

THE NATURAL HISTORY OF THE RIVER USK IN BRECONSHIRE: PAST AND PRESENT

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The term ‘natural history’ is often used to refer to the study of wildlife. This paper describes some elements of the ‘history of the natural history’ of the River Usk in Breconshire and considers ways in which organisms associated with the river interact, or have interacted, including the critical role of human beings in the process.

Background

The condition of UK rivers is currently of great concern, and for the Usk this was brought into focus by a 2021 on-line publication *A Dying River? The State of the River Usk* by Guy Mawle, a well-known former fisheries officer.¹ In this paper, Mawle considered the status of various wildlife features that make the River Usk special, referring to the designation Special Area of Conservation (SAC)², and drawing attention to data provided by various organisations active in Wales. In response to this, I started to create a dossier based on my knowledge and experience, and, when in October 2023, the Bannau Brycheiniog National Park (BBNP) launched its Heritage Environment Action Plan, I was asked to give a talk with the same title as that of this paper. It seemed especially pertinent that the five inter-connected missions of the National Park included climate, water, and nature.³ This written version of the talk expands on the same story, enabling me to give reference to the source of the records and observations. Important information comes from, among others, Natural Resources Wales (NRW), the Wye and Usk Foundation (WUF) and the Biodiversity Information Service for the BBNP and Powys (BIS). I am also very grateful to many individuals for helping me with specific topics and I am especially indebted to the late Keith Noble for the way he encouraged me to use some of his magnificent photographs.

In essence, I have endeavoured to consider the natural history of the Usk as revealed by a variety of sources, both published and unpublished. My personal perspective comes from a life-time of interest: starting with the fact that through the 1940s and 1950s, spring and summer holidays were always spent in a family house within sight of the river in Llangynidr, 10 miles east of Brecon. My brothers and I would establish an aquarium (Fig. 1) and stock it with plants, fish, and other creatures from the river, and also the adjacent Monmouthshire and Brecon canal.⁴ Thereafter, I returned to the Usk whenever I could and, since 2002, my wife Liz and I have lived very near to it full time. Over the years, fly-fishing for trout has been one of my pastimes, but I would say that, of greater importance, has been ‘simply messing about by the river’, supported by family and friends.⁵

The choice of organisms for consideration is selective not exhaustive. It relates in part to those designated by nature conservation bodies as being significant but also covers species that have interested me as a biologist and local historian. In terms of geography, I have attempted to cover the county as a whole, but my personal knowledge means that there is a focus on the ‘main stem’ of the Usk in the Llangynidr area. Here the river passes through what has been termed the Bwlch Gorge, in which it loses height quite rapidly and there are many fast-flowing stretches interspersed with pools. It would seem inappropriate for a review of this kind to neglect topics such as the nature of the pressures that the Usk is facing and the suitability, or otherwise, of work that is being carried out to monitor and improve the situation. The paper concludes with a celebration of the delights that enhance the river-bank.

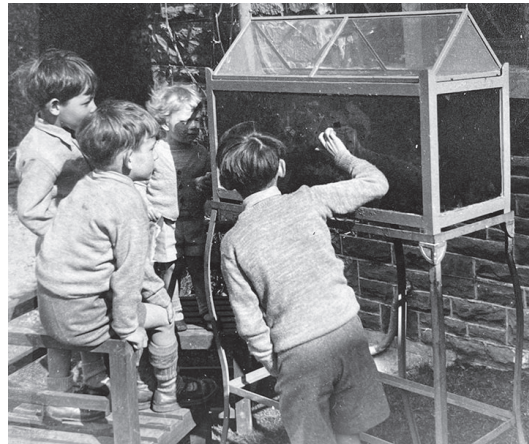


Figure 1. The four oldest Gibbs brothers and aquarium *c.*1950: from the left William, James, Andrew, and John.

Gibbs family archive

The River Usk in Breconshire as a Habitat

The catchment of the Usk within the National Park and an adjacent area of what used to be Breconshire (now part of Powys) is shown in Figure 2. Descriptions of the geological features of this area can readily be found, for example, in Chapter 2 of *Brecon Beacons* by Jonathan Mullard, a 2014 addition to the famous Collins New Naturalist Library.⁶ In brief, most of the underlying rock is old red sandstone but lying above this Devonian rock is Carboniferous limestone running from east to west on the southern side of the river. The river itself varies in character along its length. In places, it has cut down to the bedrock, creating pools, rapids, and wooded terraces. In other places, such as downstream of Brecon, it meanders across a flood-plain with shoals of shingle and earth cliffs. Useful information on the vegetation adjacent to the watercourses, as shown in Figure 2, comes from a report prepared by BIS.⁷ Within one kilometre of the water’s edge, approximately 45 percent is improved grassland, 22 percent is unimproved or rough grassland and 13 percent is woodland.⁸ Just three percent is arable; this a significant contrast to the position in the past, say 200 years ago, when very much more of the land was cultivated.⁹

In thinking of the ecology of the Usk, we must recognise that the organisms connected with the river are necessarily adapted to cope with sudden floods

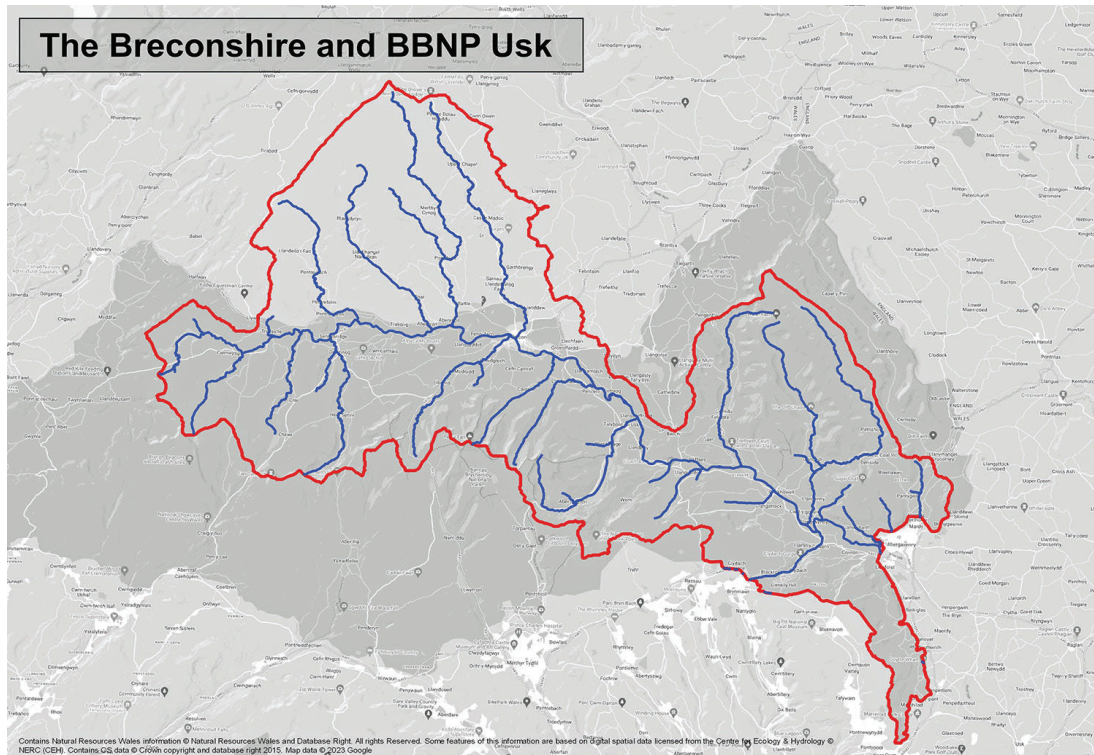


Figure 2. Map produced by BIS of the River Usk and its tributaries in Bannau Brycheiniog National Park (darker grey) and the adjacent area of the former county of Breconshire: red shows the catchment boundary.

(Fig. 3). It is a ‘spate river’ with the red-brown colour coming from sediment derived from the underlying old red sandstone soils. This colour is nothing new: in a poem called *The Storm*, Henry Vaughan (1621–1695), Breconshire’s most famous poet, associates the appearance of the river in flood with that of his own blood!¹⁰

It seems sensible to begin, as did Mawle, with what is described as ‘a habitat feature’ of the River Usk Special Area of Conservation (SAC). This is created by submerged growth of waterweed dominated by *Ranunculus fluitans*, a species of water crowfoot characterised by bright green finely-divided submerged leaves and, sometimes, white buttercup-like flowers on the surface.¹¹ In places on the Monmouthshire part of the river, mainly below the town of Usk, submerged masses of water crowfoot on the riverbed do indeed create an important habitat.¹² However, as was



Figure 3. River Usk in spate near Llangynidr on 16 February 2020. The line of trees marks the position of the river bank.

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recognised in the 2008 core plan for the SAC,¹³ this is not the case on most of the upper river, except upon one tributary: the Senni.¹⁴

In the Breconshire part of the catchment, it is the submerged shelves of rock, shoals of shingle, and beds of sand or silty-sand that provide the principal aquatic habitats. Rocks and tree-roots that are intermittently inundated, are often covered with a thick growth of moss, almost black when dry (Fig. 4). The term ‘Cinclodotus Zone’ is sometimes used for this, with the smaller lattice-moss (*Cinclodotus fontinaloides*), being one of the common species for our area. In *Brecon Beacons*, Mullard gives a list of the other mosses, lichens, liverworts, and alike to be found in the zone.¹⁵ In the summer, growth of filamentous algae—blanketweed (*Cladophora* spp)—can be conspicuous in the river, especially in static shallow water.



