River Habitat Survey (RHS) and Plant Community surveys of the River Wye SAC (Wales)

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Contents

List of Figures

List of Tables

Crynodeb Gweithredol

Cyfoeth Naturiol Cymru (CNC) sy'n gyfrifol am fonitro a rheoli'r amgylchedd dŵr croyw gan gynnwys safleoedd gwarchodedig a ddynodwyd o dan ddeddfwriaeth y DU ac Ewrop (SoDdGAau ac ACAau). Mae ACA Afon Gwy yn bwysig ar gyfer nifer o nodweddion gan gynnwys cynefin Ranunculion sy'n cael ei restru yn y Gyfarwyddeb Cynefinoedd fel y Cynefin Atodiad 1: "Cyrsiau dŵr ar lefelau gwastad a mynyddig gyda llystyfiant Ranunculion fluitantis a Callitricho-Batrachion".

Mae'n ofynnol i CNC werthuso statws cadwraeth nodwedd cynefin afon Ranunculion gan ddefnyddio canllawiau Monitro Safonau Cyffredin (CSM) (JNCC, 2016). Asesir y nodwedd hon yn erbyn wyth priodoledd: llif, ansawdd dŵr, strwythur y cynefin, gwaddod mân, dangosyddion negyddol, casgliadau biolegol, dangosyddion nodweddion lleol unigryw ac aflonyddwch dynol uniongyrchol. Efallai bod gan bob nodwedd fwy nag un is-nodwedd, sy'n cyfrannu at asesiad cyffredinol o'r nodwedd fel un sydd mewn cyflwr ffafriol neu anffafriol.

Comisiynwyd Bywater Ecology gan CNC i gynnal Arolwg Cynefin Afon (RHS), Cam 1 Syml ac arolygon macroffytau dyfrol LEAFPAC ar ACA Afon Gwy i gyfrannu at asesiad cyflwr nodweddion yn ACA Afon Gwy yn ogystal â darparu gwybodaeth i gefnogi'r gwaith o reoli ac adfer safleoedd gwarchodedig a chyflawni Cynlluniau Rheoli Basnau Afonydd.

Arolygwyd dau ddeg dau o safleoedd monitro allan o dri deg pump o safleoedd posibl yn nalgylch afon Gwy rhwng 5 Awst a 28 Medi 2024. Prif allbynnau'r prosiect hwn yw copïau digidol o gofnodion maes gan gynnwys ffotograffau, mannau mynediad a pharcio, ynghyd â disgrifiad o bob safle.

Ym mhob safle cynhaliwyd yr arolygon canlynol:

- Arolygon Cynefin Afonydd (RHS), i asesu ansawdd y cynefin ffisegol, a gefnogir gan
- Arolwg Cam 1 wedi'i symleiddio, a
- Arolygon planhigion dyfrol gan ddefnyddio dull afonydd LEAFPACS, ynghyd ag
- Arsylwadau maes o ansawdd cynefinoedd i gynorthwyo â'r gwaith o ddehongli'r data.

Effeithiwyd ar raglen yr arolwg gan law drwy gydol cyfnod yr arolwg. Er bod pob ymdrech wedi'i gwneud i drefnu arolygon fel eu bod yn osgoi cyfnodau o law a llifoedd uchel dilynol, roedd y trefniant hwyr ar gyfer y prosiect a'r tymor arolygu cyfyngedig yn golygu nad oedd hyn bob amser yn bosibl. Cynigir un ar ddeg o safleoedd ar gyfer ail-gynnal yr arolygon macroffytau yn gynharach yn y tymor yn 2025 er mwyn cofnodi'r llystyfiant tanddwr nad oedd yn weladwy nac yn bosibl ei asesu'n gywir oherwydd llifoedd uchel yn dilyn glaw trwm. Argymhellir ail-gynnal arolygon RHS mewn saith o'r safleoedd hyn er mwyn cofnodi'r nodweddion 'yn y sianel' yr effeithiodd y llifoedd uchel arnynt. Yn ddelfrydol, dylid ail-arolygu pob safle ar gyfer macroffytau yn 2025 oherwydd gallai llifoedd uchel blaenorol mewn rhai o'r safleoedd hefyd fod wedi effeithio ar ganlyniadau oherwydd bod tacson yn cael ei olchi allan. Yn ddelfrydol byddai arolygon yn cael eu cynnal yn gynharach o lawer yn y tymor arolygu, fel y byddai llifau uchel yn llai tebygol o effeithio arnynt.

Nid yw CNC wedi cynnal dadansoddiad o'r data macroffytau ac RHS eto, ond o edrych ar yr arolwg maes, gellir dod i'r casgliad bod defnydd amaethyddol yn effeithio ar afon Gwy a'i llednentydd gyda'r tir o'i hamgylch yn cael ei ddefnyddio'n bennaf ar gyfer pori defaid, yn aml hyd at grib y lan heb unrhyw barth clustogi, gydag olion sathru i'w gweld mewn mannau ar y glannau. Effeithiwyd ar nifer o safleoedd o ganlyniad i addasu'r sianel yn y gorffennol a cholli cynefin ar grib y lan. Ar un safle, roedd cnydau wedi'u plannu hyd at grib y lan.

Roedd ychydig o weithfeydd trin carthion ger rhai safleoedd, ac mae'r gollyngiad o'r rhain, ynghyd â dŵr ffo amaethyddol yn debygol o fod wedi cyfrannu at gynnydd yn y gorchudd algâu a welwyd mewn rhai safleoedd, er ei bod yn anodd cael sicrwydd mewn nifer o safleoedd oherwydd y llifau uchel.

Bydd presenoldeb Rhywogaethau Estron Goresgynnol (INNS) yn cael effaith negyddol ar yr ACA. Ni chofnodwyd unrhyw rywogaeth estron oresgynnol yn afon Gwy na'i llednentydd yn y rhannau uchaf, o'r safle pellaf i fyny'r afon yn llednant Bidno i'r cydlifiad ag afon Ieithon i lawr yr afon. Cofnodwyd Jac y Neidiwr mewn pymtheg o'r ddau safle ar hugain, gan ei fod yn bresennol ar wyneb y lan a/neu ar frig y lan yn y rhan fwyaf o safleoedd yn rhannau isaf yr afon a llednentydd afon Gwy, ac roedd clymog Japan yn bresennol yn y tri safle a arolygwyd yn afon Irfon ac ar ddau safle yn afon Gwy i lawr yr afon o'r llednant hon.

Executive summary

Natural Resources Wales (NRW) is responsible for the monitoring and management of the freshwater environment including protected sites designated under UK and European legislation (SSSIs and SACs). The River Wye SAC is important for several features including Ranunculion habitat listed in the Habitats Directive as the Annex 1 Habitat: "Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation".

NRW is required to evaluate the conservation status of the Ranunculion river habitat feature using Common Standards Monitoring (CSM) guidance (JNCC, 2016). This feature is assessed against eight attributes: flow, water quality, habitat structure, fine sediment, negative indicators, biological assemblages, indicators of local distinctiveness and direct human disturbance. Each attribute may have more than one sub-attribute, which contribute to the overall assessment of the feature as being in Favourable condition or Unfavourable condition.

Bywater Ecology were commissioned by NRW to undertake RHS, Simplified Phase 1 and LEAFPAC aquatic macrophyte surveys on the River Wye SAC to contribute to condition assessment of features in the River Wye SAC as well as provide information to support the management and restoration of protected sites and the delivery of River Basin Management Plans.

Twenty-two monitoring sites out of thirty-five possible sites were surveyed in the River Wye catchment between 5th August and 28th September 2024. The principal outputs of this project are digital copies of field records including photographs, access and parking, along with a description of each site.

At each site the following surveys were conducted:

- River Habitat Surveys (RHS), to assess the quality of physical habitat, supported by
- Simplified Phase 1 survey, and
- Aquatic plant surveys using the rivers LEAFPACS method, along with
- Field observations of habitat quality to assist with interpretation of the data.

The survey program was impacted by rain throughout the survey period. Whilst every effort was taken to schedule surveys to avoid times of rain subsequent high flows, the late appointment of the project and limited survey season meant that this was not always possible. Eleven sites are proposed for re-survey of the macrophyte surveys earlier in the season in 2025 to capture the submerged vegetation which was not visible or possible to assess accurately due to high flows following heavy rain. A repeat of the RHS surveys at seven of these sites is recommended to capture the in-channel features that were affected by high flows. Ideally, all sites should be resurveyed for macrophytes in 2025 as preceding high flows at some of the sites may also have impacted results due to taxon being washed out. Ideally surveys would be carried out much earlier in the survey season, so it is less likely to be impacted by high flows.

Analysis of the macrophyte and RHS data is yet to be conducted by NRW, but from the field survey, it can be gleaned that the Wye and its tributaries are impacted by agricultural use with the surrounding land used mainly for sheep grazing, often right up to the bank top with no buffer zone, and poaching of the banks apparent in places. A number of sites have been impacted by historic channel modification and loss of bank top habitat. At one site, there were crops planted up to the bank top.

There were a few sewage treatment works near some sites, and the discharge from these, along with agricultural run-off is likely to have contributed to increased algae cover seen at some sites, although this was difficult to ascertain at a number of sites due to the high flows.

The presence of Invasive Non-Native Species (INNS) will have a negative impact on the SAC. No INNS were recorded in the Wye or its tributaries in the upper reaches, from the furthest upstream site on the Bidno tributary to the confluence with the Ithon downstream. Himalayan Balsam was recorded at fifteen of the twenty-two sites, being present on the bank faces and/or bank tops at most sites in the downstream reaches and tributaries of the River Wye, and Japanese knotweed was present at the three Irfon sites surveyed and at two sites on the Wye downstream of this tributary.

Introduction

Natural Resources Wales is the largest Welsh Government Sponsored Body and is responsible for making sure that the environment and natural resources of Wales are sustainably maintained, sustainably enhanced and sustainably used, now and in the future. Responsibilities include the management and monitoring of the freshwater environment including protected sites designated under UK and European legislation (SSSIs and SACs) and environmental monitoring for the Water Framework and Nitrates Directives.

The River Wye is designated as an SAC covering approximately 2,200 ha. Ranunculion habitat is listed as the Annex I habitat as a primary reason for selection of this site as a SAC. The location of the River Wye is given in Figure 1 (Section 7). It has a geologically mixed catchment, including shales and sandstones, and there is a clear transition between the upland reaches, with characteristic bryophyte-dominated vegetation, and the lower reaches, with extensive Ranunculus spp. beds. There is an exceptional range of aquatic flora in the catchment including river jelly lichen *Collema dichotomum*. The river channel is largely unmodified and includes a number of gorges and significant areas of associated woodland (CCW, 2008; JNCC, 2013).

In 2012, Harrison et at noted the conservation status of the River Wye in relation to the Ranunculion habitats was unfavourable, resulting from reduced water quality in some tributaries of the Wye including parts of the Ithon and Llynfi sub-catchments, due mainly to diffuse pollution from agriculture. A further adverse factor noted was the over-abundance of invasive non-native species of bankside plant communities (CCW, 2008).

Bywater Ecology has been appointed by Natural Resources Wales to undertake surveys to monitor the river habitat and aquatic macrophyte communities of the Wye catchment in 2024. The results of these surveys undertaken in August and September 2024 are presented in this report.

