elusive and usually come out at night. Otters are large mammals, up to a metre in length, with brown fur and a pale chest and throat. Otters require clean rivers to survive, with plenty of food and riverside vegetation for cover. They are at the top of the food chain and eat fish, waterbirds, amphibians and crustaceans. They have their cubs in underground 'holts', hidden in the roots of trees or amongst vegetation. Otters are excellent swimmers and have webbed feet, thick fur and can close their ears and nose when under water. Otter numbers were very low in the 1950s to 1970s due to river pollution, hunting, loss of habitat and human disturbance. However, happily our rivers are in a much better state now, and hunting is banned, meaning otters are now found throughout England and Wales.

#### Water vole

Arvicola amphibius — "Ratty" from the classic book The Wind in the Willows, is the largest vole found in the UK, but sadly their population has reduced by 90% since 1989, mainly due to predation by the invasive non-native American mink, but also due to habitat loss and disturbance. They have glossy brown or black fur, a blunt nose, small round ears and a short, slightly furry tail. They are about 12–20cm long and feed mainly on reeds, grasses and other wetland plants in the summer, and roots, bulbs and bark in the winter. They make their homes in grassy banks along slow-moving rivers, ditches, streams and marshland, with internal tunnels and underwater entrances to avoid predators. Water voles are very shy and elusive, but they make a distinctive "plop" which you might hear as they dive into the water.

#### **American mink**

*Mustela vison* — were introduced from America to the UK, where they were farmed for their pelts. But following their release from fur farms they have become a widespread invasive non-native species in Britain, and a danger to some of our native wildlife, such as water voles, waterbirds and frogs, as they are efficient predators. They have brown fur and grow up to 65cm long.

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#### BIRDS



#### Grey heron

Ardea cinerea — tall (up to 1m) grey-backed birds with a long pale neck, bright yellow dagger-shaped bill, a black eyestripe and a wingspan of 1.8m. They can often be seen standing very still at the water's edge, waiting to spot their next meal of fish, amphibians, invertebrates, small mammals or birds.



#### Kingfisher

Alcedo atthis — lives by and feeds in slow-flowing shallow rivers and streams. Their beautiful iridescent plumage is striking and often all you will see of a kingfisher is a flash of brilliant blue and orange as it flies down the river, although it can be spotted sitting quietly on low branches over the river, waiting to spot its next meal of small fish, insects or tadpoles. Kingfishers nest in muddy or sandy riverbanks, where a pair will excavate a nest hole at the end of a tunnel. Kingfishers are about 15-17cm long with a wingspan of about 25cm.



#### Mallard

Anas platyrhynchos — the UK's most common duck. The male (drake) has an iridescent green head and neck and the female has more camouflaged brown plumage, but both have a bright blue and white patch on the wing. They have large broods of young, but the eggs and ducklings are susceptible to predation and they are vulnerable to pollution and human disturbance.



#### Dipper

*Cinclus cinclus* — the only UK songbird which can swim underwater! It is the size of a blackbird, with chocolatebrown plumage, a white throat and bib, and a short tail. They live in upland rivers and can be spotted bobbing up and down while perched on a rock at the edge or middle of fast-flowing streams. Dippers can use their wings to fly under the water, or walk along the bottom of the river, gripping with their toes and using their beak to turn stones and find food which mainly consists of freshwater invertebrates.









#### **Grey wagtail**

Motacilla cinerea — found around fast-flowing rivers and streams where the water quality is good. It has a slate grey back and is bright yellow underneath, with a very long black and white tail. It eats ground invertebrates and flying insects such as midges and ants, but also will find food in shallow water, such as snails and tadpoles.

#### Mute swan

*Cygnus olor* — very large white waterbirds with long S-shaped necks and an orange bill with a black base and black knob. They have a wingspan of 2 to 3m. They eat water plants, insects and snails. They prefer slowflowing rivers or shallow lakes. A female swan is a 'pen', a male swan is a 'cob' and the young are called cygnets.

#### Sand martin

*Riparia riparia* — a summer visitor to the UK, which flies to spend the summer here after over-wintering in Africa. It is a small brown bird from the swallow family, with a brown band across its white front, and a short forked tail. They are sociable birds and nest in colonies on river banks where they dig burrows in tunnels up to a metre long in steep sandy cliffs.

#### Goosander

*Mergus merganser* — a diving duck in the sawbill family, which use their long, serrated bill to catch fish. They are found on upland rivers during the summer where they nest in riverbank trees. The male has black and white plumage with a green head, and long red hooked bill, and the female has a grey body and chestnut-brown head, and a white throat. They spend winters on lakes and reservoirs.

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#### FISH



#### **Brown trout**

Salmo trutta — a UK native fish, golden yellow-brown, darker above and paler below, with pale ringed black and red spots over their body. They grow up to 50 to 80cm and feed on insect larvae, smaller fish such as minnow and flying insects such as mayflies and damselflies. They need unpolluted freshwater and cannot survive when the water temperature gets too high. They lay their eggs in gravelly beds.