Figure 4. Black moss on intermittently submerged rocks.

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The Invertebrates of the River

Many natural history studies consider an ecosystem in terms of a food pyramid, with the predators at the apex and their prey ranged below them. In rivers like the Usk, aquatic insects such as the mayfly, the caddisfly, and the stonefly form important prey species. A good introduction to these groups can be found in another book in the New Naturalist series ‘*An Anglers Entomology*’, written, as the name makes clear, with the angler in mind.¹⁶

The mayfly (or up-winged fly) is characteristic of fast-flowing upland streams. The larvae (or nymphs) live in the water, often having flattened bodies that enable them to cling on to stones in the current. They go through 20–30 stages as they develop, and mayflies are unique in that they moult one further time after getting functional wings; the first winged stage (the dun) giving way to the perfect stage (the spinner). The only function of this latter stage is reproduction and dispersal, with mating usually taking place in mid-air. The eggs are laid in the water and fall to the river-bed. As the season progresses, different species reach maturity, with large numbers of any one species often emerging together (a ‘hatch’). It is recognised that over recent decades there has been a widespread decline in mayflies, with pressure on the habitat being considered a key factor.¹⁷ Perhaps the most famous species on the Usk is the march brown (*Rhithrogena germanica*) (Fig. 5) which, as the name indicates, is on the wing in the spring. Historically it was abundant¹⁸ but then became much rarer. It is good to be able to say that, in recent years, there have been a fair number of records of this fine insect.¹⁹



Figure 5. March brown adult.

Richard Bartz, Wikimedia Commons

The larva of the caddisfly is a remarkable creature, with the head, thorax, and legs being armoured with chitin, but the body being soft and vulnerable. It spins a silken sheath and, to this, is attached a protective covering of sand grains, shells, or fragments of leaf according to species. Caddisfly cases are open at both ends, the larvae drawing oxygenated water through the posterior end, over the gills, and pumping it out at the front. After a number of larval instars, there is an aquatic pupal stage from which the adult emerges. It is known as a sedge and is quite different from the mayfly, having its wings folded back along the body. As well as caddisflies with portable cases, some species have fixed cases with the larvae within waiting for food to come to them. It may be noted that, unlike the situation in nearby ponds and lakes, there are relatively few large insects in the Usk or its tributaries, although an exception is the beautiful demoiselle (*Calopteryx virgo*). This damselfly, which favours fast flowing streams, is widely distributed in Wales.²⁰ It is a striking sight in early summer when the adult is on the wing or resting on riparian foliage.

Returning to the important prey species, a crustacean, the fresh-water shrimp (*Gammarus pulex*), can be found in abundance in the Usk (Fig. 6). *G. pulex* is typically 10–15 millimetres in length, with the males being larger than the females. It tends to swim on its side; hence the other common name of ‘sideswimmer’. The life cycle is quite complex. The male grabs and holds

the female for several weeks until she sheds her skin and he can mate with her. The female is then released and lives independently, carrying the developing young in a brood pouch. After about a month, the young shrimps emerge, and a few months later they can themselves breed; this enabling populations to increase rapidly. In an anecdotal way, I know something of the way in which the abundance of this species on the Usk has changed over the years. During the 1970s and 80s, I became aware that the shrimp populations in the river were much higher than they had been when I was younger: as one disturbed the submerged moss on the rocks, clouds of shrimp would appear and swim about. However, over the next 20 years they became less abundant again.



Figure 6. Freshwater shrimp.

Alex Hyde Natural History Images

When referring to crustacea, it is appropriate to mention the white-clawed crayfish (*Austropotamobius pallipes*), although it never seems to have been a common component of the Usk ecosystem in Breconshire. Thus in 1805, Theophilus Jones, wrote in the first volume of his *History of the County of Brecknock* that “It is remarkable that the crayfish is found in many brooks running into the Wye: but seldom if ever in those which fall into the Usk”.²¹ This is consistent with information from the Penpont estate west of Brecon, through the centre of which the Usk flows. Between 1774 and 1776, purchases for the table included crayfish and, on at least one occasion, the supplier was one David Thomas who lived in Llanfilo, from which village he would have had very ready access to streams in the Wye catchment like the Dulas and the Llynfi.²²

Only rarely in my youth did we catch a crayfish in the Usk. However, in the early 2000s, my family and I caught several on the Llangynidr section of the river. Then, very sadly, in May 2008, a crayfish kill was observed. A flood occurred before staff from NRW could visit and establish whether the deaths were due to agrochemical poisoning or, as seems much more likely, to crayfish plague, caused by the devastating pathogen (*Aphanomyces astaci*). This fungus arrived in Britain with the introduced North American Signal Crayfish and, over the last 40 years, has destroyed the native crayfish populations of most British rivers, including the Wye and many of its tributaries.²³

Small Fish

Further up the food chain, we come to the small species of fish. The minnow (*Phoxinus phoxinus*), a member of the carp family, is by far the most commonly-observed fish in the Usk, as I know it. Minnows are characterised by a brown

back and a silver belly separated by a black horizontal line. Most individuals are only one to two centimetres in length, although they can achieve 8–10 centimetres. Large shoals can often be observed in shallow water where they show synchronous darting movements in response to perceived threats. They have a notably long spawning season: from spring through to midsummer.

The stone loach (*Noemacheilus barbatulus*) is also a typical species of the river. It has a mottled-brownish colouration with a greyish belly and can very occasionally grow up to 10 centimetres in length. A bottom feeder, often found beneath stones, it is in a genus that is characterised by having barbels round the bottom jaw; these being used to detect its invertebrate prey. The status of the loach has not been examined in any consistent way. In recent years, we have found it to be less reliable in its occurrence in places where we have long known it to be abundant.

The bullhead or miller's thumb (*Cottus gobio*) is a freshwater member of a largely marine group: the sculpins. It has a large head with the eyes on the top and a flattened-tapering body that is well adapted to life as a bottom-living fish in a habitat comprising clear fast-flowing, shallow water over 'hard substrates' such as pebbles and larger stones. The brown-mottled skin varies in shade according to background and offers good camouflage (Fig. 7). In my experience of the Usk and its tributaries, the bullhead very rarely exceeds a length of 5–6 centimetres. The male excavates a nest under a suitable large stone and, demonstrating behaviour that is considered unusual for a fish, makes 'knocking' sounds, which may attract the female, as well as helping it to keep other males away. He defends the eggs against predators such as caddisfly larvae and, in still water, fans the eggs with his fins which, by keeping the water moving, may reduce the chance of fungal infection.²⁴



Figure 7. Bullhead.

The bullhead is characteristic of the Usk catchment and, for this reason, has been designated one of the SAC species for the river. Mawle points out that, whereas a survey in 2012 led to the conclusion that “the River Usk bullhead population should be considered to be favourable”, a subsequent assessment by NRW failed as, “less than half of the SAC units had an annual mean density that met the target”. I, myself, consider bullheads to be less common in the river at Llangynidr than they were a decade ago. However, recent WUF electrofishing exercises have shown good numbers to occur in the ‘riffles’ of both tributary streams and the main river.²⁵

The Salmonids

The salmonids are cool-water fish, migrating upstream to spawn in shallow gravels at the headwaters of rivers and streams. There are two important species in the Usk, the trout and the salmon: ‘game fish’ famous as a source of sport and food. They are celebrated in the remarkable 4.5-metre-high ‘Fish Stone’ to be found just beside the river in Glanusk Park, near Crickhowell (Fig. 8). Carved in sandstone to resemble a fish standing on its tail, it was probably erected in the Early Bronze Age as a ceremonial monument and takes the natural history of the Usk in Breconshire back some 5,000 years!²⁶

Trout

The brown trout (*Salmo trutta*) is the fish for which the Usk is best known (Fig. 9), although it is not a SAC species, perhaps because its distribution in Europe is so widespread. It lives in

the river all its life, and its biology has been the subject of many accounts, most notably the eponymous 1967 New Naturalist Monograph.²⁷ In behaviour, the trout is territorial, taking up a station in the current and waiting for food—mayflies, freshwater shrimps, and alike—to be carried down to it. Each fish will typically have a refuge beside a large stone or ledge of rock to which it will quickly retreat if disturbed. The bigger fish take the best places and if that place is vacated—through the fish being caught for example—it will be taken over by another trout. The food taken varies with circumstance. Thus, referring to the small River Bray in North Devon, Henry Williamson wrote, “The river very low, the wind southeast, and the trout trying to ease their hunger with caddis grubs, each belly and gut full of little stone fragments”.²⁸ In relation to my comments above on the relative abundance of freshwater shrimp in the Usk over the years, I further concluded that its importance as food for the local trout was reflected in the colour of their flesh. In my youth, trout caught for the table typically had white flesh, while in the 1980s, it was almost invariably pink. Nowadays, some fish are white fleshed, others are pink. In this connection, it may be noted that in his celebrated 1943 book *Coming down the Wye*, Ronald



Figure 8. The Fish Stone, a sandstone monolith from the early Bronze Age.