Methods

Fieldwork

All survey fieldwork was undertaken by a team of two including an experienced macrophyte surveyor and a field assistant for health and safety reasons (working in or near water). The main surveyor had current River Habitat Survey (RHS) accreditation from the Environment Agency, was experienced in RHS survey work, was experienced with the) LEAFPACS plant community survey and familiar with Phase 1 classification categories. The field programme was organized so as to minimise travel and other expenses.

Fieldwork was undertaken between 5th August 2024 and 28th September 2024, within the recognised macrophyte survey season (June-September inclusive). Where possible, the surveys were undertaken at low flows when visibility through the water column was good and timed to avoid the periods during and immediately following inclement weather conditions such as heavy rain which can affect the quality of macrophyte and RHS data collected.

At each site, parking, access and health and safety issues were recorded for inclusion in NRWs Survey Site Information database (SSID).

Landowner information was provided by NRW for all sites to be surveyed for this project. It was decided in agreement with the NRW project officer not to contact landowners in advance of survey unless requested to do so due to time constraints. Instead, a letter was provided by NRW to the landowner providing an explanation of the survey work and project officer contact details for use while out on site. Surveyors knocked on doors, put letters through letterboxes, put letters in their car windscreens and spoke to landowners on site where possible for permission to access the survey sites, with a policy to stop work and leave if asked to do so.

Biosecurity

Disease and invasive alien species can be spread by fish and other animals, people, vehicles and equipment. By using biosecurity measures, the risk of spreading alien species and/or disease can be reduced. All work was undertaken in accordance with standard good practice and specific provisions with reporting of any records of invasive alien species observed on each site, with suitable biosecurity in place to prevent the spread of the more widespread invasive plants such as the water-thymes (*Elodea* spp.) and New Zealand pigmyweed (*Crassula helmsii*) at all sites.

On 16 Jul 2024 NRW reported that test results had confirmed that Crayfish Plague was present in the River Irfon near Builth Wells, posing a deadly threat to the native white-clawed crayfish population. Bywater Ecology were requested to survey these sites last and to follow strict biosecurity measures for the whole survey of "Check, Clean, Dry" protocol if entering other waterways in the area: check equipment and clothing for mud and debris,

clean everything thoroughly, and dry items completely before entering other water bodies. It was deemed to be prudent to disinfect as well.

It was agreed to survey the Irfon last and consult the project officer prior to going out so the latest guidance could be followed on whether it was possible to enter the water. Sites were also surveyed in downstream order to reduce the risk of spreading any diseases or alien species upstream.

Limitations

High flows were experienced over the summer of 2024 and flow conditions were only suitable for macrophyte survey within a few weeks of August. This could have affected the plant community composition but would certainly have impacted the survey accuracy where flows were fast, water levels were high, and the water was turbid.

RHS

RHS is a standard methodology for hydromorphological assessment under the Water Framework Directive (WFD) and feature condition assessment under the Habitats Directive that is widely used in the UK and across Europe (Raven et al. 1997). RHS has been applied to more than 25,000 sites in the UK since 1994. The RHS method was developed in the 1990s by the then National Rivers Authority for England and Wales.

The RHS system for assessing the character and habitat quality of rivers based on their physical structure has four distinct components: (i) a standard field survey method; (ii) a computer database, for entering results from survey sites and comparing them with information from other sites; (iii) a suite of methods for assessing habitat quality; and (iv) a system for describing the extent of artificial channel modification. The RHS field method is a systematic collection of data associated with the physical structure of watercourses and surveys should be carried out between April to September.

The RHS field survey is carried out along a standard 500 m length of river channel. The survey is conducted in two sections: 'spot-checks' and 'sweep-up'. The spot-checks are a series of ten 1 m wide transects across the channel at 50m intervals, where bank and channel physical structure, as well as man-made modifications, land use and vegetation structure are recorded in a replicable manner. The ‘sweep-up' section, is used to note other habitat components like trees and associated features, flow features, and bank structure. In addition, background map-based information on altitude, slope, distance from source, height of source, solid and drift geology, flow category and water quality class are also collected. For each RHS survey it is mandatory to have at least two photos that illustrate the general character of the site and additional photos of all channel modifications, major structures, and special features.

RHS surveys were recorded on a Samsung tablet using the mobile RHS app. developed by Riverdene Consultancy (https://www.riverhabitatsurvey.org/sdm_downloads/rhs-mobile-android-app/).

Habitat quality indices were calculated using the RHS toolbox. The Habitat Modification Score (HMS) quantifies the extent, potential impact and persistence of engineering structures. The score is classified into five HMS categories using set boundaries, where 1 is semi-natural and 5 is severely modified. The Habitat Quality Assessment Score (HQA) quantifies the diversity and naturalness of habitat features. The HQA score is classified into HQA classes 1, very low, to 5, very high, by comparing the site to those of similar types using a context analysis. The River Habitat Quality Class is a combination of the HMS and HQA classes and represents the overall habitat quality and conservation value. The Riparian Quality Index quantifies the complexity, continuity and naturalness of the riparian vegetation. These indices are presented in the report, but further analysis of this data is to be conducted by NRW.

Simplified Phase I

Phase 1 Habitat Survey is a standardised system for classifying and mapping wildlife habitats in the UK. A simplified version of Phase 1 has been devised for use with RHS, and is adopted here, to feed into the JNCC Common Standards Monitoring (CSM) Guidance for Rivers. The methods were largely developed by the Nature Conservancy Council (JNCC).

Each RHS site is surveyed with respect to the broad habitat categories listed in the CSM Guidelines (2016). The vegetation types on the bank face and bank top in the 10 m wide transect of the riverbanks are recorded as an added module to standard RHS. Surveys result in 20 separate records for each RHS site – the left and right bank faces and bank tops of the 10 spot-check transects. Points are allocated to each of the habitat categories from 0 to 5. The total points are calculated, and a SERCON (System for Evaluating Rivers for Conservation) score (Boon et al., 1996) allocated according to how many points (maximum score 100 if all 10 transects score (2x) 5 points for the presence of one of the semi-natural vegetation types. This is recorded as an Evaluated Corridor Section (ECS) SERCON score in the results tables.

The simplified Phase 1 Habitat Survey were recorded on field sheets printed from the downloaded from the CSM guidance document (JNCC, 2016).

LEAFPACS

The macrophyte plant community was surveyed using the LEAFPACS methodology (WFD-UTAG, 2014), a standardised method where aquatic plant data are sampled from 100 m river sections. Macrophytes are larger plants of fresh water which are easily seen with the naked eye, including all vascular plants, bryophytes, stoneworts (Characeae) and macro-algal growths. Species were recorded according to the LEAFPACS species list, with voucher specimens taken where necessary to confirm identification. Each species recorded was assigned a cover score for the 100 m according to a nine-point scale used in the MTR method (Holmes et al., 1999). Specimens of species which require microscopic examination for definitive identification, such as *Callitriche* and bryophytes were collected for more detailed examination where necessary.

Physical features of the 100 m section were recorded using the standard LEAFPACS form. At the mid-point of each 100 m survey section two photographs were taken, one looking upstream and one downstream, and an additional photograph across the channel. The 10 figure National Grid Reference (NGR) was recorded. Additional ad hoc observations relating to condition were also recorded at each monitoring site.

The LEAFPACS river macrophyte field survey was recorded using the standard field sheets which included site detail categories, a macrophyte species recording list and a map template on which to draw the 100m survey length. Bryophyte samples were collected, dried, packed in specially made envelopes and sent to an expert in bryophytes, Sharon Pilkington of the Vegetation Survey, for identification and confirmation of species as required. Specialist aquatic macrophyte forums and staff at NRW were consulted for confirmation of species of higher plants.

This data will be assessed by NRW against four metrics: i) River Macrophyte Nutrient Index, which provides an index of eutrophication; ii) Number of Macrophyte Taxa; iii) Number of Functional Groups, which assesses the structural diversity of the plant community; and iv) Filamentous algal cover.

Results

Sites

Twenty-two sites were selected for survey from a list of thirty-five potential sites supplied by NRW. These were chosen to provide good coverage of the whole of the catchment. During the selection process, a few sites were suggested in place of other nearby sites by the project officer as it was thought that the Ranunculion assemblages may be better represented at these sites. When it was not possible to survey a site due to access or other issues, an alternative list was selected from the list and agreed with the NRW project offices prior to survey.

A list of the sites surveyed along with the grid reference of each site is presented in table 1 below.

Each site has a macrophyte survey site number, a macrophyte survey reference, an RHS site number and an RHS survey reference. The RHS site number was used for the Simplified Phase One surveys.

Table 2. Survey Sites for RHS, Simplified Phase 1 and Aquatic Macrophyte Survey 2024

Grid Reference	River Name	Location	Macrophyte Site Number	New macrophyte Survey Number	RHS Site Number	New RHS Survey Number	Survey Date
SN8918680712	Bidno	Bidno Mill	EFMI231	EF24NORM044	SHMI33	EF24NORH034	06.08.2024
SN9045479794	Wye	Llangurig	EFMI223	EF24NORM045	SHMI34	EF24NORH035	05.08.2024
SN9182274529	Nant y Dernol	u/s confl Wye	45675	EF24NORM023	SHMI20	EF24NORH013	06.08.2024
SN9515071550	Wye	u/s Marteg	45263	EF24NORM034	H10273	EF24NORH024	28.09.2024
SN9762867481	Wye	Rhayader	EFMI215	EF24NORM035	H10276	EF24NORH025	07.08.2024
SN9913562821	Wye	Treflyn	EFMI225	EF24NORM047	SHMI36	EF24NORH037	07.08.2024
SO0818967209	Clywedog Bk	Brynllygoed	EFMI226	EF24NORM048	SHMI37	EF24NORH038	27.09.2024
SO1050968204	Ithon	d/s A485 road bridge	EFMI218	EF24NORM038	SHMI30	EF24NORH028	18.08.2024
SO0460060400	Ithon	Dolberthog	45670	EF24NORM025	SHMI22	EF24NORH015	19.08.2024
SO0336558435	Ithon	Disserth	EFMI205	EF24NORM024	SHMI21	EF24NORH014	19.08.2024
SO0110055900	Wye	confl Ithon	EFMI216	EF24NORM036	H3260	EF24NORH026	25.09.2024
SO0313054121	Dulas Brook	Cwmbach Llechrhyd	EFMI227	EF24NORM049	SHMI38	EF24NORH039	20.08.2024
SO0182553453	Wye	Builth Rd	EFMI206	EF24NORM026	SHMI23	EF24NORH016	20.08.2024
SO1248252989	Edw	Cregrina	EFMI230	EF24NORM052	SHMI39	EF24NORH042	21.08.2024
SN9422847632	Irfon	Llangammarch wells	EFMI228	EF24NORM050	H885	EF24NORH040	03.09.2024
SN9795049195	Irfon	u/s Hafrena	EFMI221	EF24NORM042	H21570	EF24NORH032	04.09.2024
SO0309250698	Irfon	Caer Beris Builth Wells	EFMI207	EF24NORM027	H12353	EF24NORH017	04.09.2024
SO0450051500	Wye	Builth Wells	45260	EF24NORM039	H12354	EF24NORH029	21.08.2024
SO0980043300	Wye	Erwood	EFMI219	EF24NORM040	H10295	EF24NORH030	05.09.2024
SO1373238569	Wye	Boughrood	EFMI209	EF24NORM029	SHMI24	EF24NORH019	24.09.2024
SO1730139118	Wye	Glasbury	EFMI210	EF24NORM030	H23245	EF24NORH020	05.09.2024
SO2300043000	Wye	d/s Hay	EFMI213	EF24NORM032	H4960	EF24NORH022	24.09.2024

Originally, four other sites were selected, but were swapped for alternative sites as follows. One site on the River Wye downstream of Builth was not possible to survey due to extensive growth of vegetation restricting access, and three sites on the lower Wye, at Hadnock, Wyeseal Farm and Monmouth were not possible to survey due to high flows making access unsafe as these surveys required the use of a boat. Natural England had commissioned surveys on the Wye in 2024 (NRW, Pers. comm.), and one of their sites was at Wyeseal Farm.

