

Garren and Gamber Brooks Habitat Assessment

A report to the Wye Valley AONB Unit by Jessica Vuckovic and Becca Bratt

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1. Introduction

The Wye Valley AONB Unit, with support from Natural England, commissioned this report to investigate baseline data on habitat and water quality on the Garren and the Gamber brooks in order to identify any potential for habitat or management improvements. It comprises the findings of the Wye and Usk Foundation (WUF), Natural England (NE), Monnow Rivers Association (MRA), Environment Agency (EA), Herefordshire Wildlife Trust, Caroline Hanks (Farming 4 Wildlife) and the Wye Valley AONB. Information gathered from partner organisations is as up to date as possible.

The Garren and Gamber are tributaries of the River Wye Special Area of Conservation (SAC) and are situated in south-west Herefordshire. The Gamber starts at source just south of Wormelow Tump at Gamber Head (SO 4929) and flows for approximately 13.6 kilometres until it reaches the Garren at Trehumphrey (SO 5222). The source of the Garren occurs near the Welsh border at Garrendale, west of Orcop (SO 4426). The brook flows for approximately 31km towards the south-west, reaching the Wye near Goodrich (SO 5517). The map overleaf (Fig. 1) shows the location of the Garren and Gamber within the wider landscape.

A section of the Garren brook is designated as a Local Wildlife Site and features plants such as common meadow-rue (*Thalictrum flavum*) and water-crowfoot (*Ranunculus aquatilis*), with alder (*Alnus glutinosa*) and willow (*Salix sp.*) creating a wooded margin along much of the watercourse. Over-shading along many sections of both brooks is an issue, depriving the channel of sunlight and as a consequence, this reduces the abundance of plant and invertebrate life available as sources of food for larger fish and other wildlife.

The Garren and Gamber brooks are significantly influenced by local land-use, which is predominantly intensive agriculture. Land surrounding the Garren includes large arable fields and low hedgerows with some good quality agricultural land at risk from flooding. Sandstone makes up the underlying geology of the Garren and is very susceptible to erosion through inappropriate farming practices. The River Wye and its tributaries contribute towards a large, linear ecosystem which acts as an important wildlife corridor, an essential migration route, and a key breeding area for many nationally and internationally important species. Any improvements made to habitats and water quality along the Garren and Gamber will also benefit the Wye into which the Garren drains.