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Gibbings includes the comment of a local poacher that, as compared to a surface-feeding trout, the flesh of a ‘ground feeder’ is a “deeper colour from feeding on shrimp, more like the salmon”.²⁹

As long ago as 1188, Giraldus Cambrensis drew attention to the importance of the Usk for trout. Thus, in referring to the Wye and Usk rivers, he wrote that the Wye is more famous for its salmon, but the Usk is more celebrated for its trout.³⁰

In 1805, Theophilus Jones stated that the Usk trout was equal in flavour to any in the kingdom.³¹ He says that they are “in season from the beginning of March to the middle of July” and goes on to inveigh against poachers, “who take them at every period in the year, and of all sizes, and particularly with a kind of net which is suspended upon a long pole and is used in the night”. He also refers to the “infamous practice of throwing unslaked lime into brooks”. This would raise both water temperature and alkalinity. Penry Williams II of Penpont, writing in a notebook he used for his business as a JP, describes several cases that came before him. An entry dated June 5 1775, reads, “Thomas Jones, schoolmaster on oath saith he saw William David and David Davies last Thursday night take about a bushel of lime off William Thomas’s fallow toward the river and saw them in the river and take fish and the river was coloured with the lime”. Baskets and sieves were used to scoop up the fish.³² Explosives were used on occasion.

Many legitimate practices involving baited hooks will have been utilised over the years but of special significance for a river like the Usk is the practice of fly-fishing³³, which involves the creation of an artificial fly that resembles the original insect sufficiently well to deceive the trout into ‘taking’ it. The sport became increasingly popular on British rivers from the seventeenth century onwards.³⁴ A special version is ‘dry-fly’ fishing. The adult mayfly often floats downstream sitting on the surface of the water and to simulate this process, the fly fisher needs to create a fly that also will float. There is an enormous literature on patterns of artificial fly for use on the Usk and elsewhere.³⁵

From the eighteenth century onwards, the owners of fishing rights³⁶ increasingly realised that they were in possession of an asset of both economic and social significance. Travellers who were attracted to the scenic beauties of the Usk valley also brought their fishing rods with them. Robert Colt Hoare of Stourhead, who painted many watercolours of the area (Fig. 10), commented, “drawing and fly fishing accord most admirably When the sun displays its



Figure 9. Brown trout.

Wye and Usk Foundation

rays, then the rod becomes useless and the pencil must be taken up. So when the clouds lower and all effect of light and shade is reduced to only dull and dingey tone then rod and fly must be resumed”.³⁷



Figure 10. View of Usk upstream of Brecon, Richard Colt Hoare, 1793.

y Gaer Museum, Art Gallery & Library

To enhance the quality of the fishing, protected ‘beats’ were created; these offering job opportunities for ‘river keepers’ and water bailiffs. Such employees were typically recruited from other parts of the country, lest they should be too familiar with the locals and ‘turn a blind eye’ to poaching. However, in an account of the evolution of the little riverside community of Cyffredin (just outside Llangynidr), I have described how in the 1860s the Duke of Beaufort rebuilt one of the cottages as a ‘fishing box’ and installed an existing tenant, Thomas Parry, as river keeper. Parry and his relatives continued in this role for many years.³⁸

Some privileged individuals caught large numbers of trout. In 1882, Alfred Crawshay of Llansantffraid House, who we will come across again as a salmon fisherman, recorded that he caught 658 pounds of fish.³⁹ With an average of half-pound weight, this would have been well over 1,250 fish. His best day was on the Scethrog beat: “with the water dead low and clear as gin, 57 fish, 28 lbs”. Good fly-fishing for trout has continued over the years and can still be obtained. In our experience, and that of others, there is a general trend to larger but fewer fish.

Mawle comments that NRW has little information on adult brown trout stocks in the main river Usk but does conduct electrofishing surveys in the tributaries and upper reaches. Despite marked annual fluctuations, there was, over the period 1986 to 2021, a drop of two thirds in the number of fish recorded. WUF data seem to show a similar picture.⁴⁰

Before leaving this topic, I would like to refer to an item in the Brecknock Museum collection at y Gaer Museum, Art Gallery & Library: a stuffed ‘six-pound’ trout (Fig. 11). Such large trout are fish-eating and are often called ‘cannibal’ although there can be many different kinds of fish in their diet. This one was caught on Cray reservoir located on the upper reaches of the Usk; a reservoir such as this does, of course, create a very different kind of habitat from that of the valley stream that it has replaced. However, in comparison, say, to the Elan Valley of Radnorshire, reservoirs are not a major feature of the Usk catchment. In the Breconshire part of the river there are only four: Cray, Usk, Talybont, and Grwyne Fawr.



Figure 11. Six-pound trout from Cray Reservoir.

y Gaer Museum, Art Gallery & Library

Salmon

In contrast to the trout, the salmon (*Salmo salar*) has been designated a SAC species for the Usk. The life story of the ‘King of Fish’ is described in another classic New Naturalist monograph⁴¹ and relatively recently this has been supplemented with a review paper in the English Nature ‘Conserving Natura 2000’ series.⁴²

Following emergence from eggs, young fish are first known as ‘fry’ and then as ‘parr’. They feed on the same diet as trout and will often rise to an artificial fly. With a distinctive pattern of blotches along the sides, it was once argued that the parr was a distinct species of salmonid and it was not until the 1830s that the matter was resolved by controlled fertilisation of salmon eggs with

salmon sperm. After a period (in Wales, normally two years), they develop into silver ‘smolts’ and migrate downstream to the sea. Most salmon spend one winter in the sea before returning to breed in the river in which they were born; the smell of their ‘natal’ water being a key factor in the process. There are also some salmon that spend several years at sea, achieving a larger size. A remarkable ‘multi-sea-winter’ fish was netted near the town of Usk in 1782 by two men in coracles. It weighed 31 kilograms and was put on display in the local area. A contemporary wooden relief is in the Monmouthshire Museums Collection and there is also a full-sized painting.

Once in the river, the adult salmon does not feed at all. This behaviour has a real ecological advantage: large numbers of voracious salmon sweeping upstream could drastically reduce the numbers of other fish – including the young of their own species. Despite this behaviour, the returning salmon can, under the right conditions, be stimulated into taking an artificial lure.⁴³ Unlike the realistic artificial fly that is typically used for trout, salmon flies are large and highly coloured (Fig. 12). This type of fishing has been used on the Usk for centuries, as is clear from Henry Vaughan’s 1678 Latin poem called ‘The Salmon’. In translation, part of it reads:

*The false attraction of a simulated insect deceived him;
a fly made of feathers, painted with colourful markings.
As he seizes it, he is seized; heedless he swallows, and is himself doomed to be swallowed,
and the catcher of the fateful morsel is made a welcome catch in turn.*⁴⁴



Figure 12. Salmon flies.

y Gaer Museum, Art Gallery & Library

While not as famous as that on the Wye, the salmon fishing on the Usk has had a very high reputation in its day, most notably in the last quarter of the nineteenth century.⁴⁵ The 1909 ‘Glanusk edition’ of *The History of Brecknock*

attributes its reputation to “the entire absence of inland nets, the removal of every obstruction (like weirs) and an excellent system of preservation”.⁴⁶ Wet weather in spring and summer will have favoured high catches on the Breconshire part of the Usk, as the salmon need high river-flows to enable them to travel upstream past the rapids. It seems that Alfred Crawshay, fishing the Buckland water (five miles below Brecon), may well have the record. In 1891, he caught 324 salmon, with an average weight of just over 10 pounds. On three days he caught fifteen fish, and on one, sixteen. He further added that had he not gone to Scotland between 25 September and 26 October for the shooting, “I am sure I would have caught at least another 100 as the river was more or less in order the whole time and swarming with fish”.⁴⁷

Salmon that have just run up-river from the sea are silver, plump, and in excellent ‘condition’ but, if they have to wait in the river for some months until the breeding season in the late autumn, changes in appearance and a loss of weight will occur. This is well-illustrated by annotated photographs in the Brecknock Museum collection at y Gaer Museum, Art Gallery & Library taken by Alfred Crawshay’s uncle, the ironmaster Robert Thompson Crawshay. Figure 13 shows a cock fish with its hook-like lower jaw caught on 31 October 1873. As a measure of the change in weight, Crawshay noted that this fish was “over 3ft 7in long but only weighed 23lb”. He contrasts this with the 34-pound weight recorded on a slightly shorter fish caught in mid-June of the same year. In other words, about one third of the body mass had wasted away and this is consistent with much other data. In the female, the body cavity becomes little more than a mass of ova.