#### Minnow

*Phoxinus phoxinus* — a common, small fish up to 10cm long, which is often found swimming in large shoals in freshwater streams and rivers. They are olive-brown above with dark bars, and paler below, with a dark stripe along the side. The female is silver below, and the male has a pinky-red belly in the summer. They spawn in shallow gravelly beds in the early summer. Minnow feed on insects, plant debris, fish eggs, crustaceans and molluscs.



#### **Three-spined stickleback**

Gasterosteus aculeatus — a small freshwater fish, about 4 to 7cm long, with three sharp spines on its back. It is widespread and found in ponds, lakes and rivers where it feeds on invertebrates, tadpoles and small fish. Sticklebacks are brown with silvery sides and belly, but in spring the male develops a bright blue eye, red throat and belly, and bright green sides, and builds a sheltered nest from vegetation to attract a female. The male guards its nest of up to 400 eggs until they hatch four weeks later.



#### **Stone loach**

Barbatula barbatula — a small fish, 6 to 10cm long, commonly found in clear fast-flowing rivers and streams, but not often spotted as it buries itself into sand or gravel on the river bed and feeds mainly at night. It is well camouflaged with a mottled olive-brown body and grey belly, and has six moustache-like 'barbels' around its mouth which it uses to find its prey – invertebrates such as mayfly nymphs and freshwater shrimps. The females spawn around 10,000 eggs amongst the stones and vegetation on the river bed during the summer months.



#### Grayling

*Thymallus thymallus* — a member of the salmonid family. They live in shoals in fast-flowing rivers and streams. They are silvery fish with large scales and a pale belly, large eyes and a huge dorsal fin with bands of green, orange, purple and red. They are known as the 'Lady of the Stream'. They feed on invertebrates such as mayfly nymphs, caddisfly larvae and freshwater shrimps.



#### **Brook lamprey**

Lampetra fluviatilis - a rare and ancient, protected fish, which is one of the most primitive vertebrates alive today. They are small, eel-like jawless fish up to 50cm long, bluish-grey on their back and sides and white underneath. They have a toothed, sucker-mouth which they use to attach to other fish to rasp at their flesh and feed on bodily fluids, and they also feed on carrion. Adults live in the sea and return to freshwater to spawn. At a suitable breeding place, the male attaches himself to the female using his sucker and fertilizes the eggs as she lays them; after spawning the adults die. The young hatch and spend several years buried in the silt before migrating out to sea.



#### Bullhead

*Cottus gobio* — a small fish, 8 to 12cm long, with a large flattened head and a tapering body. It lives on the bottom of fast-flowing, stony rivers and streams, where it feeds on invertebrates such as mayfly nymphs and caddisfly larvae, along with the eggs of other fish. Spawning between February and June, the male guards and cares for the eggs in pits or underneath stones.

#### **Atlantic salmon**

Salmo salar – a large fish which is found in clean rivers. It spends most of its life at sea but returns to the stretch of river where it hatched in the gravelly headwaters, to spawn between November and February. The females dig small pits know as 'redds' in the gravel where the eggs are released and immediately fertilized by the male. The young hatch and stay in freshwater for up to 6 years, when they migrate to the sea until ready to spawn. They feed on invertebrates and small fish. The are known as the 'King of the Fish' because of their ability to jump huge barriers such as waterfalls and weirs on their epic return journeys to their spawing river.

**INVERTEBRATES** 

**Invertebrates** are animals without a backbone or a bony skeleton. Over 3,800 species of UK invertebrates spend at least part of their life cycle in freshwater.



#### **Mayflies**

Ephemeroptera - one of the first winged insects on Earth, mayfly fossils date back to over 300 million years ago! Mayflies in the UK range in size from 5mm to 2cm long. They provide a vital source of food for many of our other freshwater animals, particularly fish. In the summer mayflies hatch in large numbers; once they find a mate, they lay their eggs in the water, and then die. The eggs hatch into nymphs with 3 'tails' and live for 1 to 2 years before emerging as mayflies. Adults have clear lace-like wings, very short antennae and 3 very long tails. They are unique insects in having two adult stages. After emerging they shelter on vegetation before moulting their drab 'dun' skin for their shiny 'spinner' skin.





Gammarus sp. – a freshwater crustacean up to 11mm long, found in flowing water all year round. The males 'mate guard' a female and carry her around until she moults and mating can take place. She carries the young in a brood pouch for about a month until they are developed. Freshwater shrimps eat algae, detritus and organic plant material.

#### White-clawed crayfish

Austropotamobius pallipes - our native white-clawed crayfish, is a bronze-coloured crustacean, with pale undersides to its claws. It is under threat from an invasive non-native species (INNS) the North American signal crayfish, which carries crayfish plague, eats populations of native animals, and causes extensive damage by burrowing into river banks. Our native white-clawed crayfish is much smaller, from 6 to 12 cm long and is protected in the UK under the Wildlife and Countryside Act, 1981, requiring any handlers to be licensed. It lives in shallow freshwater unpolluted streams where it hides underneath stones and rocks in small crevices where it forages for its food of invertebrates, carrion, water plants and dead organic material.