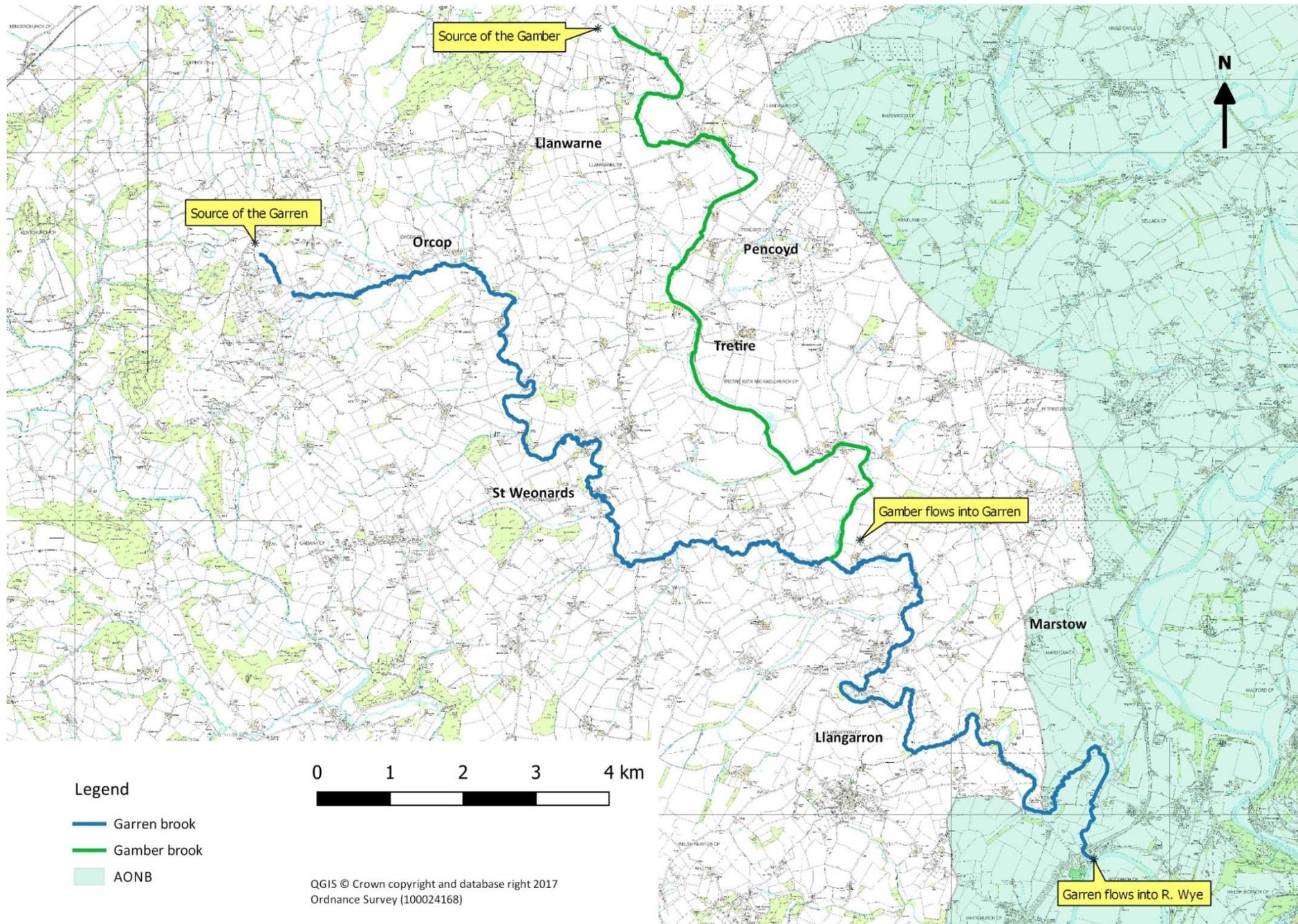


Fig. 1: Map showing the extent of the Garren and Gamber brooks.

2. Condition of riverine and adjacent habitats

Below Old Forge weir, near the Garren and Wye confluence, the river habitat is mostly fast-flowing water over a gravel riverbed, with trout and grayling present. Further upstream, deeper and slower waters are found. Other habitat types in the vicinity of the two brooks include areas of scrub and bramble, patches of marshy grassland and strips of broadleaved woodland.

Land use within the catchment of the Garren and Gamber includes arable farming on sandy soils with steep slopes. Livestock, in some cases, have unrestricted access to the watercourses resulting in bankside erosion and subsequent sediment loading. Sedimentation from farm land is a threat to both the brooks and the Wye, contributing to increased silty conditions in-stream and fewer areas of exposed gravel, which are important spawning sites for fish. Lost soil in-fills gravel and suffocates fish eggs and invertebrates, contributing to population decline.

In a walkover of agricultural land in 2011, the Environment Agency conducted an assessment of riparian habitats between Gamber Head and Llanwarne and highlighted key areas that would benefit from increased buffer zones. These areas were deemed to be at higher risk of sediment run-off due to their steep slopes and close proximity to the brook. At the present time, it is unclear whether or not the recommendations for buffer strips were actually implemented so a further assessment may need to be undertaken to assess the changes in these habitats over the past five years.

In order to reduce diffuse sediment pollution at the source, there would need to be a shift towards less intensive land use and a focus on improving soil health and quality. Restricting livestock access to watercourses would protect banksides from poaching and sediment loading. Riverside fencing would also allow riparian vegetation to recover from the effects of grazing, increase and diversify habitats and help to stabilise banks. Wider buffer strips, improved field drain management and hedgerow planting are also to be encouraged as examples of good practice for the slowing down of water run-off. Flooding is also a problem along the Wye. Compacted soil, drainage of peat soils in the headwaters and the loss of hedges and woodland all leads to faster run off and higher flood peaks.