The location of the survey sites is presented in figure 1 with the sites labelled with the grid reference common to all survey types because each site had a different site code for each survey. It should be noted that at one location on the Nant y Dernol, the macrophyte survey site midpoint was very slightly different to the RHS and simplified phase one midpoints, and at another on the Edw, the macrophyte survey midpoint was downstream of the RHS and simplified phase one midpoints, both due to access restrictions.

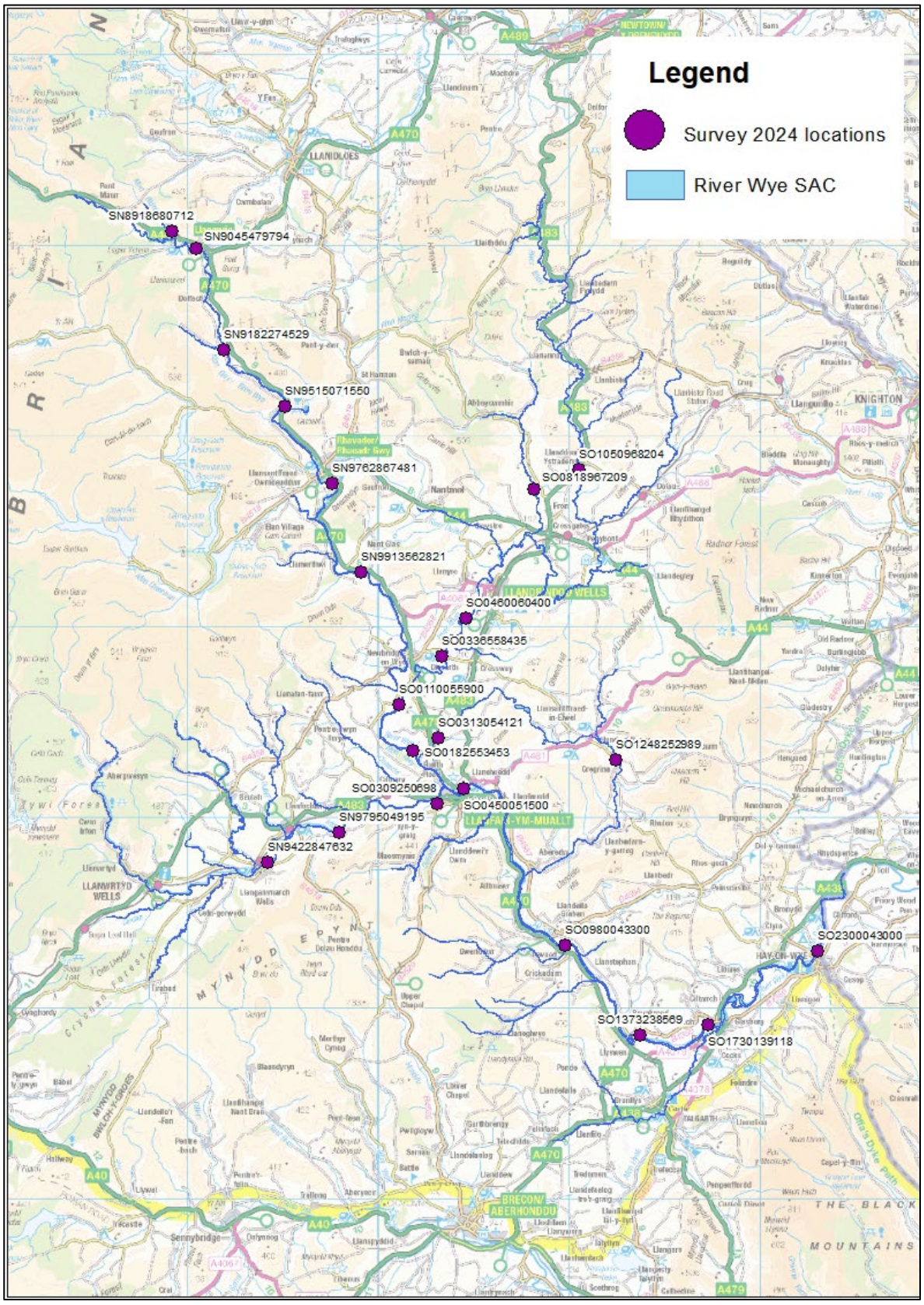

Figure 2. Location of Macrophyte, RHS and Simplified Phase 1 Survey Site Midpoints

The site access data were supplied to NRW as Appendix 1 in a separate excel spreadsheet, Appendix 1 Wye Macrophyte SIDD Data 2024_Bywater Ecology.

The RHS, Phase I Habitat Survey, and plant community data was entered into excel spreadsheet templates as provided by NRW or downloaded from the CSM guidance for rivers link and supplied as separate appendices via sharefile. These are;

Appendix 2. Wye New RHS Site Data 2024_Bywater Ecology

Appendix 3. Wye Simplified Phase I Data 2024_Bywater Ecology

Appendix 4. Wye New Macrophyte Site Data 2024_Bywater Ecology

The RHS forms were printed as PDFs and shared in a folder labelled

Appendix 5. Wye RHS PDF Forms 2024_Bywater Ecology and Wye RHS Photo Zip Files 2024_Bywater Ecology

Appendix 6. Wye Macrophyte Survey Sketch Maps 2024_Bywater Ecology

Appendix 7. Wye Macrophyte Survey Photo Zip Files 2024_Bywater Ecology.

The RHS indices calculated using the RHS toolbox are presented in Table 2 with descriptions in Table 3. These were the Habitat Modification Score (HMS) and class, Habitat Quality Assessment Score (HQA) and class, the River Habitat Quality Class and the Riparian Habitat Quality Index.

HMS scores tend to be lower in rural areas such as Llangurig and Treflyn on the main Wye and Dolberthog on the Irfon (which are all in HMS class 2, 'predominantly unmodified' and higher in towns and built up areas including the bridge on the Ithon and Glasbury on the main Wye (both HMS Class 5, 'Severely modified'). Overall, 41 % of sites (9 sites) have a HMS score of 2 (predominantly unmodified) and only three sites, representing 14 % have HMS scores of 4 or 5. Whilst this does show that large stretches of the River Wye in Wales are still in good condition and resilient to pressures, the fact that 46 % (10 sites) are HMS class 4 (significantly modified) means that the majority of the sampled stretches are in need of habitat improvement and restoration. Rehabilitation and restoration effort should generally be targeted at the more modified stretches of river with the less modified rivers being protected and enhanced.

Table 2. RHS Indices for the River Wye (SAC) sites 2024. (HMS Class 1 = pristine/semi-natural, HMS Class 5 = severely modified, HQA Class 1 = very low, HQA class 5 = very high, RHQ Class 1 = Excellent to 5 = Extremely Poor). Coloured according to score/class.

Site	Watercourse	Location	HMS	HMS Class	HQA Score	HQA Class	RHQ Class
SHMI33	BIDNO	Bidno Mill	480	3	74	1	2
SHMI34	WYE (WALES)	Llangurig	138	2	66	1	3
SHMI20	NANT Y DERNOL	Upstream Conf Wye	288	3	65	1	3
H10273	WYE (WALES)	u/s Marteg	120	2	71	1	2
H10276	WYE (WALES)	Rhaydaer	684	4	66	1	3
SHMI36	WYE (WALES)	Treflyn	20	2	63	1	2
SHMI37	CLYWEDOG	Brynllygoed	330	3	64	1	3
SHMI30	ITHON	d/s A485 road bridge	1620	5	53	2	4
SHMI22	ITHON	Dolberthog	120	2	69	1	3
SHMI21	ITHON	Disserth	420	3	66	1	2
H3260	WYE (WALES)	confl Ithon	250	3	65	1	3
SHMI38	DULAS BROOK	Cwmbach Llechrhyd	300	3	67	1	3
SHMI23	WYE (WALES)	Builth Rd	370	3	59	1	3
SHMI39	EDW	Cregrina	180	2	67	1	2
H885	IRFON	Llangammarch wells	480	3	59	1	3
H21570	IRFON	u/s Hafrena	20	2	67	1	2
H12353	IRFON	Caer Beris Builth Wells	70	2	68	1	2
H12354	WYE (WALES)	Builth Wells	484	3	54	1	3
H10295	WYE (WALES)	Erwood	100	2	67	1	2
SHMI24	WYE (WALES)	Boughrood	50	2	62	1	2
H23245	WYE (WALES)	Glasbury	2014	5	27	5	5
H4960	WYE (WALES)	d/s Hay	414	3	44	5	4

Table 3. Description of RHS derived indices

Indices	RHS index	Range	Description
Habitat quality indices	Habitat Modification Score (**HMS**)	0 to 6000+	Quantifies the extent, potential impact and persistence of engineering structures
	HMS class	1 (semi-natural) to 5 (severely modified)	Classification of HMS score into 5 categories using set boundaries
	Habitat Quality Assessment score (**HQA**)	0 to 100	Quantifies the diversity and naturalness of habitat features
	HQA class	1 (very low) to 5 (very high)	Classification of HQA score by comparing to sites of similar types using a context analysis.
	River Habitat Quality (**RHQ**) index	I (excellent) to V (very poor)	Classification combining HMS and HQA classes and representing overall habitat quality and conservation value
Hydromorphological indices	Riparian Quality Index (**RQI**)	1 (very low) to 5 (very high)	Quantifies the complexity, continuity and naturalness of the riparian vegetation
	Channel Substrate Index (**CSI**)	-2 (silt) to 1 (boulders)	Represents the average substrate size
	Flow Regime Index (**FRI**)	-1 (glide) to 2 (waterfall)	Represents the average flow-type
	Channel Vegetation Index (**CVI**)	-2 (free floating vegetation) to 1 (mosses and lichens)	Represents the dominant vegetation types
	Geomorphic Activity Index (**GAI**)	-1 (no activity sign) to 1.6 (high activity)	Represents the level of geomorphic activity (i.e. erosion and deposition)
	Hydromorphological Impact Ratio (**HIR**)	1 (low impact) to 5 (very high impact)	Quantifies the level of departure from natural state of CSI, FRI, CVI and GAI combined

The presence of Invasive Non-Native Plants recorded in the RHS are summarized in table 4 as none, present or extensive (i.e. occurring in more than a third of the bank) at each site. Invasives are distributed throughout the sites sampled with Himalayan balsam present at 70 % of sites and Japanese knotweed at 23 % of sites. These invasive plants were found in rural tributaries as well as more developed stretches of the main Wye at Builth Wells and Hay on Wye, with no obvious pattern. None of the sites had any Hogweed present.