#### Cased caddisfly larva

Trichoptera (meaning hairy winged) - a large group of insects. The aquatic larvae are known for building cases from stones, sand, leaves and twigs bound by silk which they secrete from glands round their mouth. They live in clean flowing water where they mainly feed on organic plant material although some species eat other invertebrates. There are nearly 200 species of caddisfly in the UK. After pupating, the adult caddis or sedge fly, emerges from the water. They look similar to moths, but with long antennae and wings covered in tiny hairs, which are held over their bodies like a tent when they are resting.

#### **Caseless caddisfly larva**

Free-swimming larvae, only buildings shelters round themselves when they're ready to pupate. Some construct nets to catch their food in the flow of the river. They are an important food source at the bottom of the food chain.



#### **Burrowing mayfly nymphs**

Ephemera danica – also known as the green drake mayfly' or 'common mayfly', are found in unpolluted rivers, streams and wetlands. They are in the family Ephemeroptera which means short-lived, as the adults live for only a day.



#### Swimming mayfly nymph

Also known as minnow mayflies, the nymphs are slim and streamlined so they swim very well. They feed on algae and organic material. They are commonly known as the large dark olive mayfly. The adult mayfly has two tails.



#### Flat-bodied mayfly nymph

These nymphs have flattened bodies and broad heads with large eyes, and legs spread to the sides. They prefer to cling to stones, and their bodies are dark olive-brown, so they are well camouflaged.



#### **Blue-winged olive** mayfly nymph

These small mayflies have an olive-brown coloured body and the adults have blue-grey wings. Their tails are banded with brown. They live in fast flowing streams and rivers and prefer aquatic vegetation which they can cling to.



#### Stonefly nymph

Plecoptera — Stonefly nymphs are found in gravelly fast-flowing unpolluted upland streams and rivers, where they emerge on bankside stones and plants between April and June. The two-tailed nymphs hide in gravel and cling to rocks, where they feed on algae, plants, and invertebrates. The adults have narrow, dark wings which are folded flat over their bodies when resting, long antennae and two stout tail bristles.





# MY FAVOURITE RIVER ANIMAL

There are lots of amazing animals living in and around our rivers.

Use our information sheets to find out about some of them, or do your own research. Then choose one, draw a picture of it in the box here, and add some labels and some interesting facts.

Things to think about: How big is it? Where does it live? What does it eat? How many legs does it have? Does it have any tails? How long does it live? What is its life cycle?

Why have you chosen your animal? What do you like about it?







# AT THE RIVER... WHO EATS WHAT?

A Food Chain shows the relationship between different animals and plants and describes who eats what in the natural world. The food chain shows how plants and animals get their energy.



Cut out these animals and plants and make a river food chain!

A food chain always starts with a **Producer**. This is an organism that makes its own food. Most food chains start with green plants, which use the **energy** from the **sun** to make their food from water and carbon dioxide, in a process called **photosynthesis**.



A living thing that eats other plants and animals is called a **consumer**.



Cased Caddisfly larva



Stonefly nymph



A **predator** is an animal that eats other animals. The animals that predators eat are called **prey**. Predators are found at the top of a food chain.

Rat-tailed maggot





Freshwater shrimp



Worms



#### ANSWER SHEET

# AT THE RIVER... WHO EATS WHAT?

A Food Chain shows the relationship between different animals and plants and describes who eats what in the natural world. The food chain shows how plants and animals get their energy.

of

Children should cut out the pictures of animals and plants and work out who eats what, to build a river food chain.

## TOP PREDATOR ↑ TERTIARY CONSUMERS ↑ SECONDARY CONSUMERS ↑ PRIMARY

A food chain always starts with a **Producer**.

This is an organism that makes its own food.

Most food chains start with green plants, which use the **energy** from the **sun** to make their food from water and carbon dioxide, in a process called **photosynthesis**.

A living thing that eats plants and other animals is called a **consumer**.

**Primary consumers** are organisms that eat the producers. They are herbivores or vegetarians. Examples of primary consumers in a river are Water Voles, Cased Caddisfly larvae, and Mayfly nymphs.

**Detritivores** eat dead or decaying material, which can include dead bits of plants or animals. An example of a detritivore in a river is a Freshwater Shrimp.

**Secondary consumers** are animals which eat the primary consumers, but which are then eaten by animals further up the food chain. Examples of secondary consumers in a river are small fish like Minnows, White-clawed Crayfish and the Dipper.

**Tertiary Consumers** are animals which feed on primary and secondary consumers, but which in turn are prey to top predators. Examples of tertiary consumers are fish such as the Atlantic Salmon, and Kingfishers.