3. Water quality

A Water Framework Directive (WFD) review of the Gamber was carried out by the Environment Agency in 2011 and found the waterbody to be at risk from sedimentation and diffuse source pollution – a problem that is widespread across the whole of the Gamber catchment. In 2009, all phys-chem data including temperature, ammonia and pH, was classified as ‘High’ with the exception of phosphate which received a ‘good’ rating. Data from 2006 gives a ‘Moderate’ classification for the presence of aquatic invertebrates indicating that the site is being impacted by an increase in nutrients.

A report produced by the EA in 2014 concluded that the condition of a section of the Garren, from its source to its confluence with the Gamber, had deteriorated from ‘Good’ in 2009 to ‘Moderate’ status in 2014. This was due to periodic spikes in phosphate levels from agricultural run-off contributing to macrophyte failure under the WFD. A review of the Garren in 2010 from its

confluence with the Gamber to where it enters the river Wye found it to be failing due to its poor WFD status for fish, thought to be due to a lack of habitat suitability and obstructions to migration. This section of the Garren was also found to be suffering from heavy sedimentation as a result of run-off from the surrounding agricultural land. In addition, a 2011 WFD fisheries investigation found that brown trout (*Salmo trutta*) populations in the Garren were being limited by sedimentation resulting from poaching and inappropriate arable farming practices.

Within the River Wye SAC and SSSI, conditions for salmon (*Salmo salar*) and white-clawed crayfish (*Austropotamobius pallipes*) are unfavourable, with sediment levels and diffuse pollution being the main concerns. Acidification, habitat degradation and barriers to fish migration have also added to the decline of salmon in the catchment. In 2014 the EA and NE produced a catchment scale Nutrient Management Plan which concluded that around 45% of phosphates in the Wye come from sewage treatment works, 40% from agriculture and the remaining phosphates can be linked to industry and septic tanks.

4. Barriers to fish passage

Information obtained by the Environment Agency (accurate as of November 2016) indicates several sites along the lower stretch of the Garren (from the confluence of the Garren and Gamber to the point at which the Garren meets the Wye) where high weirs and other obstructions are creating considerable barriers to fish passage. Other problems include defunct sluices and boarded up by-pass channels. Improvements to fish movement can be made by installing notches, restoring or installing by-pass channels and lowering or removing weirs.

5. Species records

SEWBReC ran a data search within the catchment which returned only two records; firstly, a plant of local conservation concern, elecampane (*Inula helenium*) near Ruxton Green and lastly, American mink (*Neovison vison*) near Llangrove. Both of these records are pre-1980.

According to NBN gateway data, water vole (*Arvicola amphibius*) were last recorded in 1964 in unspecified locations within SO 51 and SO 52. However, a survey of water vole in 1989 revealed some established local populations, especially along the River Monnow and Garren brook, but it is likely that these have followed the national trend of decline.

Sediment and nutrient pollution is a major issue affecting water quality in the Wye and as a result, spawning grounds for salmon have been greatly affected. This is also the case in both the Garren and Gamber with salmon populations being higher in more northern tributaries of the Wye which aren't as affected by sedimentation.

Figure 2 below shows NBN species records for areas around the Garren and the Gamber.

Species	Location	Most recent record
American mink (<i>Neovison vison</i>)	SO 51	2016 x2
Badger (<i>Meles meles</i>)	Three Ashes SO 5022	2014
Bullhead (<i>Ameiurus nebulosus</i>)	SO 529205	2008
Fallow deer (<i>Dama dama</i>)	SO 51	2016
Otter (<i>Lutra lutra</i>)	SO 507226	2014
River lamprey (<i>Lampetra fluviatilis</i>)	Huntsham Bridge SO 567183 & Monnow river SO 453213	1996 & 1997
Roe deer (<i>Capreolus capreolus</i>)	SO 51	2003
Salmon (<i>Salmo salar</i>)	SO 51	1997
Brown trout (<i>Salmo trutta</i>)	SO 529205	2008
Twaite shad (<i>Alosa fallax</i>)	River Wye SO 558181	1999
White-clawed crayfish (<i>Austropotamobius pallipes</i>)	Monnow SO 477173 & SO 51	1986
Yellow mayfly (<i>Potamanthus luteus</i>)	SO 55950 18390	01/09/2008

Fig. 2: Data gathered from NBN Gateway detailing the most recent record of each species noted on the Garren and Gamber brooks.