Table 4. Invasive Non-Native Plants recorded in the Wye catchment 2024

Site	NGR	Watercourse	Location	Hogweed	Himalayan Balsam	Japanese Knotweed
SHMI33	SN8918680712	BIDNO	Bidno Mill	None	None	None
SHMI34	SN9045479794	WYE (WALES)	Llangurig	None	None	None
SHMI20	SN9182274529	NANT Y DERNOL	Upstream Conf Wye	None	None	None
H10273	SN9515071550	WYE (WALES)	U/S Marteg	None	None	None
H10276	SN9762867481	WYE (WALES)	Rhaydaer	None	None	None
SHMI36	SN9913562821	WYE (WALES)	Treflyn	None	Extensive	None
SHMI37	SO0818967209	CLYWEDOG	Brynllygoed	None	None	None
SHMI30	SO1050968204	ITHON	D/S A485 road bridge	None	Present	None
SHMI22	SO0460060400	ITHON	Dolberthog	None	Extensive	None
SHMI21	SO0336558435	ITHON	Disserth	None	Present	None
H3260	SO0110055900	WYE (WALES)	Confl Ithon	None	Present	None
SHMI38	SO0313054121	DULAS BROOK	Cwmbach Llechrhyd	None	None	None
SHMI23	SO0182553453	WYE (WALES)	Builth Rd	None	Present	None
SHMI39	SO1248252989	EDW	Cregrina	None	Present	None
H885	SN9422847632	IRFON	Llangammarc-h wells	None	Present	Present
H21570	SN9795049195	IRFON	U/s Hafrena	None	Present	Present
H12353	SO0309250698	IRFON	Caer Beris Builth Wells	None	Present	Present
H12354	SO0450051500	WYE (WALES)	Builth Wells	None	Present	None
H10295	SO0980043300	WYE (WALES)	Erwood	None	Present	Present
SHMI24	SO1373238569	WYE (WALES)	Boughrood	None	Present	Present

Site	NGR	Watercourse	Location	Hogweed	Himalayan Balsam	Japanese Knotweed
H23245	SO1730139118	WYE (WALES)	Glasbury	None	Present	None
H4960	SO2300043000	WYE (WALES)	D/S Hay	None	Extensive	None

Site Descriptions

Bidno, Bidno Mill

This site on the Bidno, a tributary of the upper River Wye, was on its lower reaches with the mid-point approximately 500 m upstream of the confluence with the River Wye, at Bidno Mill, (SN8918680712) to the west of Llangurig. The Bidno is in a quiet valley with steep hills on the left bank. The landscape is agricultural sheep pasture with patches of woodland and scattered farm buildings. Photographs taken at midpoint facing upstream and downstream are presented in figures 2 and 3 respectively.

In the 100 m macrophyte survey, bedrock formed a natural weir and deflector, and artificial reinforcement of the bank was present in the form of stone blocks on right where the road abuts the riverbank. At the midpoint, there was an eroding cliff on the right bank. The river channel was approximately 5 m wide, and the substrate was coarse cobble and gravel/pebble, with some boulder and bedrock. The habitat was predominantly riffle-run, with the occasional pool and the water was clear. Macrophyte communities were dominated by brook-moss (*Hygrohypnella ochracea*) and alpine water-moss (*Fontinalis squamosa)* There were very few vascular plant species, each with low cover values.

There was less than 0.1 % cover of filamentous algae, and iron bacteria were observed in the downstream section of the survey (figure 4).

In the 500 m River Habitat Survey length, the predominant valley form was asymmetric floodplain with a distinct flat valley bottom. In the downstream section, there was historic re-sectioning noted with the right bank having a trapezoidal profile with no trees on the bank top for some of the length, and regularly spaced trees of similar species and size in the remaining. The left bank was steep and wooded in this location. The channel was deep compared to the width, but the bed was bedrock so had not been dredged. There were a number of ‘kiddies weirs’, where rocks had been placed across the channel, which had collapsed and were not holding the water back, so these were recorded as groynes. Further high flows would likely see these demolished and improve the habitat modification score, which was class 3, due to the presence of bridges and localised reinforced and re-sectioned banks.

In the Simplified Phase 1, both banks of the survey length were dominated by good semi-improved grassland. The surrounding land was used for sheep grazing. The Evaluated

Corridor Section (ECS) Score was 3, the middle category. Reprofiling of previously re-sectioned banks to a more natural profile or allowing them to degrade where it is safe to do so, is recommended.

Figure 2. Photo of Afon Bidno at the midpoint facing upstream

Figure 3. Photo of Afon Bidno at the midpoint facing downstream

Figure 4. Photo of Afon Bidno of iron bacteria observed downstream

Wye, Llangurig

This was the furthest upstream of the monitoring sites on the River Wye with the midpoint located approximately 300 m upstream of the road bridge at grid reference SN9045479794 immediately southwest of Llangurig. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 5, 6 and 7 respectively. This site is in the upland reaches of the river, which has characteristic bryophyte-dominated vegetation.

In the 100 m macrophyte survey length, the river channel was approximately 18 m wide at the midpoint with a predominantly cobble and gravel/pebble substrate. There was a large side bar along approximately half the right bank, extending halfway across the channel for most of the length, with the water only 4 m wide at the downstream end of the survey length. There was no obvious sediment on the riverbed and the water was clear. There was no shading of either bank. An embanked area noted in the 2012 macrophyte survey was no longer present due to erosion of the bank.

A riffle dominated the flow type, with 'run', some small pools and slack areas.

The macrophyte community was dominated by alternate water-milfoil (*Myriophyllum alterniflorum*) with broad leaved pondweed (*Potamogeton natans*) mixed in amongst this and in discrete patches, and several patches of water-starwort (*Callitriche sp*.).

There was a negligible cover, less than 0.1 %, of filamentous algae observed.

In the 500 m River Habitat Survey length, the predominant valley form was of a concave bowl with a distinct flat valley bottom. The land high above right bank at the upstream end had wetland rushes, meadowsweet etc growing so was recorded as marshy grassland. There was a fence along left bank top, with a hedge beyond that from the upstream limit to the midpoint. The 500m stretch was relatively unmodified and overall had a natural character typical of an upland river.

The whole channel had possibly been re-sectioned in the past as trees were absent for most of the survey length and the left bank was collapsing, but this was becoming naturalised, so natural bank was recorded in the spot checks. There was a small area of bank with a vegetated mid-bar/island feature attached to the bank at upstream end with water behind. The channel upstream of the midpoint was of low energy flow, with no trees and no boulders in the channel, so has probably been over widened in the past. Historical modification and grazing are the main pressures across this stretch.

When including the historic re-sectioning in the RHS, the HMS class was 4, very modified. This does not reflect the character of the watercourse at this location, and as the re-sectioning was considered to be historic and the channel was becoming more naturalised, re-sectioning was not included in the spot checks, resulting in an HMS class of 2. This is consistent with the emphasis to record what you see using the RHS method.

In the Simplified Phase One survey, the left bank of the survey length was dominated by upland species rich tall herbs including sneezewort, (*Achillea ptarmica*), common

knapweed (*Centaurea nigra*) and tufted hairgrass (*Deschampsia cespitosa*), whilst the right bank was mainly grassland. The surrounding land was used for sheep grazing. The Evaluated Corridor Section (ECS) Score was 4, the second highest category. It is recommended that fencing on the left bank is moved back from the bank top to allow colonisation of the banks by native flora where there has been historic re-sectioning and the bank is eroding, to create a buffer to disturbance and diffuse pollution.

Figure 5. Photo of Wye at Llangurig at the midpoint across the channel

Figure 6. Photo of Wye at Llangurig at the midpoint facing upstream

Figure 7. Photo of Wye at Llangurig at the midpoint facing downstream

Nant y Dernol, upstream Confluence Wye

At this site on the Nant y Dernol, a small, steep tributary of the River Wye, the original midpoint was located just upstream of the confluence with the Wye at grid reference SN9180374538. The watercourse flows through a wide valley with fields either side, becoming a deep gorge before its confluence with the Wye.

The macrophyte survey site was moved upstream but still within the 500 m RHS reach, with the midpoint at SN9180374538, as the original site proposed was inaccessible due to fencing, steep cliffs and eroding banks. Photographs taken across the channel, and at the midpoint facing upstream and downstream are presented in figures 8, 9 and 10 respectively.

The river channel was approximately 3m wide and consisted of a mixed cobble and gravel/pebble substrate, and sidebars were present along both banks. There were large, exposed boulders scattered across the channel.

The plant community was dominated by bryophytes including alpine water-moss (*Fontinalis squamosa*), flagellate feather-moss (*Hyocomium armoricum*) and yellow fringe-moss (*Racomitrium aciculare*).

Negligible cover of filamentous algae was observed (<1 %) Some siltation was seen associated with the ford.

In the 500 m River Habitat Survey length, the predominant valley form was a concave bowl with a distinct flat valley bottom. Given the mid-point grid ref supplied, the survey length would have extended beyond the confluence with River Wye, so the survey reach was moved upstream slightly with the midpoint at SN9182274529 with the downstream limit recorded at the confluence. The left bank had been reprofiled in places. Some of channel was inaccessible due to barbed wire fencing. The watercourse flowed in a gorge at points where the banks were high compared to width in places, but the channel substrate was bedrock so was not considered to be over-deepened. A minor ford and minor bridge with reinforcement crossed the channel, and embankment on the bank tops and set-back embankment were present, but there were no other artificial features noted, and the HMS class was 2.

In the Simplified Phase 1, both banks of the survey length were dominated by broad leaved woodland with trees on the bank faces and bank tops. Good semi-improved grassland and poor grassland was also present on both banks. The surrounding land was used for sheep grazing. The Evaluated Corridor Section (ECS) Score 4, the second highest category, primarily because of the presence of trees, but elsewhere the habitat was poor.

This site was impacted by agricultural use with low quality grassland on the bank tops, and by urban encroachment with a road running alongside the left bank, and local residents creating parking spaces on the bank top and dumping garden waste in the river corridor. The original site midpoint had high banks that were eroding, possibly due to confinement of the channel within the banks.

Protection of the bank top vegetation is recommended where there is urban encroachment, with education of local residents to prevent unauthorised development and dumping of garden waste and enforcement where appropriate.

Figure 8. Photo of Nant y Dernol at the midpoint across the channel

Figure 9. Photo of Nant y Dernol at the midpoint facing upstream

Figure 10. Photo of Nant y Dernol at the midpoint facing downstream

Wye, u/s Marteg

This site was located on the upper reaches of the River Wye which has characteristic bryophyte-dominated vegetation, with the midpoint at grid reference SN9515071550.

Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 11, 12 and 13 respectively.

The macrophyte monitoring site was within a deep gorge cut into bedrock. It was not chosen originally as it was unlikely to support a representative Ranunculion assemblage but was surveyed as a reserve site utilized to replace the downstream sites that were too dangerous to sample due to high flows. The water width was approximately 12 m wide and 0.4 m deep with a predominantly cobble and gravel/pebble substrate. Whilst there was some riffle, the main flow type was 'run' and some small pools and slack areas. Flows were high, and fast making survey difficult, but the water was clear. There were numerous exposed boulders with varying degrees of moss cover. Both banks were shaded with more dense shade on the right bank.

The macrophyte community was dominated by bryophytes with eight moss species recorded including greater water-moss (*Fontinalis antipyretica*) and alpine water-moss (*F. squamosa)* which dominated the aquatic flora. There was only one species of higher plant, reed canary grass (*Phalaris arundinacea*) recorded with low cover value. No filamentous algae were observed despite searching, but not all of the site was accessible due to high flows. This site is naturally unsuitable for Ranunculion vegetation as it is in a gorge.

In the 500 m RHS, there were no bank modifications observed except for some bank poaching on both banks. There was a track along right bank face at the midpoint, but this was not included as re-sectioning as it was high above the water. In the downstream half of the RHS, the A470 runs alongside the bank top, but there was a band of woodland dominant. Elsewhere, the A470 crosses part way up the bank, but was not recorded as re-sectioned as it was high above the water. There were no artificial features other than a minor bridge which was high above the water spanning the channel and the HMS class was 2.