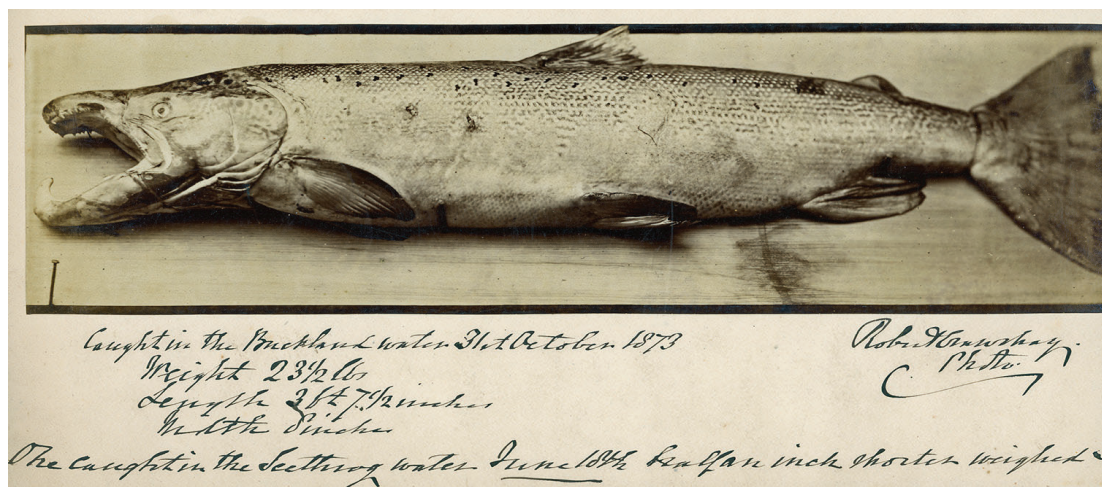


Figure 13. Male salmon caught on 31 October 1873. y Gaer Museum, Art Gallery & Library

Just as with trout there was poaching, often on the spawning beds; this, despite the relative unpalatability of the fish at this time. In 1805, Theophilus Jones commented “upon their approaching the source of rivers where the

stream is shallow, their pursuer watches them and either in the day time, or by burning a bundle of straw at night, by the light of which they are attracted, strikes them with a spear formed for this purpose and drags them from their element”.⁴⁸

After spawning, most salmon die, with only a few making it back to the sea. It has long been illegal to keep such a fish. In the *Hereford Times* of 25 May 1867, there is an account of a situation that had arisen in April on the Dan-y-Parc estate near Crickhowell, when a Mr Edward Batt was prosecuted for not having released an ‘old fish’. Although told by the bailiff to remove the hook and return the salmon to the river, Mr Batt refused and “took up a stone and struck the fish on the head twice”. Interestingly, the then 16-year-old Alfred Crawshay, who grew up at Dan-y-Parc, was one of the witnesses to the fact that it was a spent fish.

Mawle presents ‘declared’ figures for the numbers of salmon caught to the rod back to 1871. The data show that, despite year-to-year fluctuations, the numbers of adult salmon running up the Usk remained high until well into the twentieth century. After a number of poor years, increased rod catches in the 1990s and 2000s were considered to reflect greater restrictions on commercial fishing at sea, as well as improved water-quality in the estuary. However, in the last few years the figures have fallen abysmally.⁴⁹ Despite ‘catch and release’ rules, and action to improve spawning beds, the number of young fish in the tributary streams has also been very low and the salmon stock in the Usk has been declared as ‘At Risk’ by NRW. A little recent encouragement does come from the WUF 2024 electrofishing data, which has shown record, or near record, figures for salmon fry in the upper tributaries of both the Usk and the Wye.⁵⁰

Other important Species of Fish

Dace

The dace (*Leuciscus leuciscus*) is a member of the carp family reaching a max length of 30 centimetres and favouring fast-flowing, well-oxygenated rivers like the Usk. It is omnivorous, feeding on fish eggs, plants, seeds, and invertebrates. In the book *River Diary*, which is an evocative late 1940s account of the lower Usk some 15 miles into Monmouthshire, Dorothea Eastwood gives a June-evening description of the dace which lay in mid-stream and “sucked (mayflies) under, with small sounds like kisses”⁵¹ Dace are known to gather in shoals. Francis Francis (1822–86), angling editor of *The Field* for more than a quarter of a century, wrote in his important 1867 *A Book on Angling*, “the greatest number of dace I ever saw together was in the pools in the river Usk, a mile or two below Brecon. The pools were alive with them, and they ran very large; I saw some nearly a pound in weight”.⁵² Spawning takes place in April, when the females move upstream to join the males in shallow water.

Thus, like the trout it does not need access to the sea to complete its life cycle – with all the risks that this entails. Dace may rise to an artificial fly and be caught by anglers fishing for trout and, for this reason, it was not a favoured fish. I recall that in the 1950s and 60s, during the close season for game fish (mid-October to mid-February), south Wales valley's angling societies would come by arrangement to Llangynidr to fish for dace, taking away the catch to stock their own fisheries.

Eel

The European eel (*Anguilla anguilla*) is a member of a remarkable family of worldwide distribution, all the species of which breed in the sea.⁵³ In the river, it occurs in its 'yellow eel' stage, which can grow up to 50 centimetres in length. An extremely resilient fish, it can live in a wide variety of freshwater habitats and also has an ability to travel on land – usually in wet conditions at night. Over the years, we have had much experience of eels escaping from the aquarium and finding their way back to the river. They feed principally on insect larvae and other invertebrates.

In the past, eels have often been caught for food. In the 'Glanusk edition' of *The History of Brecknock*, it is stated that they "too, give excellent sport to the rising generation; who pursue them diligently". Mention is made of the use of "a steel fork as spear in low water".⁵⁴ Figure 14 shows one in the Brecknock Museum collection at y Gaer Museum, Art Gallery & Library. Note the closely spaced tines and the many teeth, designed to cope with the slimy character of the skin; this is the result of a mucous coat which deters predators and allows the eel to squeeze into tight spaces. Most people will know the expression 'as slippery as an eel'. The 'Glanusk edition' also describes eel-fishing "in flood time in summer with a clot of worms". This is a number of worms threaded together on wool to form a wriggling mass; there is no hook. Once, in the 1950s, I watched a couple of men letting a



Figure 14. Eel spear.

y Gaer Museum, Art Gallery & Library

clot (or ‘babb’ as they called it), down into the two-metre-deep water of one of the river pools at Llangynidr. The teeth of the eel get caught in the wool and the eel can be lifted out and held over a bucket until it falls in.⁵⁵ The ‘Glanusk edition’ continues, “By this latter method a hundred or more may be caught in an afternoon. These generally run small, eight or ten to the pound”; an indication of a large young population.

Yellow eels live in the river for up to twenty years, but eventually they change to a silver colour and migrate to the sea where the accepted spawning ground is in the Sargasso Sea, 1,000 kilometres away in the Western Atlantic near the Bahamas. The tiny ‘larvae’ drift towards Europe in a 300-day migration and, unlike salmon, they are not specific to any particular river. When in the estuaries, they become pigmented and metamorphose into elvers, miniature versions of the adults. In *River Diary* there is a good account of April up-river migration in a Monmouthshire tributary of the Usk: the procession formed a “lane about a foot wide which bent and curved with the curvings of the bank” and continued hour after hour “like tape on a machine”.⁵⁶

As is all too well known, there has, during the last 25 years, been a catastrophic decline in the abundance of eels across the whole of Europe—down around 98 percent—and it is now ‘Critically Endangered’ on the IUCN Red List. For me, the rarity of the eel is one of the saddest features of the Usk today: in my childhood and that of my children, there would be an eel under many large flat stones on the river bed, and one could often observe them lying on submerged shelves of rock. However, I am a little encouraged by accounts of reasonable numbers of eels of various sizes encountered in some WUF electrofishing surveys of the Usk.⁵⁷ NRW has closed all commercial fisheries for eels or elvers in Wales and anglers must return alive any eels they catch. This is in line with advice from the International Council for the Exploration of the Sea (ICES) that there should be zero catches in all habitats. This applies to both recreational and commercial activities, including the taking of elvers for restocking and aquaculture.

Lampreys

Although superficially a little similar to the eel, lampreys are much more primitive, having a sucker in place of jaws. They have little place in popular or local culture beyond the idea that King Henry I (1069–1135) died in Normandy from eating a surfeit of lampreys. Three species have a SAC designation for the Usk, and their ecology has been recently described.⁵⁸ Since the sea lamprey is mainly restricted to the lower reaches of the river, I have excluded it from this paper. This leaves the brook lamprey (*Lampetra planeri*), which grows to *c.* 20 centimetres in length, and the larger river lamprey (*Lampetra fluviatilis*), which can reach up to 45 centimetres in length. Both spawn in fresh water and the juveniles (also known as ‘larvae’) live

buried in mud or sand for five or six years, living off tiny organisms and bacteria.⁵⁹ At this stage, the two species cannot readily be separated. Whereas the former species remains in the river, the latter migrates to the sea where it develops to its full size by sucking the blood from other fishes. On return to the river to breed, the river lampreys travel by night. They typically spawn in places where the river has a clean gravelly bed and mating adults will pick up stones with their suckers and move them around to make ‘nests’: shallow depressions, 20–40 centimetres across. Mawle reported that a survey in 2013 commissioned by Dŵr Cymru Welsh Water (DCWW) looked at the abundance of juvenile lampreys. As a combined category, young river and brook lampreys were widespread and in sufficient numbers to be considered to be in favourable conservation status. The results of a current NRW survey programme are awaited.

Amphibia – Common Toad

The only amphibian to be closely associated with the Usk is the common toad (*Bufo bufo*). Toads spend most of the year on land but return to fresh water in the spring to breed. They are known to show remarkable faithfulness to their breeding sites, converging in large numbers in certain places, while avoiding other bodies of water that seem perfectly suitable.

