Freshwater Fish

It is estimated that there are about 27,000 species of fish in the world, with freshwater fish comprising 40% of all fish.

Did you know?

- More than 4 million anglers spend around £3 billion on angling in the UK every year;
- Native brown trout are found in 50% of river catchments in England and Wales;
- Since the 1980s the number of elvers (young eels) returning to European rivers has declined catastrophically to just 1% of historic levels;
- The carp family (Cyprinidae) is the largest family of freshwater fish in the northern hemisphere.

Background

There are 38 species of freshwater fish native to Great Britain and at least 12 introduced species. They range in size from the diminutive minnow to larger fish such as carp and pike, which can both exceed 20kg in weight.

These fish can be found living in habitats such as streams, rivers, ponds and lakes. As well as being found in such diverse habitats, different species occupy different areas within a given habitat such as in the surface waters or living close to the bottom.

Rare and endangered fish species include allis shad, twaite shad, vendace and pollan. The vendace *(Coregonus albula)* is now only found in two locations, both in the English Lake District. One of these populations is relatively stable while the other is showing signs of recruitment failure.

'Recruitment' overfishing occurs when more fish are removed from the sea than can be replaced through breeding or migration. This results in an unsustainable fishery as fewer fish are 'recruited' to the population in each subsequent generation. Factors that are thought to be responsible include:

- eutrophication;
- water quality decline;
- siltation of the spawning sites by organic matter;
- competition;
- predation;

Action plans to address these rare species are included in the UK Biodiversity Action Plan.

(See http://www.ukbap.org.uk/
for further details on these rare species).

Below are listed 23 species of freshwater fish that can be found in the rivers, canals and lakes of the North West which are detailed further in this document.

Atlantic Salmon (*Salmo salar*)

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This protected species is threatened throughout its range by pollution, over-exploitation, habitat degradation, lack of access to spawning grounds and reduced survival rates when at sea.

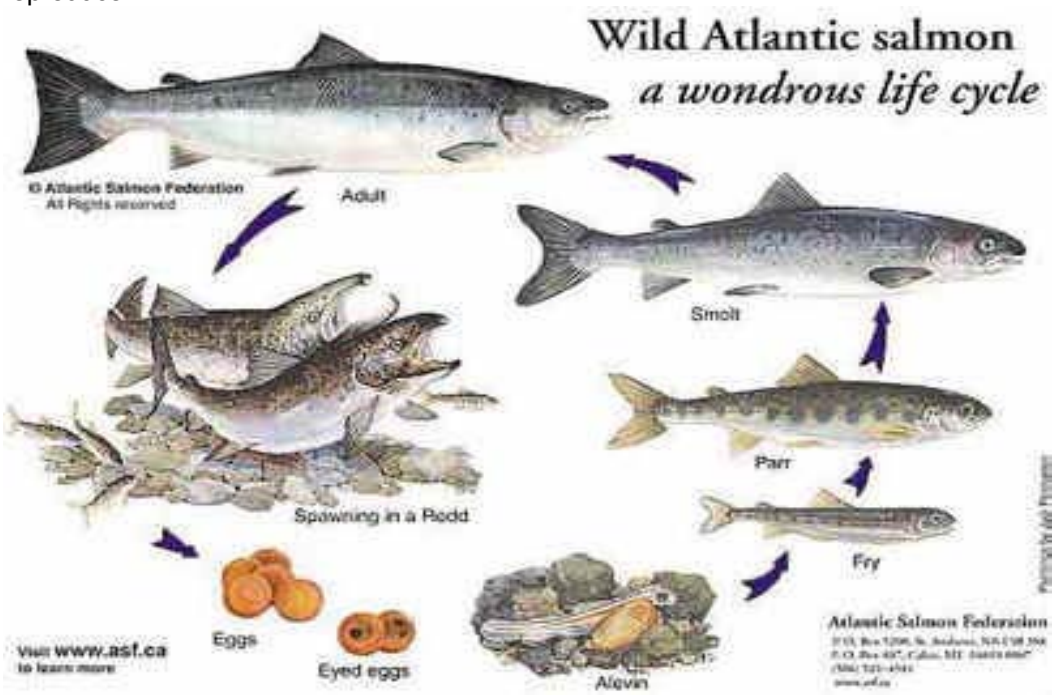
Salmon are found in Northern river systems that enter the Atlantic Ocean. When they first enter the river system, they have bright silver flanks contrasted by a dark steely back. The body is muscular and streamlined with a pointed tail.