Trees were continuous on both banks, and due to this, the simplified phase one survey scored in the highest category of 5 with 100 points. The surrounding land use is woodland and grazing on the right bank, and high moorland and woodland in Gilfach Nature Reserve on the left bank.

Figure 11. Photo of Wye, u/s of Marteg, at the midpoint across the channel

Figure 12. Photo of Wye, u/s of Marteg, at the midpoint facing upstream

Figure 13. Photo of Wye, u/s of Marteg, at the midpoint facing downstream

Wye, Rhayader

The midpoint grid reference for this site on the River Wye was at SN9762867481. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 14, 15 and 16 respectively.

The water was approximately 18 m wide at the midpoint of the macrophyte survey with a predominantly cobble and gravel/pebble substrate. There were large areas of exposed bedrock up and downstream of this, with an area of still water behind bedrock in the upstream section. There was a mix of dense, broken and no shade on both banks.

Whilst there was some riffle, the main flow type was ‘run’ and some small pools and slack areas. Whilst the water depth was mainly about 20 cm deep, the flow was very fast which made the survey difficult and means some submerged macrophytes and algae cover may have been missed.

The macrophyte community was dominated by bryophytes with eight moss species recorded including alpine water-moss (*Fontinalis squamosa*) which dominated the aquatic flora. Several species of higher plants were recorded with low cover values. There was 0.1 % cover of filamentous algae observed.

In the 500 m River Habitat Survey length, the upstream limit was inaccessible due to fencing and private gardens. Both banks had been re-sectioning in places and poaching was evident. There was some reinforcement of the banks associated with a concrete outfall and pipe/bridge abutments 30 m long on right bank and 15 m on left bank. A large

amount of epiphytic algae cover was noted at several of the spot checks. This channel had areas of moss covered, exposed bedrock and fast flows, but the downstream section was more open with lower energy flows. The HMS class was 4 suggesting a highly modified site due to the bridge crossings, bank reinforcement and re-sectioning, outfalls and deflectors, but this was still a beautiful tree lined section of river with a recreational footpath along the left bank, despite the housing on the upper left bank, farm buildings on the right and a sewage treatment works downstream on the right bank.

In the Simplified Phase 1, both banks were predominately improved and amenity grassland. The surrounding land was used for sheep grazing. The Evaluated Corridor Section (ECS) Score was 2, the second lowest category reflecting the poor quality of the bank top land use.

This site is therefore impacted by agricultural use, bank re-sectioning and reinforcement, possible sewage discharge resulting in epiphytic algae cover, and bank poaching. Reprofiling of previously re-sectioned banks to a more natural profile or allowing them to degrade where it is safe to do so, is recommended, along with fencing set back from the bank top to allow colonisation of the banks by native flora, creating a buffer to disturbance and diffuse pollution.

Figure 14. Photo of Wye, Rhayader, at the midpoint across the channel

Figure 15. Photo of Wye, Rhayader, at the midpoint facing upstream

Figure 16. Photo of Wye, Rhayader, at the midpoint facing downstream

Wye, Treflyn

The midpoint was located approximately 300 m upstream of Argoed Mill at grid reference SN9913562821 on the River Wye at Treflyn. This section of the Wye flows through a wide valley with a flat valley bottom with patches of woodland, and steep hills rising up. The channel is generally wide and tree-lined, with gravel deposits and exposed boulders. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 17, 18 and 19 respectively.

At the macrophyte survey site river channel was wide (just over 20 m), and shallow but fast flowing making access difficult. The water was brown in colour but not turbid. A large riffle occupied the mid-section of the survey length with exposed boulders and a run elsewhere. The channel substrate consisted predominantly of cobble and gravel/pebble. The banks were bordered by alder (*Alnus glutinosa*) on both sides. While the trees were set back from the water's edge on the left bank due to a large gravel/pebble side bar so there was minimal in-channel shading, the trees on the right bank face shaded the entire margin of the channel.

There were numerous emergent macrophytes at low percentage cover values, mainly associated with the sidebars, but only included where they were deemed to be in the water for an appropriate proportion of the time. No submerged macrophytes were seen other than mosses, filamentous algae and epiphytic algae. The bryophytes were dominated by alpine water-moss (*Fontinalis squamosa*) and claw brook-moss (*Hygrohypnella ochracea*). There was approximately 1 % cover of filamentous algae observed in the monitoring site, but epiphytic algae cover was estimated to be approximately 5 %.

In the 500 m River Habitat Survey length, there was no reinforcement or re-sectioning of the banks observed, and no artificial features were present such as bridges, culverts or outfalls. There was poaching from livestock present on both banks, however. Bracken was growing throughout the woodland on left bank, in the downstream section, and bracken covered the right bank at a few spot checks. Where smooth flow was recorded, no channel features were seen and silt was depositing on cobbles, so the channel may have been historically re-sectioned. Epiphytes including filamentous algae was generally covering only a quarter of the area of each cobble where present on them, so was not considered to be extensive, but there was some enrichment of the water.

Himalayan balsam was extensive on both the bank face and the bank top in this survey, where INNS were not recorded at any other sites in the upper Wye catchment. The HMS was low being only 2, reflecting the lack of modification.

In the Simplified Phase 1, both banks had trees on the bank faces and bank tops for much of the length so high scoring broad leaved woodland was the dominant habitat, but elsewhere was low scoring poor improved grassland or bracken. The surrounding land was used for sheep grazing. Control of invasive species, Himalayan balsam and bracken on the banks is recommended for this site, with possible water quality issues to investigate with epiphytic algal cover of rocks in the RHS survey, probably due to enrichment.

Figure 17. Photo of Wye, Treflyn, at the midpoint across the channel

Figure 18. Photo of Wye, Treflyn, at the midpoint facing upstream

Figure 19. Photo of Wye, Treflyn, at the midpoint facing downstream

Clywedog Brook, Brynllygoed

This site was located on the Clywedog Brook at SO0818967209. The brook is generally tree lined and flowing through a relatively shallow valley with hills covered in fields and patches of woodland to either side. There is a minor road aligned nearby to the east of the watercourse and a few farms scattered around. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 20, 21 and 22 respectively.

The water was approximately 9 m wide in the 100 m macrophyte survey and on average 0.5 m deep. The flow was fast, high and turbid following heavy rain, and so this site should be resurveyed. There was a sidebar at the downstream end that had water over it. Both banks were heavily shaded by trees. There was some bedrock, but the majority of the substrate was estimated to be pebble/gravel, with 20 % boulders/cobble and some sand and silt. Moss was collected from marginal rocks and from submerged wood pulled up from the bed using a grapnel, but no other submerged macrophytes could be seen. Only one species of emergent narrow leaved macrophytes was recorded with a low cover value, reed canary grass (*Phalaris arundinacea*). No filamentous algae were observed, but due to the turbidity this may not be reliable.

In the RHS, the left bank had no trees on the bank top and the profile was trapezoidal at the midpoint and upstream of that for 150 m, but mature trees were present on the bank face along with lots of young hazel trees. Trees mostly present on the bank faces in this survey length. This indicates that the bank had been modified, and so re-sectioning was recorded as extensive on the left bank. Poaching was present on both banks, but not extensive. There were two field drains emptying onto the right bank approximately 20 m from the water's edge creating wet marshy areas, and there was a minor bridge, but no other artificial features. At the downstream end of the survey, the river was fenced on both banks so was inaccessible. The HMS class was 3 due to the re-sectioning and poaching.

In the Simplified Phase 1, the Evaluated Corridor Section (ECS) Score was 5, the highest category, primarily because of the presence of unimproved and good semi-improved pasture and trees. Both banks had continuous trees on the bank faces and/or bank tops. The surrounding land was used for sheep grazing. Reprofiling of previously re-sectioned banks to a more natural profile, or allowing them to degrade where it is safe to do so, is recommended, along with movement of fencing away from the bank top in the downstream section of the RHS to allow a more natural vegetation to establish and create a buffer zone.

Figure 20. Photo of Clywedog, Brynllygoed at the midpoint across the channel

Figure 21. Photo of Clywedog, Brynllygoed at the midpoint facing upstream

Figure 22. Photo of Clywedog, Brynllygoed at the midpoint facing downstream

Ithon, d/s A485 road bridge

The midpoint for this site in the Ithon was located approximately 135 m upstream of the A485 road bridge at grid reference SO1050968204. The Ithon is a major tributary of the Wye on its left bank. This site is in the middle reaches of the Ithon where there are large fields on rolling hills, with patches of woodland, some farmsteads and an area of urbanisation. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 23, 24 and 25 respectively.

At the macrophyte survey site, the river channel was approximately 10 m wide and mostly shallow, with narrow side bars on both banks and a point par on the right bank. The substrate consisted predominantly of cobble with gravel/pebble, with riffle-run habitats. The water was brown in colour but not turbid. There were signs of recent dredging of the channel with cobble/pebble/gravel piled up on the left bank face at the downstream end of the site.

There were no bryophytes and no submerged macrophytes seen at the site, possibly due to the recent disturbance. Filamentous algae were present over approximately 20 % of the site and epiphytic algae cover was extensive. As the survey was conducted in an impacted area following dredging, the results should be treated with caution as they are unlikely to be representative of the site as a whole.

There were trees shading the downstream section of the left bank and stands of emergent narrow leaved vegetation along the margins of the upstream section. On the right there were areas of slumped bank and patches of emergent reeds/herbs including common

spike-rush (*Eleocharis palustris*), common reed canary grass (*Phalaris arundinacea*) and branched bur-reed (*Sparganium erectum*). The surrounding land was used for grazing sheep and cattle.

In the 500 m River Habitat Survey length, there was re-sectioning of the banks for most of the survey length, and some reinforcement associated with the road bridge. There was also a minor ford in the survey site. There was no poaching on either bank despite livestock being present, possibly due to the protection from woodland on the left bank and the presence of eroding vertical banks on the right, and a ford that would allow easier access for livestock. The right bank had clearly been modified in the past with a level bank top downstream of the bridge and no trees along the bank. However, it was eroding, and bare cliffs were present. Himalayan balsam was present on both the bank face and the bank top.

This site had an HMS class of 5, indicating a heavily modified site, mainly due to the re-sectioning at this site. Whilst this was mainly historic, and at other sites was not recorded as such due to the channel recovering, there was evidence of recent dredging at this site, and the trapezoidal bank profile was not degenerating.

Low scoring poor semi-improved grassland dominated the simplified phase one survey, but the site attained a moderate score thanks to the presence of high scoring woodland. Any unauthorised alterations to the watercourse should be investigated and remediation measures put in place. Reprofiling of previously re-sectioned banks to a more natural profile or allowing them to degrade where it is safe to do so, is recommended. Control of the invasive Himalayan balsam is also recommended, and whilst poaching was not a particular issue at this site, the vegetation was grazed up to the bank top so fencing set away from the bank top would allow creation of a buffer strip.

Figure 23. Photo of Ithon, d/s A485 road bridge, at the midpoint across the channel

Figure 24. Photo of Ithon, d/s A485 road bridge, at the midpoint facing upstream

Figure 25. Photo of Ithon, d/s A485 road bridge, at the midpoint facing downstream

Ithon, Dolberthog

This site on the Ithon was located approximately 375 m downstream of a sewage treatment works at Dolberthog Farm, with the midpoint at grid reference SO0460060400. This site is in the lower reaches of the Ithon downstream of Llandrindod Wells where the channel twists and turns through a landscape of fields with patches of woodland, some farmsteads, and a sewage treatment works on the left bank. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 26, 27 and 28 respectively.