6. Invasive non-native species

Himalayan balsam (*Impatiens glandulifera*) was once abundant along the Garren and Gamber but a recent Monnow Rivers Association project to manage it ('Water Voles on the Wye' – see below) has seen very good results, reducing its extent to small patches along the watercourse. Its dominance reduces the abundance of native plants and leads to exposed un-vegetated river banks during the winter, thereby exacerbating erosion. Himalayan balsam can easily be pulled by hand before it flowers or a herbicide can be used.

High numbers of American mink were recorded in SO 51 and SO 52 between 2005 and 2016 (NBN Gateway, no specific location), but the species was successfully eradicated from the Garren and Gamber as a result of trapping during the 'Water voles on the Wye' project.

Despite the rise in the numbers of the invasive signal crayfish (*Pacifastacus leniusculus*) across the UK, there are no published records in the surrounding area, although this may be due to an absence of reporting. There are no records of Japanese knotweed (*Fallopia japonica*) on NBN Gateway in the Garren and Gamber catchment, nor did we see any while surveying.

7. Previous / current projects in the Garren and Gamber Catchment

In 2010, as part of the River Garren Access Project, the Wye and Usk Foundation created fish access points on the Garren brook by removal of a weir and an old eel trap which blocked the river. They also lowered 'Forge Weir' – the Garren's lowest obstruction – allowing the pool to back up and fish to pass.

The Monnow Rivers Association carried out a two year project ('Water Voles on the Wye') on both the Garren and the Gamber, removing Himalayan balsam and controlling mink, with the latter being successfully eradicated across the length of the brooks. However, funding came to an end before all Himalayan balsam could be removed. Since the project finished in 2014, there has been no surveying to establish the current situation regarding mink, but it is likely that their population has once again risen.

In 2015 the EA partnered with WUF to deliver a series of improvement works on four sections of the Garren brook which fall inside the AONB, near to its confluence with the Wye. In order to increase light levels, heavily wooded areas were thinned and woody debris were installed by pleaching coppiced alder and pinning it to the banks. This method also helps to increase access to fishable swims and exposed more suitable spawning grounds by mobilising fine sediments. A pre-barrage fish pass using stop logs containing low flow notches has been installed to increase connectivity and allow for fish recolonization further upstream. Other improvement work involving revetment, coppicing and fencing has been carried out successfully and modifications were made to a fish pass to ensure functionality for all fish species.

The EA are trialling the use of technology (Sentinel satellite imagery and LIDAR data) in an evidence-based, targeted approach to identify land parcels most at risk of soil erosion. The technology can be used to highlight fields with a slope of more than 6 degrees and those that have been left without cover crops over winter. Crops such as potato and maize can leave soils particularly vulnerable as they are harvested late in the year leaving fields bare. Using this technology could help to focus projects in areas within the Garren and Gamber catchment which are at particularly high risk of erosion, run-off and siltation.

8. Potential projects / enhancement opportunities

8.1. Invasive species management

Flora

Himalayan balsam was seen in scattered patches throughout the length of the Garren and to a lesser extent along the Gamber. Additionally, a dense patch of bamboo (*Bambusoideae*) was noted within SO 5322. A more accurate picture of the extent of invasive plants would need to be established by surveying at a more suitable time of year (a walkover of the catchment by the AONB was carried out in November) and ensuring access to all land adjacent to the brooks.

American mink

Although mink control has taken place along the whole of the Garren and Gamber catchment in recent years, additional surveys would need to be undertaken to establish current population estimates with a view to trapping and further eradication. Monitoring numbers beyond this point may best be carried out and maintained by volunteer groups, as has been established along the river Monnow.

Signal crayfish control

While it proved difficult to find records of this species along the Garren or Gamber, Natural England have suggested that the Garren brook could be a target site for a signal crayfish control programme.

8.2 Water vole reintroduction

The European water vole is the UK's fastest declining mammal, disappearing from around 97% of its former range due to loss of habitat and predation by American mink. Water voles are protected under Schedule 5 of the Wildlife and Countryside Act 1981 and are also listed in the Red Data Book for mammals. They are a priority species in the UK Biodiversity Action Plan. The species needs high light levels and wide margins of preferably native vegetation as their food source and also as cover from predators. Good water vole habitat consists of soft but stable banks with steep sides to allow them to build their burrows and entrance chambers high above the water level.