After a period in freshwater, the fish become progressively darker to almost black. Salmon spawn during October to December but enter the river at any month of the year. Some may have spent a full year in fresh water living of accumulated fats. After spawning, the majority of salmon die but a few 'kelts' make it back to the sea and survive to spawn again.

Salmon are **anadromous**, living and feeding at sea but returning to freshwater to reproduce.

They are reliant on rain to trigger their migration into the river, in summer when the water is low large numbers build up in the estuary. When water levels increase they pour upstream, occasionally resting behind anywhere that provides protection from the powerful current.

Salmon are returning to River Mersey basin thanks to the improvements in water quality, removal of debris, and habitat restoration providing potential spawning grounds (See www.environment-agency.gov.uk/ for further details on these improvements). Further work is also required across the catchment on the large man-made weirs which create a barrier for salmon, resulting in a diversion up the river Bollin, a tributary of the Mersey.



Barbel (*Barbus barbus*)

A fish with a long streamlined body covered in bronze and golden scales, with four distinct 'barbels' set around a downward protruding mouth.

The torpedo-shape and paddle-like coral pink fins makes the barbel one of the most easily recognisable fish. The only fish it could be confused with is the gudgeon.

It occupies the bottom of the river, hugging the riverbed with its flattened creamy white belly in powerful flows with minimum effort.

Barbel are capable of living in many different habitats, including still waters, although they reproduce and thrive only in fast-flowing rivers and streams, such as the River Ribble.

Habitats associated with adult barbel include areas of shallow, fast-flowing water, with clean gravel substrate and prolific weed growth.

The barbel uses its shape, barbules and powerful, sucker-like mouth to browse the bottom, turning over small stones. They forage predominantly for crustaceans and small fish. Barbel feed in shoals both in daylight and at night. Although not overtly aggressive, they are highly competitive with other bottom-feeding species.

Common Bream (*Abramis brama*)

A large, bottom-feeding species with deep laterally compressed body and dark brown fins.

Bream is very widely distributed in Britain, being stocked into many canals, reservoirs and lakes. Due to the breams deep-bodied shape it avoids fast-flowing rivers and prefers sedate sluggish waters.

There are 2 species of bream:

- bronze; and,
- silver,

The silver bream is rare, with a very limited distribution; bronze bream is more common. Young bronze bream are known as "skimmers": they are silvery in appearance with black fins, as they mature the coloration changes to greyish brown and eventually bronze. The bream has a long anal fin and a pointed dorsal behind a humped back with large, almost sleepy eyes.

Bream have compressed sides and protrusible mouth that enables it to sift along the bottom and dig out food such as water snails, caddis fly larvae and bloodworms. These food types tend to be located around or in weed beds, providing cover. Also the water quality is generally good due to the oxygen provided by the plants.

Carp (family Cyprinidae)

Carp have been introduced to Britain. There are several variants of carp: common; mirror; and, crucian, as well as the king carp family with wild, koi, ghost and grass.

The Carp family is the largest family of freshwater fishes in the northern hemisphere. The carp is the most popular sporting fish in Britain, and the largest cyprinid. Along with species of Carp, many non-native species have been introduced into British waterways such as rainbow trout, wels catfish, zander and goldfish. Anglers have been moving fish between waters and rearing them for the purpose of restocking for recreational fishing for at least 150 years.

Carp are thick-set deep bodied fish that possess explosive strength, they have four barbules, a long concave dorsal fin (with the exception of the crucian) and vary dramatically in colour and scale patterns.

Carp inhabit all types of waters from fast flowing rivers to stagnant ponds. Favoured habitats will include areas of overhanging trees, beds of lilies, rushes, reeds and alongside steep undercut banks. Vegetation such as silkweed, insect larvae, molluscs and crustacea are favoured natural food for the carp. In soft bottom waters the carp uses its extendable lips to root deep into the mud for these food types. During warm sunny days carp can be easily spotted basking and feeding on the surface. Carp grow to weights in excess of 50lb and can live for many years.