The spring migration of adult toads to certain ponds in Breconshire (such as Ty Mawr Pool at Llanfrynach) has been monitored for many years, but not so well-known are the river-based populations that congregate in pools at the edge of the Usk. I have been following the ups and downs of toad-breeding in the river for the last 25 years and know of some five places on the southern bank—within a mile downstream of Llangynidr bridge—that are favoured mating sites. Congregating adults are most likely to be observed when a day or so of rain has followed a dry spell of several weeks. On 21 April 2019, the river had cleared following heavy rain on 16 April, and my grandchildren and I counted 25 toads in about four-square-metres of shallow water. Four pairs were mating and producing spawn (Fig. 15) and there was one tangled mass comprising five males and a female. The tadpoles take two to three months to complete



Figure 15. A pair of toads mating in shallow sunlit water in April 2019.

Note the chains of spawn.

John Gibbs

their development and Figure 16 shows a population photographed in May 2020 in a small pool in the rocks at the edge of the river. For toads, there are some advantages to breeding in the river over breeding in a pond, since in the former there are relatively few predatory insects like dragonfly larvae and water boatmen. However, the tadpoles can die if pools at the river's edge dry out and both tadpoles and congregating adults are liable to be swept away in a sudden spate.



Figure 16. Toad tadpoles in May 2020 in a shallow pool in the Usk. John Gibbs

The Otter

Toads, on a small scale, as well as fish and occasionally birds, are food sources for the Usk populations of one of the most loved of all river creatures, the otter (*Lutra lutra*); an Usk SAC species. Henry Williamson's *Tarka the Otter*⁶⁰ is a classic and well-informed account of otter behaviour, and a summary of European-wide research information can be found in the 2003 English Nature paper 'Ecology of the European Otter.'⁶¹ Otters are territorial but only in relation to members of the same sex; in consequence, the territories of males and females can overlap. Breeding may occur at any time of year and the pups remain dependent on the mother for about twelve months. To thrive, otters need an abundant supply of food and good quality habitat, such as that provided by islands or riparian woodland. There has been much interest in their use of covered resting-sites—often called 'holts'—and uncovered sites called 'couches'. Otters are playful creatures and will use natural slides to enter the water; we found one such river-bank slide in the snow over Christmas 2010. Figure 17 shows three otters in the Usk near Brecon photographed by the late Keith Noble in January 2022. As is well known, otter populations declined drastically in the middle of the twentieth century due to the widespread use of organo-chlorine pesticides. When these were withdrawn, the otter recovered on the Usk, as elsewhere in the UK. Thereby, for the whole Usk catchment, sites with signs of otter⁶² increased steadily from 11 percent in 1977/8 to 89 percent in 2009/10. However, in common with other parts of Wales, evidence for presence dropped back to 66 percent in 2015/17 and, *inter alia*, it is suggested that a change in diet associated with a decline in prey species such as salmon and eel may be involved.⁶³

In terms of interaction with humans, otter-hunting was once a common pursuit on the Usk as on many other rivers. Specially-bred hounds were



Figure 17. Otters in the Usk just downstream of Brecon, January 2022. Keith Noble

marshalled into packs to chase and kill the otters. Breconshire was in the territory of the Hawkstone Hunt from Shropshire, and I well remember the huntsmen with their distinctive livery of bright blue jackets and knickerbockers and scarlet caps, ties, and socks. Opposition to otter-hunting, on grounds of cruelty, goes back to the 1890s, and it was finally made illegal in 1978. Well before this, on the Usk, the Brecknock Wildlife Trust, under the leadership of Dr David Kyle, had successfully encouraged fishery owners to take a stance against hunting and so the hunt lost its ‘life-blood’. In this, Brecknock was in contrast to some other Wildlife Trusts.⁶⁴ My brother William recalls how in the mid 1960s, and while still a student at University, he denied a belligerent Master of Hounds access to the stretch of river downstream from Llangynidr bridge.

Riverine Birds

For many people, it is the birds that determine the interest of a habitat. Here again, I have been selective in my choice.

The dipper (*Cinclus cinclus*) is the iconic species of clear fast-flowing upland rivers in the UK: the name coming from its characteristic bobbing motion when standing on a rock (Fig. 18). It can swim under water, at which time the plumage is covered by a thin, silvery film of air. In the 1899 publication, *The Birds of Breconshire*, Edward Cambridge Phillips describes how the dipper is a favourite of his, “now dabbling in the water, now splashing about in its glee, then off down-stream like an arrow, uttering its gladsome cry”.⁶⁵ Although a study of a tributary of the lower Usk showed that young bullheads can comprise an element of the diet⁶⁶, dippers feed principally on aquatic invertebrates, including mayfly nymphs and caddisfly larvae. They therefore provide a useful measure of the health of invertebrate populations. Dippers are territorial and

where food supplies are good, have been shown to occupy territories of about one third of a mile in extent.⁶⁷ Thus, it was encouraging when we observed three pairs on a Llangynidr river-bank walk of about a mile in November 2021. On a UK-wide basis, populations have declined by about half over the last twenty years and the Usk Valley population has seen a similar reduction. The highest densities of breeding pairs occur on some of the tributaries, such as the Honddu and Grwyne Fawr, rather than on the main river.⁶⁸



Figure 18. Dipper.

Keith Noble

The kingfisher (*Alcedo atthis*), by contrast, feeds mainly on fish and it has special visual adaptations to enable it to see prey under water. Clear rivers thus provide a good habitat. Cambridge Phillips commented that it was fairly numerous on the Usk itself but only occasionally seen on the mountain streams.⁶⁹ Minnows and sticklebacks feature prominently in the diet, although, on the Usk, it must mainly be minnows as sticklebacks are very rare.⁷⁰ The UK population of the kingfisher has been stable in recent years and climate change, with a reduced likelihood of a severe winter, might favour the species.

The grey heron (*Ardea cinerea*) is also an iconic species; standing sentinel at the edge of the Usk waiting for a catch or flapping slowly overhead like a winged dinosaur. Although it may eat mice and amphibians, fish are its principal diet and, when eels were abundant, was famous for its antics in swallowing them. Cambridge Phillips observed that it could be found everywhere on the streams and rivers of Breconshire but commented that there were no *large* heronries in the county and that it bred in scattered locations across the area.⁷¹ In the past, it was sometimes subject to persecution by fishery owners, but this became illegal with the passage of the Wildlife and Countryside Act of 1981. Hard winters see a drop in heron numbers, and, on a UK basis, there is evidence that the population was slow to recover after the winter of 2009/10. In our experience at Llangynidr, the heron is doing well and on one occasion within the last few years, as many as six have been encountered, spaced out 2–300 metres apart along the river-bank. Annual nest-counts show stability at the three main heronries in the Breconshire part of the Usk valley (Sennybridge, Llanspyddid, and Llandetty).

The goosander (*Mergus merganser*), a handsome saw-billed duck, is native across the northern part of the Northern Hemisphere and has long been

regarded as quite a common winter visitor to Britain. In *The Birds of Breconshire*, there is a reference to up to 20 females being seen together on the Usk at Buckland.⁷² Males were less common. The goosander was regarded as a voracious predator on salmon and trout stocks and birds were shot by fishery owners such as Andrew Crawshay and Lord Glanusk. In recent times, ‘scaring’ techniques have been used to reduce predation and there are, in any case, fewer winter arrivals in Wales as, with climate change, the birds have to fly less far to escape severe weather.

Goosander only started breeding in Scotland in the nineteenth century and just two breeding pairs were recorded in Wales as recently as 1975. Now, adults and young, often fishing as a group, are a frequent summer sight on the Usk as on other rivers of the area. Because of the way that that goosanders sweep through a pool, fish that form shoals—like minnow and dace—are likely to suffer more than those that do not, like trout. It seems that there are grounds for regarding the breeding British goosander population as discrete from the winter migrants, which form part of a population centred in mainland Europe.⁷³

The osprey (*Pandion haliaetus*) has provided the Usk’s ornithological story of recent years. The osprey is a fish-eating raptor of world-wide distribution. It spots its prey from a height of 10–40 metres and then plunges into the water feet first. Most of the fish that it catches are in the range of 150–300 grams, but some may be up to its body weight of two kilograms! In the late summer of 2023, a pair established a nesting site on Gilestone farm, near Talybont on Usk. They returned in 2024 and although no eggs were laid, the bonding between the pair was increased by nest improvement and food-sharing. Fishing was principally conducted on the river with regular forays to Llangorse Lake (itself in the Wye catchment) and occasional visits to Talybont Reservoir. Nest-cam footage has revealed that trout is the main species taken, with Llangorse providing a range of coarse fish such as perch and tench. In 2025, three eggs were laid and one hatched (it is common for some of the eggs to be infertile for young Osprey parents), the first in the Usk Valley for perhaps 250 years.⁷⁴

Riverside Vegetation

It is beyond the scope of this paper to say more than that, as well as stabilising the bank, riparian trees can provide beneficial shade, shelter, and organic nutrient, via the fallen leaves. In addition, the root masses of alder and willow can create an important under-water habitat. Apart from the fact that beech (*Fagus sylvatica*) is towards the western end of its UK range in the valley of the Usk, perhaps the principal speciality of the riverside is the majestic black poplar (*Populus nigra* ssp. *betulifolia*). This is one of the rarest native trees in Britain and our area is one of its strongholds. Most of the Breconshire trees

are of one particular clone and much of its distribution is thought to have occurred via cuttings, possibly because of the value of the timber for making cartwheels.⁷⁵

When it comes to herbaceous plants, I will just pick out the globeflower (*Trollius europea*), a member of the buttercup family like the water crowfoot with which I began this paper. It is at the southern end of its range in our part of Wales and although populations of this beautiful plant (Fig. 19) are struggling somewhat in the damp meadows for which it is best known, it does find a favourable habitat on certain rocky partially-shaded banks of the Usk.