The work that the Monnow Rivers Association (MRA) carried out along the Garren and Gamber has significantly improved the habitat for water vole and laid the foundation for their possible reintroduction. If further enhancements were carried out, there is the capacity to release water vole back onto the Garren and Gamber brooks. As mentioned above, American mink would need to be eradicated for a water vole reintroduction project to be successful. Improving the bankside habitat via Himalayan balsam removal, fencing and coppicing would increase bankside vegetation diversity and increase connectivity between sites.

Several sections along both brooks contain suitable habitat for the release of water vole and feature areas with sparse tree cover and wide strips of bankside vegetation over marshy grassland. Narrower sections of slow flow and pool systems with cut off meanders are also ideal.

There is potential for the release of water vole at several sites along the Garren and Gamber with a possible staggered release over two years. Reintroduction methods may involve 'soft' releases whereby pens are dug into the ground with food provision for a period of time. This is found to be a more effective and successful method than a 'hard' release. Initial estimates for breeding and transport costs for the number of water vole required are thought to be in the region of £10k. The use of volunteers or the acquisition of a translocation project would bring costs down.

8.3 Buffer strip creation

Soil erosion has been identified as a considerable problem within the Wye catchment, particularly where soils are left bare over winter under certain arable regimes such as potato cropping and maize production. Erosion of soils leads to the siltation of rivers, which is of particular concern in the Wye SAC and the Garren and Gamber tributaries. Although not a perfect solution, the creation of buffer strips of grassland along river systems help to intercept soil run-off and reduce the volume entering the water courses. This intervention may also help to reduce contamination by pesticides and fertilisers. There are a number of locations along the Garren and Gamber where riparian areas could benefit from the introduction or extension of buffer strips, particularly those in areas adjacent to arable fields at high risk of sedimentation by run-off, or on pasture where the river banks are susceptible to poaching or overgrazing.

The current Countryside Stewardship scheme provides guidelines for the establishment and management of buffer strips which include:

- maintaining a 4 – 6 metre wide grass buffer strip during the first 12 months of the agreement
- once the strip has been established, cut between 1 and 3m of the strip next to the crop edge every year after 15 July
- only cut the remaining width to control woody growth (leaving aside areas containing fallen timber)
- where there are hedgerow trees over 30cm in diameter at breast height, leave fallen timber beneath the canopy, stacking any timber that obstructs management of the buffer strip

8.4 Riparian fencing and alternative drinking arrangements for livestock

In areas where livestock have unrestricted access to waterways, the riparian habitat can become degraded. Poached soil in unfenced areas leads to bank destabilisation and greater sediment loading. Often the watercourse becomes wider and shallower as the banks become increasingly eroded. Excess sediment is detrimental to fish spawning habitats and reduces the range of habitats available for other organisms such as invertebrates.

By excluding livestock, riparian fencing can help to reduce bankside erosion and lower sediment and nutrient inputs. Over time, the reduced erosion will contribute to the narrowing and the deepening

of the channel. Fencing allows vegetation to recover, helping to stabilise the bank and creating a buffer zone which provides habitat and therefore increases biodiversity in these areas.

Alternative drinking facilities for livestock could take the form of designated drinking bays, or more ideally, drinking troughs. It is important to note that the vegetation will need some management by occasional, short-term livestock grazing or cutting. The benefits to farmers of riparian fencing include a reduced risk of foot and leg injuries to livestock at the water's edge and improved biosecurity - disease organisms are prevented from spreading to other livestock downstream.

8.5 Managing and restoring species-rich hedgerows

2020 biodiversity targets for England include strategies for restoring hedgerows to 'favourable' condition by planting new hedges and improving the condition of existing ones. Hedgerows consisting of native species are a priority habitat as they are a vital refuge for a variety of wildlife, particularly in areas of intensive agriculture. Hedgerows also help to guard against soil erosion by wind and rain by binding the soil and intercepting lost sediment. This is particularly important in areas with large fields with fewer boundaries, as can be seen in many areas in the predominantly arable landscape around the Garren and Gamber.