The river channel was approximately 10 m wide with a mean depth of 0.5 m in the 100 m macrophyte site. The substrate consisted predominantly of bedrock, with gravel/pebble and cobble elsewhere. The habitat was riffle-run, with run dominant. There was semi continuous cover of trees with mainly dense cover on the right bank and half with dense cover on the left bank.

The macrophyte cover consisted mainly of algae, including filamentous algae, a red thalloid algae (*Hildenbrandia rivularis*) and a stiff bristle-like alga (*Lemanea fluviatilis*), and bryophytes, with only one small specimen of river water-crowfoot (*Ranunculus fluitans*), and some emergent reeds/herbs including reed canary grass (*Phalaris arundinacea*) and hemlock water-dropwort (*Oenanthe crocata*).

In the downstream section of the 500 m RHS survey length, the ground was very level with no trees on bank top and similarly aged alders along the bank face. This indicates that the bank was re-sectioned in past but the river bank has become naturalized, so was not

recorded as re-sectioned in the survey. Himalayan balsam was present on the bank face and extensive on the bank top. The HMS class was 2, as no artificial features were recorded, but the channel was noted as having possibly been realigned and over deepened.

The surrounding land is used for grazing sheep, and whilst the presence of broad-leaved woodland meant the simplified phase one score was moderate, the high scoring unimproved pasture recorded in the upstream section on the right bank was a narrow strip with improved grassland beyond the bank top. Creation of a wider buffer strip along the bank top is recommended to enhance the quality of the channel and protect the water quality. Control of the invasive Himalayan balsam is also recommended at this site.

Figure 26. Photo of Ithon, Dolberthog, at the midpoint across the channel

Figure 27. Photo of Ithon, Dolberthog, at the midpoint facing upstream

Figure 28. Photo of Ithon, Dolberthog, at the midpoint facing downstream

Ithon, Disserth

The midpoint of this site on the Ithon was located at Disserth Caravan Park, at grid reference SO0336558435. This site is also on the lower reaches of the Ithon, further downstream. The channel twists and turns through a landscape of fields with patches of woodland, a couple of caravan parks and steep wooded banks in places. The channel has cobbles and gravels deposited as side bars and exposed rocks. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 29, 30 and 31 respectively.

In the macrophyte site the river channel was approximately 17 m wide with a mean depth of 0.1 m. The substrate consisted predominantly of boulder/cobble with gravel/pebble and 1 % bedrock. The habitat was mainly run with some riffle. There was semi continuous cover of trees with mainly dense cover on the right bank and continuous broken shade cover on the left bank.

The macrophyte cover consisted mainly of algae, including filamentous algae, a red thalloid algae (*Hildenbrandia rivularis*) and a stiff bristle-like alga (*Lemanea fluviatilis*), and bryophytes, and stream water-crowfoot (*Ranunculus penicillatus* subsp. *pseudofluitans*). There were some emergent reeds/herbs at low cover values and free-floating duckweed (*Lemna minor*) was also present. Filamentous algae covered approximately 15 % of the bed, mainly at the downstream end.

In the RHS survey length, the right bank was steep and wooded, and there was a caravan site along most of the left bank. Artificial features noted were a major bridge and a major deflector, but no artificial bank was noted other than poaching of both banks. Impacts include agriculture and the presence of the caravan site, with moving of the left bank noted as recent management. The caravan site manager informed us that there were otters along this section of bank but none were seen on this visit. Himalayan balsam was present on both the bank face and the bank top. The HMS class was 3, mainly due to the presence of the caravan park on its banks.

The surrounding land is used for grazing sheep, the presence of poor improved grassland and amenity and improved grassland meant the simplified phase one score was moderate despite the presence of broad-leaved woodland on the right bank. Recommendations for this site include control of the Himalayan balsam and creation of a buffer strip within the caravan park where caravans and their decks are sited right up to the bank top in places. Control of the invasive Himalayan balsam is also recommended at this site.

Figure 29. Photo of Ithon, Disserth, at the midpoint across the channel

Figure 30. Photo of Ithon, Disserth, at the midpoint facing upstream

Figure 31. Photo of Ithon, Disserth, at the midpoint facing downstream

Wye, confl Ithon.

The midpoint of this site on the Wye was approximately 500 m downstream of the confluence with the Ithon at grid reference SO0110055900. This is a fairly straight reach within a meandering sinuous section of the River Wye in a wide flat-bottomed valley with hills rising up beyond large fields on either side. The left bank is high, steep and wooded, and there are continuous trees along the right bank. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 32, 33 and 34 respectively.

In the macrophyte survey, the river channel was approximately 35 m wide and 0.4 m deep. The water was brown coloured and fast flowing following heavy rain, so access was restricted making the assessment of submerged macrophytes difficult. This site has been recommended for re-survey for this reason.

The substrate was estimated to be 40 % bedrock in the 100 m macrophyte survey site, with a mix of mainly boulder/cobble and gravel/pebble elsewhere. The left bank was steep, and tree covered and was completely shaded by trees with a mixture of broken and dense shade, whilst 20 % of the right bank was unshaded. There were vegetated sidebars on the right bank and there was a marginal strip of the emergent marginal plant reed canary grass (*Phalaris arundinacea*) along the left bank.

Where wading was possible, no filamentous algae or submerged macrophytes other than a few bryophytes were observed. Use of a grapnel in deeper areas did not yield any

macrophytes. Ten species of emergent marginal macrophytes were present, some truly aquatic, and some amphibious species.

In the 500 m RHS, there were no artificial features present, and the left bank was largely unmodified other than some localized re-sectioning, but the right bank had extensive re-sectioning and had some poaching. There was a vegetated sidebar along most of the right bank. The HMS class was 3.The alien invasive species Himalayan balsam was present on the bank face.

Despite the broadleaved woodland which scores highly present on the left bank, the SERCON score was only 3, the middle category of the simplified phase one habitat survey due to the dominance of poor semi-improved grassland on the right bank with arable land behind a footpath and narrow strip of hazel trees on the bank face. The surrounding land use was agricultural with crops and sheep grazing. Recommendations for this site include control of the invasive Himalayan balsam and creation of a wider buffer strip along the bank top where appropriate.

Figure 32. Photo of Wye, confl Ithon, at the midpoint across the channel

Figure 33. Photo of Wye, confl Ithon, at the midpoint facing upstream

Figure 34. Photo of Wye, confl Ithon, at the midpoint facing downstream

Dulas Brook, Cwmbach

This site was located approximately 300 m upstream of Cwmbach Bridge on the Dulas Brook, a tributary of the River Wye, at grid reference SO0313254121. The brook is small with a boulder/cobble bed flowing mainly through woodland in this reach with tree lined banks where it flows through fields. There is a railway running alongside to the west of the brook and a few scattered farm buildings. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 35, 36 and 37 respectively.

In the macrophyte survey 100 m, the watercourse was small, approximately 2.5 m wide and 0.1 m deep with a few deeper pools. The substrate was cobble with some gravel/pebble, dominated by riffle.

The banks had mainly broken shade with some dense shade from tree cover on the right bank but only 30 % broken and dense shade combined on the left bank. There was woody debris from tree cutting dumped in the channel at the midpoint of the survey. The surrounding land was used for pasture with some farm buildings.

Fine silt and diatoms were noted coating rocks and the channel bed in a fine layer so the form of the substrate could still be seen beneath. There were very little filamentous algae, some moss, but no higher plants in channel although some narrow leaved and broad leaved macrophytes were present on the sidebar and bank face. Six species of bryophyte were recorded and five types of algae including a red thalloid algae (*Hildenbrandia rivularis*).

In the RHS survey, artificial features included a minor bridge, a minor weir and a ford. There was some localized bank re-sectioning noted, an area of embankment, and poaching of the banks was recorded, with bare bank in places, but most of the bank was considered to be natural with various features including stable and eroding cliffs, sidebars and point bars. The HMS class was 3, mainly due to the artificial features recorded.

The surrounding land is used for agriculture, and the presence of poor improved grassland and some bracken meant the simplified phase one score was moderate despite the presence of broad-leaved woodland. Fencing in places, set away from the bank top to allow a natural strip of vegetation would reduce the bank poaching, and maybe also reduce the siltation seen in the channel.

Figure 35. Photo of Dulas Brook, Cwmbach, at the midpoint across the channel

Figure 36. Photo of Dulas Brook, Cwmbach, at the midpoint facing upstream

Figure 37. Photo of Dulas Brook, Cwmbach, at the midpoint facing downstream

Wye, Builth Rd

The midpoint of this site on the River Wye was approximately one kilometre upstream of a railway bridge at grid reference SO0182553453. This is a fairly straight low energy reach of the River Wye in a wide flat-bottomed valley, curving gently around Builth Road as it flows southwest towards Builth Wells, with large fields on either side. Both banks are low with fairly continuous trees and patches of woodland. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 38, 39 and 40 respectively.

The water was approximately 50 m wide with an additional 15 m berm/sidebar within the channel which had a predominantly cobble and gravel/pebble substrate. The left bank had predominantly broken shade, whilst the right bank was mostly unshaded.

The main flow type in the macrophyte 100 m survey was ‘run’ with slack areas. Whilst the water depth was mostly in the 0.5 – 1 m depth category. The flow was fast which made the survey difficult and means it is likely that some submerged macrophytes and algae cover may have been missed. This is one of a number of sites recommended for re-survey earlier in the year when conditions are more favourable.

The macrophyte community included a few bryophytes, mainly alpine water-moss (*Fontinalis squamosa*) and greater water-moss (*F. antipyretica*), and the only other submerged macrophyte was stream water-crowfoot (*Ranunculus penicillatus* subsp. *pseudofluitans*). Several species of emergent reeds/herbs were recorded with low cover

values from a band of marginals along the edge of the berm. There was 2 % cover of filamentous algae observed.

In the 500 m River Habitat Survey length, 50 % or more of both banks had been re-sectioning and embankment was extensive on the left bank. At the midpoint, there was a berm along the right bank. Trees were fairly continuous on both bank faces except for the upstream section of the right bank where trees were regularly spaced on the bank top. Poaching was present on both banks. Both bank tops were predominately improved, and amenity grassland and the surrounding land was used for sheep grazing. Himalayan balsam was present on the bank face and the bank top. The HMS class was 3 due mainly to re-sectioning and embankment on part of the left bank. Historic re-sectioning on the right bank was not included as it was considered to be becoming naturalised.

This site is therefore impacted by agricultural use, historic bank re-sectioning and embankment. Recommendations at this site are to control the invasive Himalayan balsam and allow the re-sectioned banks to degenerate naturally, or reprofile to a more natural shape as appropriate. As mentioned at other sites, fencing should ideally be set back away from the bank top to allow more natural vegetation to create a buffer strip.

Figure 38. Photo of Wye, Builth Rd, at the midpoint across the channel

Figure 39. Photo of Wye, Builth Rd, at the midpoint facing upstream

Figure 40. Photo of Wye, Builth Rd, at the midpoint facing downstream

Edw, Cregrina

The proposed monitoring site midpoint was located approximately 200 m upstream of a road bridge at grid reference SO1248252989. This location was used as the midpoint for the RHS, but the macrophyte monitoring site was moved to the downstream end of the survey length to grid reference SO1245753167 because the site monitored in 2012 was fenced on both banks and had steep eroding cliffs, which combined with high flows meant access was not possible. The Edw is a small sinuous tree-lined watercourse in a field covered sloping valley with mountains further out either site. It flows into the Wye on the left bank. Photographs taken at the midpoint facing downstream, and from the road bridge facing upstream and downstream are presented in figures 41, 42 and 43 respectively.