Figure 19. Globeflower.

John Gibbs

Pressures on our Rivers

What are the main threats to the wildlife of the rivers in this part of the world? A useful list of factors contributing to ‘ecological disruption’ was produced by Simon Evans, Chief Executive of WUF, for a meeting about the River Wye at the ‘Restore the River’ event held at Monmouth in February 2024. He emphasised that many of these factors interact and that disentangling their relative importance can be a major task. I have expanded his list somewhat as follows:

Presence of excess nutrients – Nitrogen and Phosphorus.

This can lead to ‘eutrophication’ and excessive growth of algae and other plants. Eutrophication can be caused by manure (sheep/cows/chickens), by farm fertilisers, and by sewage (treated as well as raw).

Excessive sediment deposition

This can seriously damage the submerged beds of gravel and shingle vital for many species, especially for egg-laying. It can be caused by poor farming practices such as erosion due to over-stocking and ploughing too close to the river-bank.

Changes in water flow.

The erosive power of very severe floods can damage the banks, carry off aquatic vegetation, and move pebbles, stones, and rocks on the river-bed.

Populations of vertebrates and invertebrates may be reduced or disrupted. By contrast, very low water flows can concentrate unwanted nutrients and other chemicals. Aquatic creatures, particularly those living under stones, may be stranded and die.

Raised water temperature linked to climate change

As water temperature increases, the amount of dissolved oxygen falls; there is then a potential for damage to river-life: especially to cool-water fish, such as the salmonids. The problem is exacerbated if eutrophication has resulted in increased algal growth.⁷⁶ Weather conditions are critical, of course, but also important are factors such as the beneficial shading effect of trees on the river-bank. Slow-moving watercourses are more vulnerable than faster-moving ones.

Specific pollution events

In addition to pollution incidents caused by the release of sewage, slurry, and other manures, certain farm pesticides, such as those used in sheep dips, have long been a cause of concern. Recently worries have justifiably focussed on fipronil, which is used to control fleas on domestic pets. It is exceptionally toxic to aquatic invertebrates.

Invasion by non-indigenous organisms

Many exotic organisms (animals, plants, fungi) quickly find a stable place within an ecosystem, but some do not. Conspicuous examples of plants that can damage British riparian habitats are the Himalayan balsam (*Impatiens glandulifera*) and the Japanese knotweed (*Fallopia japonica*), both of which can take over large sections of bank and exclude many native plants.

The Position with the Usk: Specific Issues and Prospects for Improvement

As noted above, The BIS study of the Usk catchment showed that nearly half the land within one kilometre of the river and its tributaries is 'improved grassland'; hence the issue of eutrophication linked to inappropriate or excessive application of inorganic fertiliser and poor management of manure is a major interest. In recent years, the whole of Wales has been placed in a single Nitrogen Sensitive Zone with a requirement for the progressive introduction of various measures.⁷⁷ For example, October 2024 saw the introduction of an autumn/wintertime closed-season for the spreading of manures.⁷⁸

Phosphorus levels in the Usk became the focus of special attention in January 2021, when NRW reported that the Usk was the worst performing of all Welsh river SACs in terms of this element: only two out of 17 assessable sections of river meeting their targets. The question of interaction between factors is well-illustrated by these data. The Usk was the only river in the study in which

there were extensive failures in the headwaters, and NRW commented that, “in part this is likely to be a consequence of overgrazing, as the dominant Old Red Sandstone geology of the river creates relatively nutrient-rich soils that are prone to runoff and bank erosion during wet weather”. Sewage is also an important contributor to phosphorus levels and a consequence of the publication of the Usk survey data has been action by DCWW to announce the introduction of various phosphate-stripping processes in their sewage works, including the one in Brecon.

More generally, it is to be hoped that the nutrient management plan being developed under the auspices of the Usk Catchment Partnership will bring real benefits.⁷⁹ In this connection, the water-quality data currently being collected by citizen scientists under schemes such as CaSTCo will, if suitably sustained, greatly enhance those being obtained by the professional organisations.⁸⁰ Although the Usk in Breconshire has so far been spared a devastating fish-kill due to acute farm pollution, such as that which occurred in July 2020 on the Llynfi, a tributary of the Wye, worrying events do occur. The highest single record for phosphorus (31 ppm) obtained anywhere during the NRW survey was in April 2017 on the Rhiangoll, which runs to the Usk down the Cwm Du valley. Here, it coincided with high values for other indicators of poor water-quality such as ammonia. This is consistent with a significant pollution incident, almost certainly associated with farm manure.

Other types of poor farming practice are known to have caused specific problems. In spring 2016, fields above Brecon on a very steep slope were ploughed much too close to the water’s edge. Very heavy rain in late May caused huge quantities of soil to be carried into the river. As the flood subsided it was discovered that for at least 20 miles down-stream the river-bed was covered with one centimetre or so of thick mud. This persisted throughout the year with very adverse consequences for aquatic life.⁸¹

Data on river flow from three gauging stations on the Usk in Breconshire are held in the National River Flow Archive (NRFA). The two earliest stations are at Trallong and Llandetty, a few miles above and below Brecon respectively, and date back to the 1960s. The five highest floods at Llandetty were, starting with the highest: 27 December 1979; 16 February 2020; 23 October 1998; 16 October 1967, and 2 February 2002.⁸² In Llangynidr, we have some markers showing very high river levels that have occurred since 1955, and can add that a flood on 4 December 1960 as being similar to that of 16 February 2020. To provide a longer-term historic perspective, one should note the notorious flood of 9 July 1853 which, particularly affecting the Honddu as it joins the Usk, caused widespread and serious damage in Brecon and was featured in the *Illustrated London News* of 30 July.

It would be helpful if more summary data on river-flow could be available. For example, tables of monthly mean river flow over the last 50 years would

be useful in quantifying low river levels associated with periods of drought. The great drought of 1975–6 was a devastating event⁸³ and a legacy of this can be seen at Llangynidr. Here, beech trees on four narrow islands in the river still have conspicuous dead branches in the crown as a result of drought-stress experienced in that year.⁸⁴ In terms of a direct impact on the natural history of the river itself, it seems that nothing can compare with 1899 when the effects of a severe drought were compounded by excessive abstraction of water at Newton Weir, Brecon to supply the canal. At times, the downstream movement of water completely ceased and just below the town “salmon and trout died in their hundreds”. The papers of John Lloyd ‘The Radical’ contain much relevant information and some dramatic photographs of an almost empty river.⁸⁵

A significant part of the current problem in the Usk catchment is the poor retention of winter rainfall on the land. The WUF is working with farmers on degraded and sheep-compacted soils in the Crai, Ysgir, and Bran tributaries to determine ways of ensuring that this rainfall is held *within* the soil, with the consequent replenishment of aquifers and reductions in flood peaks. This approach is favoured by the fact that the deep old red sandstone soils of the area have the capacity to absorb a great deal of water once given the opportunity. Amelioration can be brought about by measures such as changing stocking levels, the contour planting of hedgerow trees and shelter belts, blocking manufactured drainage, and the establishment of improved riparian buffer zones.

The issue of water abstraction from a river is often contentious but, with the Usk, it is one where useful progress has recently been made. Some 10-years ago, agreement was reached between WUF, DCWW, and NRW on methods for improving the ecological condition of the river while minimising impacts on the public water supply.⁸⁶ It is aimed at creating a situation whereby water-removal takes place at suitably high rates of river flow and ‘compensation’ water is released from reservoirs to boost spates, the peaks of which have been reduced by storage behind the dams. There has, during the last decade, been DCWW expenditure on a new £34 million pumping station at Prioress Mill, near Usk, to supply the Llandegfedd reservoir, and the provision of new enlarged outlet valves on the Usk and Talybont Reservoirs, which will allow the large spate-boost releases to be made. The question of the regular provision of compensation water from the reservoirs to help with the supply to the Brecon and Monmouthshire canal in dry summers is unresolved at the time of writing. Relevant to the issue of river flows and the safe passage of migrating fish is the current NRW project to modify Newton Weir at Brecon so as to facilitate the downstream progression of salmon smolts.⁸⁷

As yet, no damaging effects on the life of the river have been directly linked to high summer temperatures and associated oxygen depletion, but it is noteworthy that a significant fish kill occurred on a stretch of the

Monmouthshire and Brecon Canal near Llangynidr during a spell of very hot weather in June 2023.⁸⁸ The very slow flow rate of the latter watercourse may have been the key difference between it and the river.