Chub (*Leuciscus cephalus*)

Chub are one of the most widespread river fishes in Europe, but are absent from Ireland and the Mediterranean islands.

Chub are found throughout Europe and are common in many British rivers and streams such as the Ribble, Colne, and Calder to name a few. Due to the distribution of chub across Europe; its' occurring in large shoals; grows to a fairly large size; and will eat almost anything, the Chub is one of the most popular fish for anglers.

Chub are robust fish with a large mouth adorned with distinctive thick white lips. "Loggerhead" is the acquired nickname due to their large blunt head. Small chub feed on insect larvae and crustaceans, whilst large chub consume larger prey such as small fish, frogs and young water birds as well as crayfish where available.

Although regarded as a fish of flowing water mainly the middle and lower reaches of rivers, they can also be found in still waters where they are also successful.

Dace (*Leuciscus leuciscus*)

Dace are usually the first of the cyprinid species to spawn, normally between February and early May.

Although dace can easily be mistaken for a small chub, the difference is that the anal fin on a dace is concave whereas convex on a chub. The dace is more elegantly built and has a narrower, smaller and rather pointed head, large eyes and a dainty mouth.

Dace form large shoals in the main flow, waiting for anything the current may bring. They surface feed in the warmer months of the year taking insects such as mayfly and caddis fly. Dace are found in clean, swift flowing rivers, chalk streams and brooks. The River Hodder and Calder, main tributaries to the River Ribble, have many fast runs and deep pools that hold good populations of both dace and chub.

They are rarely found in still waters unless close river systems have flooded, even though they are quite capable of surviving. They prefer streamer weed beds to provide cover on deep powerful rivers: these habitats hold the most prolific shoals of dace.

European Eel (*Anguilla anguilla*)

Eels have the ability, alone amongst British fishes, to migrate overland. This is usually over wet terrain at night. They achieve this by closing their gill covers, trapping a reserve of water in their gill chambers.

The European eel is the only species of eel found in British freshwater, although there are at least 17 species worldwide. Eels begin life in saline conditions in the Sargasso Sea in the western Atlantic, before moving to river estuaries. This is called **catadromous**, and is the reverse to the life-style of the Atlantic salmon, which is **anadromous**.

Eels are commonly caught in the Mersey estuary as they migrate upstream, where they live for many years before returning to the Sargasso Sea to spawn as mature adults. The sexes migrate at different ages, with males migrating younger and smaller than the females.

Eels are mainly nocturnal, spending much of the day resting in dark holes under tree roots and bridges. They colonise foreign objects on the bed of the river or canal, such as shopping trolleys.

The Operculum bone is found in perch and eels, which can be used to age the animal like counting tree rings. Using this method, an angler who caught a 6-7lb eel found the animal to be 68 years old: he vowed never to kill an eel again. Whilst exceptional, it is not uncommon for female eels to live beyond 20 years.

Adult eels possess a long dorsal fin that travels around the tail to join the anal fin. This acts as a rudder allowing the eel to move backwards and forwards.

Eel stocks are critically low. The number of juvenile eels returning to our rivers has collapsed to just 1% of historic levels. The reasons for this decline are unclear, but potential factors include:

- Natural variation;
- Over-fishing;
- Loss of suitable freshwater habitat;
- Bioaccumulation of organic chemicals;
- Infection by swim bladder parasites.

Gudgeon (*Gobio gobio*)

The gudgeon is a bottom feeding fish rarely straying to mid-water.

Gudgeon are widespread throughout Europe. In Britain they favour fast-flowing, clean rivers and streams, but can also be found in still and slow-flowing waters, such as the Norfolk Broads, and are particularly numerous in the canal system of Britain.

Although they are similar to the barbel in their appearance, gudgeon has two barbules whereas the barbel has four.

Gudgeon are bottom-feeding fish, sifting through mud and silt, sucking up invertebrates. They rarely exceed a few ounces, with a half-pound fish exceptional. Gudgeon often form shoals, particularly in warm, shallow water. They communicate in shoals by a series of 'squeaks'.