A **Predator** is an animal that eats other animals. The animals that predators eat are called **prey**.

Predators are found at the top of a food chain. An example of a top predator in a river is an Otter.

## **RIVER FOOD CHAIN**



PRODUCERS

## RIVER MINIBEAST HUNT



Take an adult with you, and investigate your local stream.

Make sure it's safe — don't go after heavy rainfall, and keep to water that is below the level of your wellies!

## WHAT YOU'LL NEED:

- Wellingtons
- A Fishing net
- A clean bucket
- A white tray or clean empty shallow container like an ice-cream carton
- A magnifying glass
- Some small pots
- An old spoon



- Get some stream water in your bucket and put it on the river bank.
- Take your net and stand it up in the water so the open part of the net is facing the flow of the water.
- Just in front of the net, disturb the water by gently shuffling your foot. This should wash some creatures into your net.
- Empty your net into the bucket of river water by gently turning it inside out in the bucket water to release the animals.
- Lift some stones and look for creatures clinging on to them.
- Have a look and see what's in your bucket. Put some more stream water in the white tray and pots, and carefully transfer some of the creatures from the bucket so you can view them close-up with a magnifying glass.
- Don't forget to carefully put all your creatures back into the stream when you've finished looking at them.
- Check, clean and dry all your equipment to stop the spread of disease and stop the transfer of creatures to a different river or pond.
- Don't forget to wash your hands when you get home.

## ANIMALS THAT YOU MIGHT FIND...

#### Beetle larva





Freshwater shrimp



Cased Caddisfly larva



Stonefly nymph



Mayfly nymph



Non-biting midge la



Ramshorn snail



Rat-tailed maggot

## THINGS TO LOOK AT & QUESTIONS TO ASK ABOUT YOUR ANIMAL:

How big is it? Where does it live? What does it eat? How many legs does it have? Does it have any tails? How long does it live? What is its life cycle? Does it have a shell? Is it a fast swimmer? How does it breathe?

## FIND OUT WHAT YOU'VE GOT!

Use a simple identification chart, such as the Field Studies Council's Freshwater Name Trail:

www.field-studies-council.org

Or Gatekeeper Guide to Freshwater Invertebrates:

www.gatekeeperel.co.uk

# **RIVER ART**

After you've made your natural art, take a photo and then leave your artwork for the river and the weather to take it back to nature.

You can use natural materials found on the river bank to make some river art.

You need to do this with a grown-up and make sure the river isn't flowing too fast and high. It's best done at the side of a stream or beck rather than a main river.



## THINGS TO USE:

- Stones and pebbles
- Autumn leaves
- Riverbank mud and clay
- Twigs
- Empty snail shells



- Build a tower of stones
- Make a rainbow out of leaves
- Build a house from sticks and mud
- Make a river monster
- Form a mud face on a tree

### MAKE A MINIATURE BOAT OUT OF NATURAL MATERIALS

Use leaves, twigs, bark, empty nut shells, woven grass, feathers, ferns.



- Make sure your materials float
- Try weaving grasses and reeds together
- Use some pebbles as a cargo to help keep your boat upright



Only use natura

Only use natural materials that you find at the river.

Never use anything made of plastic or textile.

If you find any litter on the river bank, you could ask a grown up to help you collect it using gloves, and take it home to dispose of it properly.

# **RIVER POEMS**

# Write your own river poem, inspired by your local river.

Take us on the journey of your river, using some of the words you've learnt about rivers in your poem.

## YOUR TITLE

Think of a suitable title which describes your poem.

## DESIGN

Will it be a shape poem, an acrostic poem, will it rhyme?

#### Ideas of words for an acrostic poem or for alliterations in your poem:

river	ru	shing	raç	ging
rapic	r k	ainy	inte	nse
i	су	impre	essive	
iconi	ic ir	nfinite	va	lley
view	ver	tical	vigo	rous
vast	everla	sting	enor	mous
evenir	ng	eager	re	stful
ace	rich	rom	antic	ratty

#### Other adjectives which you could use in your poem:

meandering	bubbling
flowing	gentle
peaceful	eroding
racing	tranquil
beautiful	winding
timeless	

flooding	spring
riverbed	estuary
tributary	stream
rapids	bank
sea	nature
source	flow
mouth	wildlife
waterfall	marshy

**River words:** 

ILLUSTRATE YOUR POEM

#### SHAPE & STYLE

Will your poem be in the shape of a river? Decide on your design.

# RIVER POLLUTION

There are lots of amazing animals living in and around our rivers, but some animals can't survive when our rivers are polluted.

#### What is pollution?

Can you think of some things that might pollute our rivers?

We can tell how clean a river is by seeing which animals are living in our rivers. They are called Indicator Species.

How do river invertebrates indicate how clean a river is?

Choose two of the things from this list and find out how they can damage rivers.

Plastic	Pesticides
Fertilizers	Sewage
Oils and fats	Soil

## What can we do to help prevent pollution?

There are ways everyone can help. Can you think of any?