In the 100 m macrophyte survey the river channel was approximately 5 m wide with an average depth of 0.5 m at the midpoint. The substrate consisted predominantly of boulders/cobbles with some gravel/pebble with riffle-run habitats and a pool associated with an eroding cliff on the right bank. The banks were mostly unshaded with some broken and dense shading on the left, and 50 % broken and dense shading on the right. There was very little macrophyte cover, with low cover of 6 species of bryophytes including St Winifrid's moss liverwort (*Chiloscyphus polyanthos*), but no water crowfoot (*Ranunculus sp.*) or other submerged vascular plants. There were a few emergent tall grasses and herbs, mainly hemlock water-dropwort (*Oenanthe crocata*). There was a low cover of filamentous algae observed in the monitoring site, approximately 4 % and the red algae *Hildenbrandia rivularis* was present.

In the longer RHS reach, the banks were considered to be natural with the only re-sectioning associated with a minor road bridge which was the only artificial feature recorded. No poaching of the banks was observed, probably due to the fencing. The vegetation groups present were bryophytes, emergent broad-leaved herbs, emergent reeds/sedges/rushes, free floating and filamentous algae. Himalayan balsam was present on both the bank face and the bank top. The HMS class was 2 due to the presence of a road bridge with its associated bank reinforcement. Historic re-sectioning at the downstream end was considered to be re-naturalised.

In the Simplified Phase 1, The Evaluated Corridor Section (ECS) Score was 4, the second highest category because of the presence of trees, and unimproved and semi-improved grassland, but there was also some poor semi-improved grassland. The surrounding land was used for sheep grazing. Whilst there is fencing at this site and consequently no bank poaching was present, creation of a wider river corridor by moving the fencing away from the bank top to allow ungrazed vegetation to grow would be considered beneficial.

Figure 41. Photo of Edw, Cregrina, at the midpoint facing downstream

Figure 42. Photo of Edw, Cregrina, from the road bridge facing upstream

Figure 43. Photo of Edw, Cregrina, from the road bridge facing downstream

Irfon, Llangammarch

This site midpoint was located on the River Irfon, approximately 800 m downstream of the Llangammarch Wells road-bridge, at grid reference SN9422847632. The Irfon is a major tributary of the River Wye flowing west to east in a wide, flat-bottomed valley with its confluence on the right bank. The watercourse is mostly tree lined with fields either side and patches of woodland, some on steep banks just downstream of this site. Bedrock is present in the channel and is also sometimes exposed at the margins. There were high flows after heavy rain prior to the survey, and the fact the water was brown in colour, made viewing the bed and submerged macrophytes difficult. This is one of a number of sites recommended for re-survey earlier in the year when conditions are more favourable. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 44, 45 and 46 respectively.

The channel in the 100 m macrophyte survey was approximately 18 m wide, and quite deep with high flows meaning not all areas were wadable. The substrate was dominated by bedrock, with a mix of boulder/cobble and gravel/pebble elsewhere. Both banks were heavily shaded by trees. The macrophyte community was dominated by bryophytes including the water mosses *Fontinalis antipyretica* and *F. squamosa*, *Rhynchostegium riparioides* and *Hygrohypnella ochracea*, and two species of liverwort.

Filamentous algae were present in 1 % of the monitoring site. One species of submerged fine leaved macrophyte, a starwort (*Callitriche* sp.), and a couple of emergent marginal plants were also present.

In the RHS, it was noted that the left bank was heavily poached and re-sectioned in places. The right bank had extensive re-sectioning. The alien invasive species Japanese Knotweed was present on the bank top and bank face, and another, Himalayan Balsam, was present on the bank face. Major impacts noted were agriculture and bank poaching.

The banks had been historically re-sectioned as they were trapezoidal in shape with no trees on bank top, but continuous trees along the bank faces. Where this was breaking down and becoming more natural in places, it was recorded as natural bank. The HMS class was 3 mainly due to the historic re-sectioning.

The surrounding land was used for grazing sheep, and low scoring poor semi-improved grassland dominated the simplified phase one survey bank, with some wooded areas and good semi-improved grassland on the right bank, so the score was 2, the second lowest for the simplified phase one survey. Recommendations for this site are to control the invasive species Japanese Knotweed and Himalayan balsam and allow the historic re-sectioning to degrade and become more naturalised, a process which is already happening at this site. Fencing set away from the left bank top if possible is also recommended to protect the bank from the heavy poaching observed.

Figure 44. Photo of Irfon, Llangammarch, at the midpoint across the channel

Figure 45. Photo of Irfon, Llangammarch, at the midpoint facing upstream

Figure 46. Photo of Irfon, Llangammarch, at the midpoint facing downstream

Irfon, u/s Halfrena

The midpoint of this site was located on the River Irfon, at grid reference SN9795049195, approximately 1.5 km of the Halfrena entering the Irfon on the left bank. This site is similar in character to the previous site at Llangammarch 6 km upstream approximately. There were high flows after heavy rain prior to the survey, but further heavy rain was forecast so the survey was continued. The water was brown in colour, making viewing the bed and submerged macrophytes difficult. This is one of a number of sites recommended for re-survey earlier in the year when conditions are more favourable. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 47, 48 and 49 respectively.

The channel in the 100 m macrophyte survey was approximately 20 m wide, with exposed bedrock along the right bank, and quite deep with high flows meaning not all areas were wadable. The substrate was dominated by bedrock, with a mix of boulder/cobble, gravel/pebble and sand elsewhere. Both banks were heavily shaded by trees. Filamentous algae were present in 1 % of the monitoring site. The macrophyte community was dominated by the bryophyte *Rhynchostegium riparioides* and the emergent marginal plant reed canary grass (*Phalaris arundinacea*). A few other marginal species were present too, but no other submerged macrophytes were seen.

In the RHS, the banks were recorded as natural, not re-sectioned, although the left bank may have been reshaped in the past, but there was some poaching in places. No artificial features were present. The alien invasive species Japanese Knotweed and Himalayan balsam were present on the bank face. Agriculture was noted as a major impact. The HMS class was 2, due to poaching of the banks.

The surrounding land was used for grazing sheep, and low scoring poor semi-improved grassland dominated the simplified phase one survey on the left bank, with broadleaved woodland dominating the right bank, so the score was 3, the middle category of the simplified phase one survey. Recommendations for this site are to control the invasive species Japanese Knotweed and Himalayan balsam and allow the historic re-sectioning to degrade and become more naturalised, a process which is already happening at this site. Fencing, set away from the bank tops if possible, is also recommended to protect the bank from the heavy poaching observed.

Figure 47. Photo of Irfon, u/s Halfrena, at the midpoint across the channel

Figure 48. Photo of Irfon, u/s Halfrena, at the midpoint facing upstream

Figure 49. Photo of Irfon, u/s Halfrena, at the midpoint facing downstream

Irfon, Caer Beris Builth Wells

This site midpoint was located on the River Irfon, at Caer Beris to the west of Builth Wells, at grid reference SO0309250698. There were wooded areas in addition to the urban encroachment of Builth Wells around this sinuous section in the lower reaches of the watercourse which had areas of exposed bedrock. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 50, 51 and 52 respectively. There were high flows after heavy rain prior to the survey, but further heavy rain was forecast so the survey was continued. The water was brown in colour, making viewing the bed and submerged macrophytes difficult. This site is recommended for re-survey earlier in the year when conditions are more favourable.

The channel in the 100 m macrophyte survey was approximately 35 m wide, and quite deep with high flows meaning not all areas were wadable. There was exposed bedrock in the channel along the left bank for up to a third of the channel width. The substrate was dominated by bedrock, but covering less than half the channel, with a mix of boulder/cobble and gravel/pebble elsewhere. Both banks were heavily shaded by trees.

Filamentous algae were present in 1 % of the monitoring site. The macrophyte community was dominated by bryophytes with five species recorded including *Hygrohypnella ochracea*, and the emergent marginal plant reed canary grass (*Phalaris arundinacea*). A few other marginal species were present too, but no other submerged macrophytes were seen.

In the 500 m RHS, the banks were mainly recorded as natural, not re-sectioned, although the left bank may have been reshaped in the past, but there was some poaching in places and a small amount of re-sectioning and reinforcement at the downstream end resulted in an HMS class of 2, although no artificial features were present. The alien invasive species Japanese Knotweed and Himalayan balsam were present on the bank face. Agriculture was noted as a major impact.

Broadleaved woodland dominated both banks, so the score was 5, the highest category of the simplified phase one survey. However, beyond this, both banks had amenity grassland in the upstream section of the survey, and there was suburban development on the right bank in the downstream section. Recommendations for this site are to control the invasive species Japanese Knotweed and Himalayan balsam.

Figure 50. Photo of Irfon, Caer Beris Builth Wells, at the midpoint across the channel

Figure 51. Photo of Irfon, Caer Beris Builth Wells, at the midpoint facing upstream

Figure 52. Photo of Irfon, Caer Beris Builth Wells, at the midpoint facing downstream

Wye, Builth Wells

The midpoint of this survey site was located approximately 450 m downstream of the A483 road bridge on the River Wye and 1.3 km downstream of the Irfon confluence, at grid reference SO0450051500. The Builth showground is to the north and Builth Wells is to the southwest. This section of the River Wye in mid Wales appears to have been straightened. This is one of a number of sites recommended for re-survey earlier in the year when conditions are more favourable. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 53, 54 and 55 respectively.

The channel in the 100 m macrophyte survey was approximately 65 m wide with no trees shading the left bank but mainly broken shade on the right bank. The riverbed was dominated by a cobble, gravel/pebble, and the flow was mainly run habitat. There was a vegetated mid-bar in the channel from downstream of the midpoint to beyond the downstream limit. The water was mainly in the 0.25 - 0.5 m and 0.5 – 1 m depth categories and the flow was fast making wading unsafe. It is possible that some submerged species were missed in this survey and/or cover values may be inaccurate.

Filamentous algae were observed covering approximately 2 % of the channel, and the red algae (*Hildenbrandia rivularis*) was present. There were a few bryophytes, and a small specimen of stream water-crowfoot (*Ranunculus penicillatus* subsp. *pseudofluitans*).

The channel was probably over widened but the bed was fairly natural, so it was not recorded as re-sectioned in the River Habitat Survey. Brown diatoms/algae were noted as covering most of channel, but there was very little filamentous algae or *Ranunculus* sp. seen throughout the 500 m length. Emergent reeds/grasses sedges were present all along the left bank in a thin strip and there were patches on right bank. There was ungrazed grass on the left bank face with tall herbs, and short grass on bank tops for most of survey length. Himalayan balsam was present on the bank face and the bank top at this site. The HMS class was 3 due mainly to historic realignment of the channel. The banks were considered to be becoming naturalised despite the presence of historic re-sectioning, and there were no artificial features or bank reinforcement recorded.

The surrounding land was used for sheep grazing, with a sewage treatment works on the right bank, and urban development including a road bridge just upstream.

Recommendations for this site are to control the invasive Himalayan balsam and allow the historic resectioning to degrade and become more naturalised or recreate a more varied bank profile as appropriate.