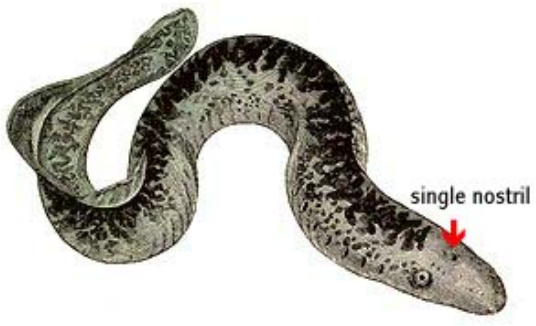
Gudgeon currently dominate the fish community in the Turning Basin of Manchester Ship Canal, indicating that the Canal is no longer anoxic in the bottom layers of the water column and the water quality has improved allowing this fish to inhabit this once lifeless waterway.

Lamprey (family Petromyzontidae)

There are 3 species of lamprey, of which two; the sea lamprey and the river lamprey are both anadromous, whilst the brook lamprey remains in freshwater for its entire life-cycle.

The lampreys belong to a small group of 'jawless' fish, the most primitive of all living vertebrates. Eel-like in shape, they have only one nostril!

Adults migrate upstream to spawn, normally in stony or gravelly stretches of running water. The young larvae travel downstream with the current to end up in sandy and silty areas where they spend the next few years in burrows. They metamorphose to become full adults, and usually migrate downstream away from the nursery areas. Brook lampreys never feed as adults, after metamorphosing they spawn and die. They are rare and seriously declining.

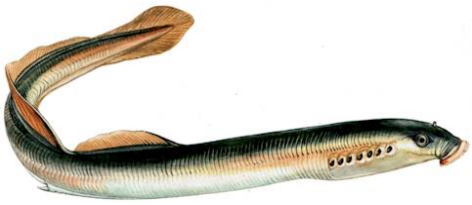


All lampreys require clean, flowing water with a loose gravel and pebble substrate to spawn successfully. All lampreys spawn in nests, which are depressions in gravel, with a distinctive mound at the downstream end. All lampreys die after spawning.

The **river lamprey (*Lampetra fluviatilis*)** is found in coastal waters, estuaries and accessible rivers. The species is normally anadromous (i.e. spawning in freshwater but completing part of its life cycle in the sea), and pollution or artificial obstacles such as weirs or dams impede migration. Sites that hold healthy populations of river lamprey have clear water and suitable areas of gravels, silt or sand for spawning. These are generally extensive river systems, including important tributaries, which provide conservation of the range of habitat features required by the species.

The **sea lamprey (*Petromyzon marinus*)** is a primitive, jawless fish resembling an eel. It is the largest of the lampreys found in the UK. It occurs in estuaries and easily accessible rivers, and is an anadromous species (i.e. spawning in freshwater but completing its life cycle in the sea). Like the other species of lamprey, sea lampreys need clean gravel for spawning, and marginal silt or sand for the burrowing juvenile ammocoetes. Sea lampreys have a preference for warm waters in which to spawn. Features such as weirs and dams, as well as polluted sections of river, may impede migration to spawning grounds. In comparison to the river lamprey, sea lampreys seem to be relatively poor at ascending obstacles to migration, and are frequently restricted to the lower reaches of rivers.

The **brook lamprey (*Lampetra planeri*)** is the smallest of the lampreys found in the UK. It is a non-migratory freshwater species, occurring in streams and occasionally in lakes in north-west Europe. Like other lamprey species, it requires clean gravel beds for spawning and soft marginal silt or sand for the ammocoete larvae. It spawns mostly in parts of the river where the current is not too strong. The brook lamprey has declined in parts of the UK, although it is still widespread. This species is the most abundant and widespread of the British lampreys and is often found in the absence of the other two species, for example above a barrier that precludes the presence of the migratory species. It can be found in the River Eden and River Derwent in the North West of England.