Choose an animal which lives in rivers and research about how it can tell us if the river water is clean.



Facts about my animal and where it lives:

What I am going to do to help rivers.



#### **ANSWER SHEET**

# RIVER POLLUTION

#### What is pollution?

Pollution is the introduction of harmful substances into the environment.

Can you think of some things that might pollute our rivers?

Sewage, soil, pesticides and fertilizers, plastics and microplastics, litter, chemicals, medicines, oils, paints, tyres.

We can tell how clean a river is by seeing which animals are living in our rivers. They are called Indicator Species.

## How do river invertebrates indicate how clean a river is?

Animals which are sensitive to pollution include stonefly nymphs and mayfly nymphs, so you won't find them in polluted water, but other animals such as worms and midge larvae are more tolerant of pollutants.

Choose an animal which lives in rivers and research about how it can tell us if the river water is clean.

MY RIVER ANIMAL

Facts about my animal and where it lives:

There are lots of amazing animals living in and around our rivers, but some animals can't survive when our rivers are polluted.

Choose two of the things from this list and find out how they can damage rivers.

Plastic	Pesticides
Fertilizers	Sewage
Oils and fats	Soil

## What can we do to help prevent pollution?

There are ways everyone can help. Can you think of any?

Only put the 3 Ps down the toilet: paper, poo and pee

Don't waste water

Don't put oils and fats down the kitchen sink

Don't drop litter

Check – Clean – Dry equipment and clothing after visiting a river

What I am going to do to help rivers.



## SUSTAINABLE DRAINAGE SYSTEMS

Sustainable Drainage Systems (SuDS) are natural methods of intercepting, slowing and holding water to reduce flooding, improve water quality, support biodiversity and increase public amenity.

## SuDS solutions Install a water butt Make a rain garden Have a permeable drive Grow a green roof Keep plants and lawns in our gardens No artificial grass

## What are the differences between natural and urban drainage?



- Holds water in the uplands
- Allows infiltration into the ground
- Improves water quality
- Provides habitats for wildlife
- Replenishes groundwater
- Creates spaces for people to connect with nature

#### URBAN DRAINAGE

- Rapid run-off causing flooding
- Reduced groundwater absorption
- Reduces habitat for wildlife
- Less connection for people with nature
- More treated water has to be used



#### **GREEN ROOFS**

Green roofs are flat, or gently sloped roofs, covered in plants. Their advantages include:

- Holding rainwater and reducing run-off
- Building insulation
- Offering a habitat for birds and insects
- Helping improve urban air quality
- Aesthetic benefits

#### Find out about green roofs!

You can find out more about green roofs by visiting this website:

www.livingroofs.org



# WATER FRIENDLY LIVING

#### **KEEPING RIVERS HEALTHY**

We can all do little things to make our homes and gardens better for our rivers and wildlife:

- Use water wisely
- Don't throw litter or grass cuttings into rivers or streams
- Avoid washing your car on a drive where soap and chemicals can wash into the drains and into our rivers
- Avoid using slug pellets and weed killers. Use natural controls instead
- Pick up pet waste in biodegradable bags and put it in your wheelie bin
- Only put the 3 Ps in your toilet pee, poo and paper

Most road drains lead straight into our streams and rivers. Don't pour anything down the drain which could kill wildlife in the river, such as chemicals, soap or oils. Remember:

Only rain goes down the drain!

#### Investigate how you can use water more wisely

How much water can you save if you turn<br/>off the tap when you brush your teeth?Why is it better not to cut your lawn too short?Wait until your washing machine or<br/>dishwasher is full before you use it.<br/>How much water will you save?Mend the dripping tap. How much water<br/>can be wasted in one day, if a leaky tap<br/>has one drip per second?

## What 4 things will you do to help save water?



#### **ANSWER SHEET**

## WATER FRIENDLY LIVING

#### **KEEPING RIVERS HEALTHY**

We can all do little things to make our homes and gardens better for our rivers and wildlife:

- Use water wisely
- Don't throw litter or grass cuttings into rivers or streams
- Avoid washing your car on an impermeable drive or road where soap and chemicals can wash into the drains and then into our rivers
- Avoid using slug pellets and weed killers. Use natural controls instead
- Pick up pet waste in biodegradable bags and put it in your wheelie bin
- Only put the 3 Ps in your toilet pee, poo and paper

Most road drains lead straight into our streams and rivers. Don't pour anything down the drain which could kill wildlife in the river, such as chemicals, soap or oils. Remember:

Only rain goes down the drain!

#### Investigate how you can use water more wisely

How much water can you save if you turn off the tap when you brush your teeth?

It will save up to 18 litres per minute, so if you brush your teeth twice a day for 2 minutes, that's 72 litres!

Wait until your washing machine or dishwasher is full before you use it. How much water will you save?

It can save you up to 4,500 litres of water per month (and save on electricity too!)