Among the invasive organisms most pertinent to the Usk, mention has been made of Himalayan balsam. It was introduced to the UK for ornamental planting in 1839 and, in my youth, I knew it as a plant restricted in distribution to a few damp Usk-side locations.⁸⁹ Around the 1980s, it began to colonise much more aggressively and is now to be found far from water in hedgerows, woodlands, and even on the open hillside, as at Buckland Hill, near Bwlch. Perhaps a new genotype was introduced from the Himalayas? It is an annual plant, which can readily be uprooted, and effective management of discrete areas can certainly be achieved. Over recent years the BBNP has been attempting to maintain a control programme on the upper Usk for both balsam and the perennial Japanese knotweed starting, logically enough, with the head waters. Constant commitment is essential for sustained progress.

The North American mink (*Neogale vison*) became established in the UK in the 1960s following escape or intentional release from fur farms. It is a fierce predator of fish and other riparian animals. The recovery of otter populations has been associated with a decline in mink but, in our experience, the latter has become more evident again on the Usk in recent years.

The need for Suitable Monitoring Data and Assessment Procedures

It should be recognised that there are valid frustrations over the limited availability of survey data in relation to some important species characteristic of the Usk, including those non-SAC designated. In addition, there are doubts over whether the current criteria for assessing fresh-water habitats meet the needs of situation. Thus, the British Ecological Society has recently published a paper criticising the use of the criterion ‘Good Ecological Status’ as a ‘blunt tool’ that “may obscure progress that is being made with respect to specific aspects of the aquatic environment”.⁹⁰

Scope for Remedial Action in Respect of Different Species

For some of the organisms considered here, the geographical focus for any remedial action will need to be very wide. This is because their life cycles involve extensive migrations that greatly increase the range of ecological conditions with which they have to cope. The most obvious example is the eel where tiny ‘larvae’ are passively moved huge distances by ocean currents before they reach the estuary of the Usk. Responses in such situations need to be on an international scale and, in the case of climate-related matters, a truly global level.

At the other end of the spectrum are those organisms that live their whole lives in a relatively small area. Some riverside plants fit this category as also

do the invertebrates and fish such as the minnow, bullhead, and trout. Here, relatively local remedial activity may bring lasting benefits.

Conclusion: A Living Landscape

In recent years, the term ‘Living Landscape’ has been much used in aspirational literature by wildlife trusts and other countryside organisations. The River Usk in Breconshire, with its intricate web of wildlife and its interaction over the centuries with the people who have worked and sought recreation on its banks, is one of the most beautiful and important living landscapes in Britain. By any measure, it deserves the designation ‘Special Area of Conservation’. It has proved a fascinating exercise to bring together information from various sources to illuminate so vibrant a series of ecosystems, not least because of the significant challenges they face.

In concluding, it should be recognised that while there have been losses in recent decades there have also been gains: osprey breeding in the Usk valley being a notable example. And, perhaps, of more general importance is the fact that an hour by the Usk or one of its tributaries still offers the prospect of a diverse and varied natural history experience. Long may it remain so.

Notes

¹ This paper can be found at <https://afonyddcymru.org/a-dying-river-the-state-of-the-river-usk> [Accessed June 2025].

² This term is defined at <https://www.gov.wales/special-areas-conservation> [Accessed June 2025].

³ The proceedings were filmed by ‘Open Past’ and my talk can be found at <https://youtu.be/VvzpcGGySzI> [Accessed June 2025]. The Management Plan For Bannau Brycheiniog National Park 2023-2028 can be found at <https://future.bannau.wales/wp-content/uploads/2023/04/Y-Bannau-The-Future-1-1.pdf> [Accessed June 2025].

⁴ The Brecon and Abergavenny Canal is the original name for this section of what is now known as the Monmouthshire and Brecon canal, completed between Brecon and Newport in 1812. It is owned by the Canal and River Trust (CRT).

⁵ The exact quotation is “There is nothing—absolutely nothing—half so much worth doing as simply *messing* about by a *river*” and comes from A.A. Milne’s 1929 play *Toad of Toad Hall*, itself based on Kenneth Grahame’s *Wind in the Willows* of 1908.

⁶ Mullard 2014.

⁷ *Ecological Baseline Study on the Breconshire and BBNP Usk*, January 2024.

⁸ Within 10 metres of the water’s edge the figure for woodland rises to 20 percent.

⁹ To take just one example, Aberyail farm in Llangynidr, which borders the Usk, was 52 percent arable in 1845. This had dropped to 15 percent when the Beaufort Estate sold the farm to its tenant family in 1915. Apart from an occasional field of stubble turnips, it is now zero.

¹⁰ I am indebted to Bob Wilcher of the Vaughan Association for drawing my attention to the poem ‘The Storm’ and its reference to the redness of the Usk in flood: “I see the Usk and know my blood / Is not a sea, / But a shallow, bounded flood / Though red as he; / Yet have I flows, as strong as his, / And boiling streams that rave / With the same curling force, and hiss, / As doth the mountained wave”.

¹¹ The complicated story of the water crowfoot species on UK rivers is described by Hatton-Ellis and Grieve 2003.

¹² The current Monmouthshire situation is summarised in Karran 2023. In essence, water crowfoot is quite commonly to be found between the town of Usk and the tidal limit, but there is reason to think that the vigour of growth is less than it has been. Flowering has not been recorded in recent years.

¹³ Core Management Plan including Conservation Objectives for River Usk Special Area of Conservation, originally by Cyngor Cefn Gwlad Cymru / Countryside Council for Wales, https://naturalresources.wales/media/673384/river_usk-sac-core-plan.pdf [Accessed June 2025]

¹⁴ In the mid-1990s I was very interested to come across the beds of *R. fluitans* in the Senni when scouting for Phytophthora disease of alder. The stream meanders across the fields and I thought then (as I am inclined to do now) that the relatively slow flows might be the reason why it grew well there and not in other places.

¹⁵ Mullard 2014: 161-2.

¹⁶ Harris 1956. The author devotes Part One of the book to the mayflies and Part Two to other flies. For these organisms, as for many others to be considered later, I have also found Wikipedia to be an excellent reference-point.

¹⁷ This point is made in Mullard 2014: 172, which also gives a list of other Usk-associated mayflies.

¹⁸ Harris 1956: 141.

¹⁹ My brother, Andrew Gibbs, makes frequent reference to it in his Fishing Book covering the years from 1997 onwards. Also, personal communication from Simon Evans of WUF.

²⁰ Cham, Nelson, Parr, Prentice, Smallshire, and Taylor 2014: 85-8.

²¹ Jones 1805-09 I: 15.

²² In an email dated 11/8/23 Jonathan Williams commented, "Here are some selected entries from the diary of Penry Williams II: May 21 1774 To Crayfish [200?] £0.2.0.; August 2 1775 To David Thomas Lanvillo for Jack, perch and Crayfish in full £0.11.0.; May 25 1776 for two jacks and one perch and 100 crayfish £0.6.0." It may be noted that jack (pike) and perch are included in a list produced by Theophilus Jones of fish to be found in the catchment of the Wye rather than that of the Usk.

²³ Although we only encountered the occasional specimen in the Usk, I do recall that in c.1955 we caught a number in a Wye tributary, the Llynfi, near where it flows out of Llangorse lake. In the 1980s, I spent a day looking at crayfish on the Edw, another tributary of the Wye with John Foster, a research student of Fred Slater of the Llysddinam Field Centre. He was sanctioned to carry out experimental releases of native crayfish into suitable streams from which they were absent, and I helped him with the release of at least 100 crayfish into the Claisfer, a stream which enters the Usk at Llangynidr. I have often wondered if the crayfish we encountered in the adjacent river in the early 2000s were derived from that introduction.

²⁴ Tomlinson and Perrow 2003.

²⁵ Personal Communication, James Hawkins WUF.

²⁶ Edited by Toby Driver in 2007 from Briggs 1997: 174-5.

²⁷ Frost and Brown 1967.

²⁸ Quote at the end of the Introduction to the 1931 edition of *The Compleat Angler*, Shallowford 14 March 1931.

²⁹ Gibbings 1943.

³⁰ Thorpe 1978.

³¹ Jones 1805-09 I: 16.

³² Information provided by email by Jonathan Williams on 26/10/23.

³³ The Wikipedia entry is comprehensive and should be consulted.

³⁴ Izaak Walton's very popular book *The Compleat Angler* came out in 1657.

³⁵ See, for example, *An Anglers Entomology*.

³⁶ In the context of fishing, the definitive version of Magna Carta (1225) is considered to provide the basis for the tight controls that pertain in rivers where they are non-tidal. The rights lay with Lords of the Manor and other landowners and, typically, they were withheld when riparian land was rented out or sold.

³⁷ I would like to thank my brother, William Gibbs, for bringing this quotation to my attention (and also for many of the other fishing references). Colt Hoare's fishing-book for 1799 is in the National Library of Wales, MS 5370C. Between 11 June and 13 July he caught no fewer than 323 small trout weighing 64 pounds (an average of only just over three ounces). He also listed 24 north Wales lakes, noting what fish they contained and the best conditions for catching them.

³⁸ Gibbs 2023.