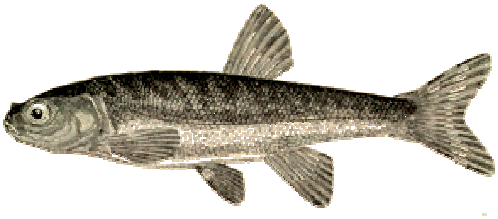
(i) River Lamprey

(ii) Sea Lamprey

All three species are protected under the Habitats Directive and the Bern Convention as well as listed under the UK Biodiversity Action Plan. They are all threatened throughout their range by habitat degradation and the anadromous forms are particularly susceptible to industrial pollution and physical barriers to upstream migration, such as weirs.

Minnow (*Phoxinus phoxinus*)

These tiny fish are amongst the most important foods of several species of piscivorous birds and larger fish such as perch, trout and pike.



Minnows are distinguished by the distinct black and gold stripe along the middle of the flank. The body is a mixture of brown and yellow, with dark blotches and a white belly. When the males are sexually mature they adopt a red underside.

Minnows are very small fish that prefer clean, fast flowing, well-oxygenated water with a gravel substrate. Typically they occupy the upper and middle reaches of rivers and streams, but they also occur in clean, gravel and stony-bottomed lakes. They live in large shoals, occupying the river margins feeding on a wide variety of small invertebrates, algae and plant debris.

Minnows are very sensitive to water quality and usually among the first fish to be effected by pollution, causing problems such as low oxygen levels. The fish rarely grows to more than an ounce and is a favourite food of the kingfisher and predatory fish such as brown trout and perch.

Perch (*Perca fluviatilis*)

The large mouth, spiked dorsal fin, boldly striped flanks makes the perch highly recognisable and probably the most colourful and well known of the coarse fish species in Britain.

Generally the perch is predominantly green in colour and has a double dorsal fin with a white belly. When threatened the perch erects its spiny dorsal fins to protect itself but when this predator is preyed upon by larger predators it is fairly ineffective.

Perch are predatory and, from an early age, will readily eat other small fishes. It mainly uses its sensitive eyesight for feeding in murky conditions, using submerged or emergent vegetation as places of ambush.

In low light perch feed very close to the riverbank eating crustacea, worms, insects and their larvae. In brighter conditions perch move into deeper water. Perch are cannibalistic and will eat smaller perch to enhance the chances of survival for the population when there is a limited supply of food.

The perch is one of the hardiest fish, thriving in muddy ponds, stagnant canals, lakes, all rivers and estuaries.

Perch are the first natural colonisers of the vast majority of newly flooded waters. This could be due to their very sticky eggs, which easily adhere to the feet or feathers of nomadic water birds, thereby allowing the species to colonise new water bodies.

Pike (*Esox lucius*)

Pike was a popular but scarce and expensive food item in mediaeval England, but is now rarely eaten in Britain.

Probably the best-known freshwater predator in the world, pike are probably the most widely distributed piscivorous fish in the Northern hemisphere.

They are the largest predatory fish in Britain being found in most types of waters, from lakes to larger ornamental ponds and from canals and slow-flowing rivers to streams. Larger pike are usually associated with deeper, more turbid waters.

Pike vary from deep olive on the back, through to a marbled combination of grey, green and yellow spots on the flanks. It has a large tail and the dorsal fin is set well back and in direct line with the anal fin to give maximum propulsion and incredible acceleration often from a standing start.

Weed and rush beds are one of the pikes favourite ambushing places, sunken trees and depressions in features are also likely places. At dawn and dusk pike are most active hunting shoals of roach and dace, moving to deeper water and shadows by mid-day. They are essential for British waterways in controlling natural populations of prey fish and controlling disease by eating unhealthy and dead fish.

Pike rely on three senses to find their food:

- Sight - when feeding on live fish;
- Smell for locating dead fish; and,
- Neuromar System for detecting vibration.

The Neuromar System detects electo-magnetic impulses from other fish using a very sensitive nervous system along the lateral line of the pikes body.

Pike grow to weights around 2-14 kg, but the maximum weight is 32kg. The British record is for a specimen caught in Wales weighing 46 lb 13 oz!

Roach (*Rutilus rutilus*)

This prolific species generally inhabits lowland rivers and still waters and is particularly tolerant of poor water quality in intensively managed catchments.

Roach are widespread throughout Britain, thriving in all waters including slow flowing rivers, lakes, ponds, canals and streams.