## What 4 things will you do to help save water?

<ul> <li>2 Chill a jug of drinking water in the fridge</li> <li>3 Take a shorter shower</li> <li>4 Install a water butt to hold water and use it to water my plants</li> </ul>	1	Turn off the tap when brushing my teeth
<ul> <li>3 Take a shorter shower</li> <li>4 Install a water butt to hold water and use it to water my plants</li> </ul>	2	Chill a jug of drinking water in the fridge
4 Install a water butt to hold water and use it to water my plants	3	Take a shorter shower
	4	Install a water butt to hold water and use it to water my plants

Why is it better not to cut your lawn too short?

Longer grass retains more water so less watering is required, and it also provides a great habitat for invertebrates!

Mend the dripping tap. How much water can be wasted in one day, if a leaky tap has one drip per second?

One drip per second adds up to over 20 litres per day!

# SAMPLE: RISK ASSESSMENT

Stream dipping to collect and identify freshwater invertebrates and river flow and measurement activity

Name: Organisation:
---------------------

Extreme weather.Overheating, sunburn in hot weather; hypothermiaMedium for the weather.School to ensure children are dressed appropriately for the weather. Sunhats/suncream (reef friendly), in sun; warm clothing and waterproofs in cooler	Identifying members of the team running the event.Child abduction.High the feam running the branded t-shirts and/or identified with name badges and wearing high vis jackets.Children not to be left unattended and must be under supervision of their teacher/group leader at all times.	Hazard or Activity       Associated Risk       Potential to cause harm       Controls in place & actions required by
opriately endly), poler	e badges t be ader	Residua Risk

Low	Medium	Low
Ensure a safe area is used for the sampling with easy access, no steep banks, and a pre-visit check has taken place. The water level must not go over the children's wellington boots. On the day a separate check to be carried out and if the depth or flow is too strong – ONLY staff / volunteer to enter the water. Ensure all invertebrate identification takes place on the bankside, safely away from the water and in small groups with a staff member / volunteer / group leader with each group. Ratio of adult:child when in water 1:2. On bank 1:4. With group of 9 children 1:3. Ensure children to be made aware of the river and river safety. Supervise carefully when close to the water's edge. Remove from the activity, any children unable to follow guidance once a warning has been given, to a safe place with adult supervision.	Ensure the children and teachers / group leaders are aware of the importance of hand washing, using gel or plastic-free wipes. Ensure gel and wipes are available and participants are advised to wash hands at the end of the session. No eating until hand cleaning has taken place. No drinking water from river / stream. Any cuts or grazes treated and covered immediately. Site check. Adults to look out for animal faeces and remove if possible. Any children doing dipping in the water must have appropriate footwear: wellington boots.	Ensure school is aware of any children who are likely to react badly to insect bites and stings and ensure any medication is carried by the group leader. Make sure all children are suitably dressed with no bare skin on arms and legs. Advise teachers to inform parents to check children for ticks following visit.
Hgh	High	High in a few cases
Trips, slips and falls. Worst case drowning.	Microbacteria infection from contact with animals or their faeces / urine. Some infections cause serious illness and in worst case death.	Allergic reaction to bites and stings. Infections such as Lyme's disease.
Invertebrate sampling session at the river / stream. River measurement and flow activities at the river.	Water quality health hazards such as Weil's disease (leptospirosis), or blue-green algae.	Insect bites and stings. Ticks.

	Risks to the environment.		Running, banksides, wet grass, mud.
Distress to fish and other wildlife.	Spread of infection to and from other water courses, including invasive species and disease.		Slips, trips and fall injuries.
	Medium		Medium
Try to minimise disturbance of surrounding area. Do not keep fish in trays but return to river if caught. Activity to take place for limited time only. Any native white-clawed crayfish to be immediately returned to the water. Limit the number of people in the water at any time.	Advise volunteers and participants about Check, Clean, Dry procedures. Make sure all equipment and wellingtons are washed in clean water, dried and not used in another watercourse for at least 48 hours.	Ensure all children are aware not to run – and why. Ensure all children are wearing appropriate outdoor clothing. Carry a First Aid kit and ensure an allocated member of staff is FA trained. Ensure any children with known support needs are fully supported.	Ensure all children are supervised by their group leader.
Low	Medium		Low