Converting fence-lines to hedgerows in vulnerable areas such as these could help to reduce erosion from adjacent fields into the watercourse. Targeting areas on steeper slopes and on land where hedgerow decline has been most marked would contribute to the reduction of soil erosion, therefore helping to improve soil and water quality. Managing for tall, thick hedgerows and conserving mature hedgerow trees should be encouraged.

8.6 Coppicing bankside trees

There are many areas along the Garren and Gamber where dense shade from tall trees is reducing habitat quality. Bankside trees that have not been cut or coppiced in several years develop multiple stems and lack the varied age structure that benefits a range of wildlife. Reduced light levels restrict plant growth on the bankside and this has a detrimental impact on species diversity and also on bankside stabilisation. Coppicing in selected areas would increase the amount of light getting through the canopy, which would then promote the natural regrowth of bankside plants and allow the banks to re-stabilise. This method also promotes more diverse vegetation age structure which increases the benefit for wildlife. In some areas which are heavily shaded and the brooks are very narrow, it wouldn't be suitable to coppice due to the increase in light levels only being short term and coppicing would be expensive.

8.7 Pleaching and large woody debris

Pleaching riverside tree species such as alder would have multiple benefits to riverside habitats. In addition to the lighter, warmer conditions created by opening up the canopy, pinning felled trees to the banksides provides cover for young fish, helps stabilise the riverbank and creates other niche

habitats. Fine organic matter and leaf litter are also captured as the river flows through. The felling of trees into river systems as 'large woody debris' has similar benefits but also diversifies the river structure, creating small pools, shelter and areas of slower flow. Stones and gravel are deposited here by the river, creating areas suitable for young fish. Water vole would benefit from habitat enhancements created by the above methods.

8.8 Revetment work

If river banks are unstable due to a lack of native vegetation, the bankside is more likely to erode. This alters the channel and can make it become wider and shallower, whilst also smothering valuable habitat on the river bed in silt. As a consequence, the value of the river to wildlife is reduced. Successful revetment work has already been carried out on a section of the Garren. Further work using natural materials along the Garren and Gamber could provide additional habitat for fish and invertebrates as well as reinforcing banksides to halt erosion.

8.9 Fish pass and habitat solutions

Projects which improve fish habitats and connectivity in the Garren and Gamber brooks will help to increase fish populations and in turn support those in the River Wye. Enhancements to river habitats may include the modification or removal of barriers to fish migration, stabilising banksides, restoration of spawning habitats or enhancing fish cover.

Salmon embryos require well oxygenated water to aid their development. The presence of fine sediment can reduce the flow of water, and sediment deposition on spawning grounds can lead to the suffocation of embryos. To reduce fine sediment being deposited over gravel beds, there are a number of possible remedies. Water velocities can be increased in targeted areas by narrowing the river channel via installing stream deflectors, boulders and submerged weirs. A drawback to these methods is that sediments would then be washed and deposited further downstream. If a habitat has become severely degraded or lost, it may be appropriate to create new spawning habitat. If poaching or over-shading has led to poor bankside vegetation, cover for fish may be negligible. The installation of woody debris or the placement of boulders in the channel may offer cover for fish and other organisms.

Bypass channels and fish passes are an option to allow fish movement around obstructions such as weirs and dams. Along the Garren and Gamber, options for fish passes / easements (such as larinier, pool and slot, rock ramp or pre-barrage) will need to be assessed on a site by site basis to determine their suitability. It is worth noting that the only way improvements to fish habitats will be valuable and worthwhile in the long run, is if they are part of a wider plan to improve the way the surrounding land is managed. Without this catchment-scale approach, the source of the problem is not addressed and siltation of spawning habitat will continue.

8.10 Wetland creation / restoration

Wetlands are not only important habitats for a wide variety of wildlife but they are also hugely important for the ecosystem services they provide. Wetland habitats act as buffers for water courses by filtering out sediments and capturing nutrients that would otherwise end up in our river systems. For these reasons, increasing areas of wetland in land adjacent to the Garren and Gamber would be beneficial to both brooks. Species associated with rivers would have their habitat extended and this would provide flood control by retaining water and altering flow. Larger areas of wetland habitat can also reduce the impact of mink predation by providing greater cover and larger habitat extent for native species such as water vole.