This prolific species is found throughout the North West particularly on the Rivers Ribble, Colne, Irwell, Medlock, Mersey and Tame. Their distribution is a result of their natural preference for lowland habitat and their introduction to waters that had not previously contained them.

Water plants and aquatic invertebrates are among favourite foods, generally feeding on or just off the bottom, over a wide range of temperature conditions. Roach are not territorial, but will migrate to preferred habitat types on a daily and seasonal basis. Roach grow to weights in excess of a pound in most environments, 2-3lb roach is exceptional.

Rudd (*Scardinius erythorphthalmus*)

Rudd commonly hybridises with other cyprinid species, principally roach and bream. Hybrids with bleak, dace and silver bream are also known.

A close relation of the roach, rudd are also widespread but much less common. They inhabit slow-flowing rivers, lakes and ponds where there is abundant submerged vegetation. Rudd are probably native only to South East England, but they have been redistributed very widely for and by anglers. They now occur in the lowland areas of the North West.

They have golden flanks with polished scales, blood red fins, bright yellow eyes with a red spot and a much deeper body profile than the roach. The upward-slanting mouth and protruding bottom lip marks the fish as a surface feeder taking all manner of insects from the surface film as they bask in heavily weeded areas.

Rudd are a threatened species throughout their range due to habitat deterioration or loss caused by eutrophication and unregulated stocking with species that they do not happily co-exist with. However, they are widely regarded as the most striking of all the coarse fish species, and are easy to keep in captivity. This along with their tolerance of conditions in aquaria and small ponds, makes them favourable as an ornamental species.

3-spined Stickleback (*Gasterostreus aculeatus*)

Three-spined sticklebacks are omnivorous, depending on their size and what is available in their habitat.

Three-spined sticklebacks are found in all types of fresh waters throughout Britain and are probably absent only from high altitude lakes and rivers. They are also absent from river reaches at lower altitudes that have swift currents and few refuges.

There are three sub-species, which all share a common body shape. Three or four spines align in front of the dorsal fin. The colour of individuals varies due to location and conditions. During the breeding season males develop a red breast (see picture).

Three-spined stickleback are short-lived, usually surviving to breed only once. They feed on a range of food types, including invertebrates and the eggs and fry of fishes.

Spawning behaviour is highly ritualised, taking place between March to August. Males defend a territory, constructing a nest on the bed of the watercourse made from plant debris, glued together with ‘spiggin’, an adhesive protein secreted from the kidney. Ripe females are encouraged into the nest to deposit their eggs, which are fertilized by the male. The male then drives off the female, caring for the nest alone, fanning the nest for up to 10 days until the eggs hatch. The males defend the eggs and fry from predators for the first few days after hatching.

They normally spawn among sandy or silty sediment in slow-moving shallow, fresh or brackish water.

Tench (*Tinca tinca*)

Tench are primarily found in slow-flowing lowland rivers, still waters and canals, preferably with good communities of aquatic plants and a muddy substrate.

Tench is one of the most recognisable coarse fish, widespread throughout Britain and Europe. The locations it is found in reflect its preference for lowland rivers, canals and still waters. They prefer environments with good communities of macro-phytes and a muddy substrate.

Tench require higher temperatures to spawn that other cyprinids, typically 18-24^{o}C. They are tolerant of low levels of dissolved oxygen and consequently are often the main survivors of pollution incidents.

They vary from olive green, to deep bronze with a light belly. Tench are heavy, thickset, short, deep bodied fish, covered in tiny scales that are imbedded deep in the skin. They are also covered with thick slime, which makes the fish very difficult to handle. This slime or mucus on the fish has purported healing properties, and hence the name ‘doctor fish’ attributed to tench.

Habitat complexity is important for their feeding strategy (grazing), the presence of prey and avoidance of predators. Tench browse the margins, particularly where there are reed beds, feeding off the bottom eating all types of aquatic invertebrates and water plants.

They are one of the later fish to spawn, sometimes well into July, but do not seem to suffer loss of condition as much as other fish.

Trout

Brown Trout (*Salmo trutta*)

Brown trout are the same species as Sea Trout. In this case 'brown' trout is used to describe individuals that spend their entire life in freshwater, while 'sea' trout are those that start life in freshwater, but migrate later to sea.