Rivers, Water cycle, Living things and habitats	Week: 5         Ing       Week: 5         Condensation       Condensation         Condensation       Condensation         Condensation       Intervet played by         condensation       evaporation and condensation         iate       Intervet cycle and associate         in the water cycle and associate       Intervet         the rate of evaporation and condensation       Intervet         in the water cycle and associate       Intervet         the rate of evaporation and condensation       Intervet         the rate of evaporation and condensation       Intervet         in the water cycle.       To understand the water cycle.         the rate of evaporation and condensation       Intervet         team       To use and understand the terms         evaporation and know these are reversible       Intervet         is.       Itas         is.       Itas
2 (Upper KS2) ny and Science	<ul> <li>Week: 4</li> <li>Focus: Water cycle – observer version</li> <li>Bobjectives to share:</li> <li>Objectives to share:</li> <li>Identify the part played by evaporation and condensation the vater cycle and association with temperature.</li> <li>Know that the water we drin today is the same water that people drank in the past.</li> <li>Use correct terminology to explain concepts, e.g. the 's on the windows is condensation and condensation are reversible changes.</li> <li>To use the term and underst the process of evaporation.</li> <li>To observe evaporation.</li> <li>To observe condensation.</li> <li>To know that water can existing a liquid, and ice as a solid.</li> </ul>
Lower KS Geograph Planning	Weeks 3 Focus: Trip to a local river: field sketching and mapping a section of the river Objectives to share: KS2 Geography: Use fieldwork skills to observe, measure, record and present the human and physical features in the local area using a range of methods, including sketch maps, plans and graphs, and digital technologies. Outcomes: • To develop field sketch skills by drawing the main features first and then adding details. • To add labels and a title to a field sketch. • To add labels and a title to a field sketch. • To observe and sketch the physical features of the river, waterfall. • To observe and sketch the physical features of the river; bridge, flood defence, weir, drainage pipes – what is their purpose? • To draw a map of the river, plants, trees, bridges, riffle, waterfall, tributary, beach, bank. • To know a map of the river, plants, trees, bridges, riffle, waterfall, tributary, beach, bank.
ΣZ	Week 2Focus: Trip to a local river, river dipping, river measurementsdipping, river measurementsdipping, river measurementsCbjectives to share: KS2 Science:KS2 Science: KS2 Science:Recognise that living things can be grouped in a variety of ways. Explore and use classification keys to help group, identify and name a variety of living things in the local environment.KS2 Geography: Physical - rivers Use fieldwork skills to observe, measure, record and present the human and physical features in 
MEDIUM TER LESSON PLA	Week 1 Focus: Introduction to Rivers Visit from the Rivers Trust van Rivers2U Objectives to share: KS2 Geography: Use key vocabulary to demonstrate knowledge and understanding of rivers, physical features, human features, mountains, hills, sea, climate. Outcomes: •To be able to explain the reasons why rivers are important for the survival of life on Earth. •To learn about the physical features of a river using the river table in the Rivers Trust van. •To be able to describe the changes that occur in a river over its length and over time.

you can see that the water has evaporated as the level of water in the bottom goes down. Now hang the bag somewhere cooler, leave for an hour or more, and observe as the water vapour condenses on the side of the bag. Keep checking the bag to see what is happening. The children should observe the water droplets and explain what condensation is. This is like the precipitation, or rain falling from a cloud when it cools down and is full of water. Explain this is what happens when it rains and the water vapour in the clouds condenses, cools and falls as rain. Bring all the learning together to explain the water cycle.		<ul> <li>Take a guided walk of the river section and use language such as:</li> <li>The riffle is before the meander.</li> <li>There is a large tree on the bend.</li> <li>The tributary joins the river just after the bridge.</li> <li>Model how we draw a map from an aerial view. Look at some examples of maps drawn for other areas.</li> <li>What makes a good map? What do we need to include in our maps?</li> <li>Model making a map, children to help with locating key features to include. Add a title and key.</li> <li>Children to create own maps of the river area, including a title and key. Annotate land use.</li> </ul>	Take photographs/video of the river. Measure depth, width, flow at a safe part of the river. Note changes in height, depth, width, flow of water. width, flow of water.	Observe the rivers table to see how rivers form from source to sea.
Measure a chosen amount of water into a clear plastic bag such as a sandwich bag, and mark the water level with a permanent marker. Hang it in a window on a sunny day. Ask the children what will happen to the water, based on what they have learnt so far. Leave the bag for a few hours on a sunny day, to give the sun chance to heat the water and for evaporation to occur. Explain that	On a sunny day, make puddles on the playground and draw around them in chalk. Observe over time- eg every 15 min and observe them 'shrinking'. Where have they gone? Discuss evaporation. Plot graphs. Introduce the water cycle.	Create a field sketch of the river. Leader to carefully model how we begin by drawing the main features. Then add detail in the foreground and background. What physical and human features can we see? Add labels of the main human and physical features such as meander and tributary, erosion or deposition, bridge, flood defence. Take time to observe and notice things.	Work with the Rivers Trust to collect animals safely from the river and use identification charts to name them (this may be done in the Rivers van session). Walk along the river noticing the direction of flow and features of the river. Note human use along the river, eg. farming, fishing, industrial water supply, tourism, sewage.	for. Guide children to think about: importance of water for life: drinking, washing, cooking, sewage treatment. Water cycle, movement of nutrients and water to places all over the world. Transportation, recreation, animals – domestic and wildlife. Habitat for animals and plants. Energy source. Agriculture – animals, crops.
Practical Activities including modelling:	Practical Activities including modelling:	Field Activities including modelling:	Field Activities including modelling:	Class activity: Discuss/ brainstorm what we need water
<b>Question to investigate:</b> What makes it rain? What happens when water vapour cools?	<b>Question to investigate:</b> Where do puddles in the playground go? How does the washing get dry on the line?	<b>Question to investigate:</b> What do we need to include in a map of the river area we are visiting?	<b>Question to investigate:</b> What physical and human features can we find when visiting the river? Can you describe and explain erosion and deposition, focusing on a suitable meander point to contrast outer and inner bends, speed of water flow, contrasts in river bank features and water depth. What animals live in the river? How fast does the river flow? How deep and wide is the river? (measured in-stream for slow- flowing streams, or from a bridge for larger rivers, by lowering a weighted rope.)	<b>Question to investigate:</b> Why are rivers important? What do we use water for? Can you tell me about some physical and human features of a river?