There is the potential for a collaborative approach to small scale wetland restoration between land owners in the catchment. It has been noted that there are some residual lapwing (*Vanellus vanellus*) populations in this vicinity and there may be interest from landowners to increase their numbers through habitat improvements.

8.11 Landowner engagement

Herefordshire Meadows, Caroline Hanks (Farming 4 Wildlife) and Farm Herefordshire have been working with landowners in the catchment over a number of years. Their aim is to promote good farming practice, healthy soils and clean water. They facilitate training days, give advice and open up communication between landowners and other interested parties. It is advisable that any projects going forward in the Garren and Gamber catchment involves the above organisations, where a relationship with local landowners has already been established. It has been suggested that any projects needing the involvement of landowners, could be advertised in the Herefordshire Rural Hub newsletter. A local group consisting of landowners interested in habitat improvements within the Garren and Gamber catchment could be set up to support each other and share ideas. Other agricultural organisations such as the Herefordshire Soils Discussion Group could be contacted when promoting projects as they are well placed to encourage landowner discussion and sharing of best practice. There is also a real opportunity to set up a group based in the Garren and Gamber catchment which could run in a similar way to the Soils Discussion Group. If future funding could provide a farm adviser for the area, they could join the Farm Herefordshire partnership and be supported to hold local events, discussion groups, meetings, and best practice demos alongside advice on soil and water, habitat creation, species reintroduction and invasive species management.

9 Conclusion

With support from local landowners, significant improvements to riverine habitats have already been made by WUF, MRA and the EA along the Garren and Gamber in recent years but many issues still remain. In order to address any of the issues outlined in this report, landowner engagement and clear communication must be a priority. In this way the root causes of these issues could be addressed and mitigated against.

It is worth noting that information provided by partner organisations may be several years old so conditions on the ground may well have changed.

Recommended funding opportunities currently available:

1. **Dŵr Cymru Water Framework Directive Funding Scheme**

Dŵr Cymru are currently providing a funding opportunity to implement the European Union's Water Framework Directive (WFD). It aims to support projects that improve the ecology of the water environment. It is targeting water bodies or protected areas that are failing to reach objectives under the WFD.

2. **National Grid – VIP (Visual Impact Provision) Landscape Enhancement Initiative**

Funding is available to help reduce the visual impact of National Grid high voltage electricity infrastructure in nationally protected landscapes (AONBs and National Parks) across England and Wales. While in some cases, views of the line may be screened or softened, in many cases where it may not be possible to address the impacts of the electricity line directly, it may be possible to 'shift the balance' of the impacts by enhancing the local environment in other ways. The initiative is providing up to £24 million over six years (May 2016 to March 2021). National Grid pylons run through Marstow and to the south of Llangarron.

3. **Countryside Stewardship Facilitation Fund**

This fund supports projects that bring together farmers and landowners to improve their local environment at a landscape scale. Priority is given to approaches which show collaborative partnership working to achieve environmental benefits beyond what could be achieved by individuals acting alone.

4. **Heritage Lottery Fund - Landscape Partnerships Grant**

Grants from £100,000 to £3,000,000 are available to help conserve habitats at landscape-scale. It is for schemes led by partnerships of local, regional and national interests which aim to conserve areas of distinctive landscape character throughout the UK.

5. **Government agri-environment schemes**

Existing funding opportunities under the current Countryside Stewardship Scheme include the Hedgerows and Boundaries Grant and Water Capital Grants. The UK's departure from the EU will inevitably change the way our current agri-environment schemes look, but there may be new opportunities in the future.

6. **Section 106 / Community Infrastructure Levy (CIL) 'Planning Gain' agreements**

Contributions for specific projects may be sought from local developers as a way of mitigating against the effects of a development. Section 106 and CIL can be used to ensure that the new development contributes positively to the local environment.

Depending on the applicant, a variety of other smaller funding opportunities could also be available from initiatives such as the Landfill Communities Fund, the Esmée Fairbairn Foundation and Tesco's 'Bags of Help,' to name a few examples.

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