³⁹ This information comes in a letter from Alfred Crawshay to John Lloyd ('The Radical') on 2 March 1913. It appears as an Appendix in *Usk Salmon*, National Rivers Authority Welsh Region Technical Fisheries Report No. 1 of December 1992. It may be noted that the metric system is used in this paper except where an original citation refers to an imperial measure (1lb is equal to 454g).

⁴⁰ Personal Communication, James Hawkins WUF.

⁴¹ Jones 1959.

⁴² Hendry and Cragg-Hine 2003.

⁴³ In our part of the Usk, it was always known that, as the river level dropped after a flood, there were certain 'lies' favoured by the salmon, where a properly presented lure would very often prompt a response.

⁴⁴ I am indebted to Elizabeth Siberry for an introduction to this poem and the English translation. Being a metaphysical poet, Henry Vaughan is describing more than a fish being caught. In the last lines he writes, "What a pregnant emblem of great matters these trifles form, The weir is the world; the salmon, man; and the feather deceit".

⁴⁵ A report in the *Sheffield Evening Telegraph* of 30 September 1891 contrasts the current position with the years 1843–53 when "he breed of salmon was almost exterminated" in the Usk.

⁴⁶ Jones 1909-30 I: 11.

⁴⁷ This information also comes in the letter from Alfred Crawshay to John Lloyd referred to in endnote 34 above.

⁴⁸ Jones 1805-09, I: 18.

⁴⁹ <https://afonyddcymru.org/wp-content/uploads/2023/11/Usk-Salmon-CatchStock-Status-2023.pdf> [Accessed June 2025].

⁵⁰ Personal Communication, James Hawkins WUF.

⁵¹ Eastwood 1950: 119. I am very grateful to my brother Simon for giving me this delightful book just as I was preparing to write up this account of the river's natural history.

⁵² Francis 1867: 37.

⁵³ A good description of the Anguillid eels can be found in the Wikipedia entry at <https://en.wikipedia.org/wiki/Anguillidae> [Accessed June 2025].

⁵⁴ Jones 1909-30, I: 11.

⁵⁵ A 1975 film of eel-clotting on the Somerset levels can be found at <https://player.bfi.org.uk/free/film/watch-eel-clotting-at-whitcombe-1975-online> [Accessed June 2025].

⁵⁶ Eastwood 1950: 78.

⁵⁷ Personal Communication, James Hawkins WUF.

⁵⁸ Maitland 2003.

⁵⁹ The Sea lamprey *Petromyzon marinus* is also a SAC species for the Usk. It is a larger fish that occurs on the lower river. Features such as weirs and dams, as well as polluted sections of river, may impede migration to spawning grounds and it seems to be poorer than the river lamprey *Lampetra fluviatilis* at ascending obstacles to migration.

⁶⁰ Williamson 1927.

⁶¹ Chanin 2003.

⁶² Principally, evidence provided by the spraints (faeces) with which the otters mark their territories.

⁶³ <https://cdn.cyfoethnaturiol.cymru/media/694539/osw-6th-report-final.pdf> [Accessed June 2025].

⁶⁴ This proactive attitude of the Brecknock Wildlife Trust is well described by Mullard 2014: 182-4.

⁶⁵ Cambridge Phillips 1899: 28.

⁶⁶ Ormerod and Tyler 1991.

⁶⁷ This figure comes from a pre-war survey of the Esk in Scotland by Serle and Bryson and fits well with experience on comparable rivers elsewhere.

⁶⁸ I am very grateful to Breconshire Bird Recorder, Andy King, for the information on local dipper populations. Also, for the way that he has enhanced the other bird entries.

⁶⁹ Cambridge Phillips 1899: 66.

⁷⁰ It is worth adding that sticklebacks have found a much more suitable home in the historical Brecon and Abergavenny Canal, along with other fish like roach and gudgeon that do not favour fast-flowing water. By contrast, minnows, so abundant in the river, are not found in the canal.

⁷¹ Cambridge Phillips 1899: 97-100.

⁷² *Ibid.*: 124-125.

⁷³ The status of Goosanders in the UK: an update to the SPA/Ramsar Scientific Working Group <https://data.jncc.gov.uk/data/70a0d107-19b8-4458-9138-639e82b2c00f/spar-swg-20150200-status-of-goosanders.pdf> [Accessed June 2025].

⁷⁴ Andy King's contribution has been invaluable here. Latest information can be found at <https://www.uskvalleyospreys.org/> [Accessed June 2025].

⁷⁵ Cottrell, A'Hara, and Adams 2018: 14. The clone that predominates in the Usk Valley is Clone 23, which is also relatively common elsewhere in Wales, in East Anglia, and in Somerset.

⁷⁶ This is because while green plants in the water will increase oxygen levels during the day by photosynthesis, they will deplete it by respiration during the night.

⁷⁷ See <https://www.gov.wales/sites/default/files/publications/2023-10/water-resources-control-agricultural-pollution-wales-regulations-2021-guidance-farmers-and-land.pdf> [Accessed June 2025].

⁷⁸ It may be noted that farmers in the 'Beacons Water Group' would prefer to see emphasis placed on 'data rather than dates' *i.e.* on locally-derived information as to whether the grass is physiologically active or not; this depending on factors such as air temperature.

⁷⁹ The composition and purposes are described at <https://uskcatchmentpartnership.wales/> [Accessed June 2025].

⁸⁰ CaSTCo stands for 'Catchment Systems Thinking Cooperative'. It is managed by WUF and is a £7.1m, three-year project funded by the OFWAT Innovation Fund. The Usk is the only Welsh river to be involved.

⁸¹ Notes by Andrew Gibbs in his Fishing Book from 1997 onwards.

⁸² I am very much indebted to Mervyn Bramley for giving me some understanding of the recording of river-flows and providing the information on the gauging stations. He produced the list of high floods as recorded at Llandetty. There is also a gauging station at Usk Reservoir and on the Senni at Pont Hen Hafod, the Yscir at Pont Ar Yscir, the Honddu at The Forge Brecon (discontinued 1984), and the Grwyne at Millbrook. For the National River Flow Archive (NRFA), see <https://nrfa.ceh.ac.uk/data/search> [Accessed June 2025].

⁸³ For UK-wide data on this drought, see https://nora.nerc.ac.uk/id/eprint/15011/1/CEH_1975-76_Drought_Report_Rodda_and_Marsh.pdf [Accessed June 2025].

⁸⁴ During my professional career as a Tree Pathologist for the Forestry Commission, I became aware that, in times of severe drought, the trees most likely to show symptoms are those that *normally* have ready access to groundwater, such as those near water-courses. Trees growing in soils further from groundwater have developed the extensive root systems necessary to obtain soil moisture and will be more resilient when a drought occurs.

⁸⁵ John Lloyd's paper 'The Usk and the Canal' (Lloyd 1903) provides information to show that most of the water was being taken for purposes of sale not navigation – transport by railway having largely replaced transport by canal. The story of this water-extraction controversy is well-summarised by David John: 1968.

⁸⁶ I am very grateful to John Lawson and Ian Harmond for introducing me to the relevant documentation and providing an update on the current position as described at <https://wyeuskfoundation.org/our-work/usk-and-wye-abstraction-group/> [Accessed June 2025]. The report

there followed consideration of a WUF discussion paper showing that current procedures for water extraction were having deleterious effects on aspects of the river ecosystem such as the migration of salmon. Key elements of the improved licensing approach are set out in the agreement. John Lawson said in an email to Ian and me on 1/1/25, “As far as I know, there have been no formal changes to the agreement since the 2016 addendum, and even that may not have been formally signed off by all parties. However, with the passage of time and changing of personnel, there is a danger that the 2014 agreement will get forgotten, watered down or ignored. I suggest that interested local parties should keep reminding Welsh Water and NRW of its existence and press for more action”. The Canal & River Trust (CRT) has also been involved in these discussions with the aim of arranging for releases from the reservoirs at times of very low flows in order to maintain supplies to the Brecon and Abergavenny Canal.

⁸⁷ For more information <https://naturalresources.wales/4RiversforLIFE?lang=en> [Accessed June 2025].

⁸⁸ Rob Williams, Ecologist for the Canal & River Trust, sent me an email on 7/7/23, “There was indeed a fish kill on the M&B near Llangynidr around the 12th June. Following investigation by one of our environmental scientists, this was attributed to the prevailing hot weather conditions at the time but crucially then combined with huge deluges of rain which resulted in a sudden large input of de-oxygenated and polluted water into the canal (from various different sources / outfalls). High temperature always results in lower concentrations of dissolved oxygen, but on its own does not often result in fish kills. In this instance, after weeks of dry weather, the sudden input of water into the canal from surrounding land (which had likely carried with it various pollutants and organic matter) resulted in a dissolved oxygen crash. The ‘slug’ of water could be traced moving gradually down the canal by taking dissolved oxygen readings. A range of species was killed, and as one would expect, large specimens were worst affected due to their higher oxygen demand”.

⁸⁹ Eastwood 1950: 145. In a way that is akin to my own experience, the author is noting that Himalayan balsam was just one component of a varied high-summer assemblage of river-bank plants on the lower Usk. Nowadays in the same locality it is virtually a monoculture of balsam.

⁹⁰ https://www.britishecologicalsociety.org/wp-content/uploads/2024/03/BES_Delivering-biodiversity_priority-actions-for-fresh-water.pdf [Accessed June 2025].

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