Brown trout are the indigenous species of trout throughout Britain and Europe. They are found in shallow, clean, cool, oxygenated flowing waters with mainly cobble and gravel substrates. Areas with abundant cover, provided by the substrate, undercut banks and aquatic vegetation are favoured.

Rivers in the North West holding good heads of 'brownies' include the River Douglas, Bollin, Goyt, Medlock and the River Tame. Many populations of brown trout in rivers and still waters have been physically isolated since the end of the last ice age.

The brown trout shows varied colouration largely dictated by the individuals' habitat. Where the water is dark and peat-stained the fish themselves are often very dark with many large black spots. Conversely, where the environment is open and light the trout has either pale or silvery flanks with much smaller and less profuse spots. Usually in small brooks and rivers such as the Tame, the trout have mixed spots on their flanks from silvers, browns, yellows and reds. Brown trout have a brownish coloured back with a pale belly and no spots on their tale unlike the rainbow.

Brown trout are highly territorial particularly in rivers. They feed on all aquatic insects such as stoneflies and caddisflies, also small crustaceans. Early in the year, when this food is scarce, trout will readily eat small fish such as bullheads and minnows.

Both the brown and sea trout are protected species. They are intolerant of pollution, affected by habitat degradation, over-abstraction of water and barriers to movement to spawning grounds.

Rainbow Trout (*Oncorhynchus mykiss*)

Introduced to Britain in the 1880s from North America, rainbow trout were found to be tolerant of intensive rearing and began to be farmed extensively and stocked in still-water fisheries from the 1970s.

The rainbow trout is deep bodied; the fins and tail are thickly speckled with black spots. The flanks are silver or pinkish-silver and it has a green tinge on top of its back, a pale belly and a pink stripe running from the gill plate along the flank intensifying in colour as the fish comes into spawning condition.

Most rainbow trout live and breed entirely in fresh water, both in rivers and lakes. They can tolerate lower water quality and higher temperatures than the brown trout. Although once known as *Salmo gairdneri*, it has recently been reclassified as *Oncorhynchus mykiss* to show its close relationship with the other various Pacific salmon such as coho and Chinook. The non-indigenous rainbow trout originated from the pacific area of North America.

Their diet is extremely varied, and along with a range of aquatic invertebrates and insect larvae, it is not averse to eating larger creatures such as grasshoppers, fish and even mice. Although these food types form the bulk of the diet, *daphnia,* a microscopic animal, is consumed in winter months.

Sea Trout (*Salmo trutta*)

A type of brown trout that start life in freshwater, but which later migrate to sea.

The sea trout is a sea-going version of the brown trout, living an anadromous lifecycle similar to that of Atlantic salmon. They are also similar in appearance but the sea trout tends to have spots below as well as above the lateral line and a flatter tail edge that can be slightly convex. Like the salmon however, the sea trout is bright silver when it enters the river and grows progressively darker the longer it is in freshwater until it reverts to a colouration more typical of brown trout.

Unlike the salmon, the sea trout does not die after spawning but instead returns to the sea to feed and grow. However, it will feed spasmodically whilst in freshwater. Sea trout weigh typically over 10 lbs but exceptional specimens can approach twenty pounds in weight.

The collapse of the sea trout populations on the west coast of Scotland (and in Ireland) appears to be linked to the salmon farming industry – in particular due to lethal infestations of sea trout smolts with sea lice transmitted from the farmed salmon.

Further Information

Key Reference:
Davies, C., Shelley J., & Harding P., et al. (Eds.) (2004) Freshwater Fishes in Britain: the species and their distribution. Harley Books, Colchester.
- An excellent book providing all of the basic information required on freshwater fish species in Britain.

See Environment Agency web-pages for further information on our nations fish and fisheries:
http://www.environment-agency.gov.uk/subjects/fish/

A one-stop portal for all information of fish.
http://www.onefish.org/global/index.jsp

Fishbase, a global information system on fishes. This resource provides everything you may wish to know about fish.
http://www.fishbase.org/home.htm

Below is a link to the freshwater fish records website – listing all records from size, weight and age for all freshwater fish.
http://www.fishing-worldrecords.com/