Key Vocabulary:	Key Vocabulary:	Key Vocabulary:	Key Vocabulary:	Key Vocabulary:
River, channel, source, hill, meander, dam, flow, upstream, downstream, tributary, valley, erosion, deposition, bank, river bed, floodplain, mouth, sea, flood defence, human, physical, natural, manmade.	River, channel, flow, human, physical, natural, manmade, invertebrate, identify, classification key, depth, width, upstream, downstream, distance, pollution.	Field sketch, Map, plan, aerial view, key, title, symbol, features, human features, physical features, natural, manmade, landscape, agricultural, industrial, housing, land use, settlement, landmark, distance, urban, rural.	Water cycle, evaporation, sun, heat, water vapour, clouds, particles, cycle, cooling, condensation, precipitation, seasons, weather. Climate, extreme weather, understanding the impact of humans on the earth.	Water cycle, evaporation, condensation, cool, heat, sun, condense, clouds, water vapour, rise, precipitation.
Follow up:	Follow up:	Follow up:	Follow up:	Follow up:
Compare your local river to a chosen river in the world. Use Maps and Atlases to locate the rivers. Use local maps to locate your local river and its catchment. Plot your local river from source to mouth, noting towns, names of tributaries etc. Write an explanation text about the features of the local river. Creative writing – the story of a river, or writing a river poem.	Draw up a cross-section diagram of the river, and label. Record and graph features of and changes to the river. Create graphs from data to show the variety and numbers of invertebrates. Create a river food web diagram.	Children to share their maps and refine if necessary. <b>Extension:</b> Create a 3D model of a river in an old shoebox or similar, labelling features.	Write up the investigation to answer the question — where do puddles on the playground go?	Draw and label a water cycle diagram.

# FRESHWATER INVERTEBRATE MONITORING

Date:		
Names:		

Location:

Weather conditions:

Animal	Found (tick)	Number: 1–10	Estimate Number to nearest 10
Freshwater shrimp			
Stonefly (2 tails)			
Burrowing mayfly nymph			
Swimming mayfly nymph			
Flat-bodied mayfly nymph			
Blue-winged Olive mayfly nymph			
Cased Caddisfly larva			
Caseless Caddisfly larva			
Other			

# RIVER MEASUREMENTS

Location:

<b>River width</b> (Measurement in Metres)	
River depth	
Near bank	
Mid-point	
Far bank	
Average depth	
Time to travel metres	
First time	
Second time	
Third time	
Average time to travel	
<b>Extended learning:</b> Calculating Flow rate in cubic m/s Flow = volume x (distance ÷ time) Width x average depth x average time x 0.85 correction	
(to correct for surface flow being faster)	

## POLLUTION TESTING WATER

#### HOW CLEAN IS THE WATER?

High nitrate and phosphate levels in the water indicate pollution from fertilisers, wastewater, landfills, urban drainage, detergents or septic tanks. Eutrophication, or high levels of nutrients in the water, causes excessive growth of algae and aquatic plants and bacteria which can harm aquatic life and lower dissolved oxygen levels.

Use the testing kits to find out the level of nitrates and phosphates in the water course.

#### TEMPERATURE

Use the thermometer to test the temperature of the water. There will be seasonal variations and differences according to the time of day you take the temperature, but you can record it at different times and then take an average.

#### DISSOLVED OXYGEN METER

Dissolved oxygen (DO) is the amount of oxygen that is present in water. Water bodies receive oxygen from the atmosphere and from aquatic plants. Running water in fast flowing rivers and streams dissolves more oxygen than still water. We can test the amount of DO in the water by using the DO meter.

The amount of oxygen in the water depends on things like the temperature and saltiness of the water. The higher the temperature, the lower the oxygen levels. The greater the saltiness, the lower the oxygen levels. Fish like salmon need a lot of oxygen, so they can only live in colder places.



#### TURBIDITY TUBE

# Use the turbidity tube to measure the amount of sediment suspended in the water.

In clear water you have low turbidity and high turbidity in very cloudy water. Turbidity will change depending on the weather and the season. High turbidity can indicate the presence of pollution in the water which can negatively affect aquatic life and water quality.

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