Figure 53. Photo of Wye, Builth Wells, at the midpoint across the channel

Figure 54. Photo of Wye, Builth Wells, at the midpoint facing upstream

Figure 55. Photo of Wye, Builth Wells, at the midpoint facing downstream

Wye, Erwood

The monitoring site midpoint was at Erwood on the River Wye, approximately 12 km downstream of Builth Wells at grid reference SO0980043300. This section of the River Wye lies in a valley with numerous small tributaries flowing down from the steep hills either side of the valley, including the Cletwr Brook which flows through a wooded valley and has its confluence at Erwood. This is one of a number of sites recommended for re-survey earlier in the year when conditions are more favourable as the flows were fast. Two photographs taken at the midpoint are presented in figures 56, 57, one of the areas behind the sidebar in figure 59, and photographs facing upstream and downstream are presented in figures 60 and 61 respectively.

In the 100 m macrophyte survey length, the river channel was approximately 30 m wide, with the depth mostly in the 0.25 - 0.5 m category. The left bank had a large cobble/gravel sidebar along the whole length with approximately 70 % of the bank shaded whilst the right bank was steep and also 70 % shaded. The substrate was predominantly boulder/cobble with gravel/pebble with cobble and sand. The habitat type was predominantly riffle-run, and the dominant vegetation was greater water-moss (*Fontinalis antipyretica*), slender tufted-sedge (*Carex acuta*) and reed canary grass (*Phalaris arundinacea*). There were a couple of other bryophytes and several emergent marginal macrophytes present at low cover values, but there were no other submerged macrophytes recorded. There was a minimal amount of filamentous algae observed in the monitoring site at 0.5 % cover.

The land use on the left bank was grazing pasture, and on the right, a residential area in the upstream section, with pasture beyond and a small water treatment works downstream of the midpoint.

In the RHS, the banks were mainly recorded as natural, not re-sectioned, although the right bank may have been reshaped in the past because the mid-section appeared very straight, the trees were of a similar age and were regularly spaced. In the downstream section of the RHS survey, there was a massive shingle deposit along left bank with a low area between it and the bank that had a pool of water in which not connected at downstream end. The bank top was 1 m above the trees along the water's edge with no trees on the bank top in the upstream section, indicating that this section may have been re-sectioned. The bank has degraded since so it was not recorded as re-sectioned. There was some poaching in places and a small amount of re-sectioning noted at the downstream end. No artificial features were present, and the HMS class was 2. The alien invasive species Japanese Knotweed and Himalayan balsam were present on the bank face. Agriculture and bank poaching were noted as major impacts.

Broadleaved woodland which scores highly and improved and amenity grassland which scores zero were present in roughly equal amounts, so the score was 3, the middle category of the simplified phase one habitat survey. However, beyond this, was agricultural use and there was suburban development, sometimes up to the edge of the bank top, on the right bank.

Control the invasive species Japanese Knotweed and Himalayan balsam is recommended at this site. It is also recommended that the historic resectioning is allowed to continue to degrade and become more naturalised, a process which is already happening at this site. Fencing, set away from the bank top, if possible, is also recommended to protect the bank from the poaching observed.

Figure 56. Photo of Wye, Erwood, at the midpoint across the channel (1)

Figure 57. Photo of Wye, Erwood, at the midpoint across the channel (2)

Figure 58. Photo of Wye, Erwood, behind side bar at midpoint

Figure 59. Photo of Wye, Erwood, at the midpoint facing upstream

Figure 60. Photo of Wye, Erwood, at the midpoint facing downstream

Wye, Boughrood

The midpoint of this site on the River Wye was located at Boughrood, approximately 8 km downstream from the site at Erwood at grid reference SO1373238569. The channel is sinuous in this reach, in a wide-open valley with fields either side and small areas of urban habitation on either bank upstream. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 61, 62 and 63 respectively.

The water level and flow rates were high, and the water was turbid following recent heavy downpours, but further rain forecast, and end of season was imminent, so we continued with the survey from the bank after consulting with NRW, ensuring it was safe to do so. No water was entered where flow was dangerous.

In the macrophyte monitoring site, the river channel was approximately 75 m wide, with the depth mostly in the 0. 5 - 1 m category. No deeper water was recorded, but this was due to difficulty with access due to fast flows. The water was brown and turbid following heavy rain, but there was no option to reschedule due to the forecast for further rain and the imminent end of the survey season. Submerged macrophytes were not visible, it was not possible to wade across the channel, and use of a grapnel did not yield any macrophytes. It is recommended that this survey is repeated as it was conducted in spate conditions through necessity, and so the results are not representative. Visiting the site allowed for access, suitability and mapping to be conducted none the less.

The left bank had a high wooded bank with a footpath along the top, and a narrow shelf along the water margin along for most of the length with 100 % shading whilst the right

bank was lower but also wooded with 90 % shading. The substrate was estimated to be boulder/cobble with gravel/pebble and the habitat type was run. Along the margins, three bryophyte species were recorded, including smaller lattice-moss (*Cinclidotus fontinaloides*) and (*Rhynchostegium riparioides*) ten species of emergent marginal macrophytes including reed canary grass (*Phalaris arundinacea*) as the species with the highest cover value. There was a minimal amount of filamentous algae observed in the monitoring site at 0.1 % cover but this was an estimate as most of the site was not visible.

For the 500 m RHS, access along left bank was by a footpath along high bank top, with access down to and along the water's edge in several places.

No bank modifications other than some localized re-sectioning and a small amount of bank poaching, and no artificial features were recorded in this survey and the HMS class was 2. The alien invasive species Japanese Knotweed and Himalayan balsam were present on the bank face.

Broadleaved woodland which scores highly was recorded at all but one spot check of the RHS survey, where scrub and bracken was recorded, so the score was 5, the highest category of the simplified phase one habitat survey. However, beyond this, was agricultural use with sheep grazing on improved grassland.

Control the invasive species Japanese Knotweed and Himalayan balsam is recommended at this site.

Figure 61. Photo of Wye, Boughrood, at the midpoint across the channel

Figure 62. Photo of Wye, Boughrood, at the midpoint facing upstream

Figure 63. Photo of Wye, Boughrood, at the midpoint facing downstream

Wye, Glasbury

This site midpoint was located at Glasbury, approximately 850 m upstream of the A438 road bridge, at grid reference SO1730139118. This site was 4 km downstream from the site at Boughrood, and the channel was sinuous in this reach, with fields either side and the town of Glasbury on both banks with a road bridge linking the 2 sides at the downstream end. Photographs taken facing across the channel, and at the midpoint facing upstream and downstream are presented in figures 64, 65 and 66 respectively.

The river channel was approximately 40 m wide and very deep in the macrophyte survey length. This meant that only a narrow strip near the left bank could be surveyed. Rip rap deflectors were present along the whole of the left bank at approximately 10m intervals, some of which had deteriorated. The substrate was predominantly boulder/cobble, with run type habitat.

There was low filamentous algae (*Cladophora sp.*) cover of 0.1 % of the monitoring site that was possible to see. Epiphytic algae cover meant the bed was slippery and combined with fast flows and cloudy water, it was difficult to survey the site. The extent of algae and submerged bryophyte and higher plant cover may be more extensive. This is one of a number of sites recommended for re-survey earlier in the year when conditions are more favourable. On this survey, two moss species including greater water-moss (*Fontinalis antipyretica*) and four emergent narrow leaved macrophytes including slender tufted-sedge (*Carex acuta*) and common spike-rush (*Eleocharis palustris*) were present at the site. No other submerged macrophytes were recorded including *Ranunculus* species which were recorded near this site in 2012.

The channel was historically extensively realigned in the RHS. The banks had a trapezoidal profile with no mature trees on the bank tops. There were extensive eroding cliffs on left bank despite the numerous riprap deflectors, with burrows in one section. The channel was wide and had low energy flow types despite recent rain so was recorded as re-sectioned throughout. There was also some set back embankment present at downstream end, presumably to protect the houses just downstream. There were no other artificial features present other than the deflectors. The HMS class was 5 mainly due to the numerous deflectors, but also because of bank re-sectioning. It will take further time and/or restoration for the historic re-sectioning of the banks to become fully naturalised.

The surrounding land was used for sheep grazing and scored 0 in the simplified phase one habitat survey, the land use being mainly in the improved and amenity grassland category. This site has been impacted by channel modification and loss of bank top habitat.

Figure 64. Photo of Wye, Glasbury, across the channel

Figure 65. Photo of Wye, Glasbury, at the midpoint facing upstream

Figure 66. Photo of Wye, Glasbury, at the midpoint facing downstream

Wye, d/s Hay

The survey site midpoint was approximately 450 m downstream of Hay Bridge in Hay-on-Wye at grid reference SO2300043000. This is the furthest downstream site surveyed on the River Wye and is in a wide-open valley with fields on both sides and the town of Hay-on-Wye on the right bank. Photographs taken at the midpoint facing across the channel, upstream and downstream are presented in figures 67, 68 and 69 respectively.

The water level and flow rates were high, and the water was turbid following recent heavy downpours, but further rain forecast, and end of season was imminent, so we continued with the survey from the bank after consulting with NRW, ensuring it was safe to do so. No water was entered where flow was considered to be dangerous. The river channel was approximately 60 m wide and 0.75 m deep in the macrophyte survey 100 m length. No deeper water was recorded, but this was due to difficulty with access due to fast flows. The water was brown and turbid following heavy rain, but there was no option to reschedule due to the forecast for further rain and the imminent end of the survey season. Submerged macrophytes were not visible, it was not possible to wade across the channel, and use of a grapnel did not yield any macrophytes. It is recommended that this survey is repeated as it

was conducted in spate conditions through necessity, and so the results are not representative. Visiting the site allowed for access, suitability and mapping to be conducted none the less.

The substrate was estimated to be 30 % bedrock, 20 % boulder/cobble and 30 % gravel/pebble using a ranging pole to probe the bed and aerial imagery from times of lower flow. The left bank was mostly shaded by trees along the bank, whilst the right bank was mostly unshaded. There was a large gravel/pebble/cobble sidebar along half of the right bank. This was mainly colonized by terrestrial plants at the upstream end, with pools and aquatic/amphibious plants downstream.

The left bank had a steep wooded bank whilst the right bank was lower and was mostly improved grassland along the bank top. No filamentous or other algae, no bryophyte species and no submerged higher plants were recorded due to the difficulty in surveying. Seven species of emergent marginal macrophytes were present, with reed canary grass (*Phalaris arundinacea*) dominant species in terms of cover.

In the 500 m RHS, there were no bank modifications on the left bank other than some localized re-sectioning, but the right bank was re-sectioned and had some reinforcement associated with a car park, and some poaching. Trees were present on the right bank on bank face but there were none on bank top. There was a sidebar along the whole survey length on the right bank. Emergent narrow leaved vegetation seen within the channel in places that would likely be vegetated rocks or mid-bars in lower flows. No artificial features were recorded in this survey and the HMS class was 2, mainly due to the localised bank reinforcement and re-sectioning. The alien invasive species Himalayan balsam was present on the bank face.

Despite the broadleaved woodland which scores highly present on the left bank, the score was only 3, the middle category of the simplified phase one habitat survey, mainly due to the dominance of poor semi-improved grassland on the right bank and the carpark at the upstream limit. The surrounding land use was agricultural with sheep grazing on improved grassland. There was urban development 100 m from the water’s edge on the right bank, and upstream of the survey site, and a small sewage treatment works downstream.

Figure 67. Photo of Wye, d/s Hay, at the midpoint across the channel

Figure 68. Photo of Wye, d/s Hay, at the midpoint facing upstream

Figure 69. Photo of Wye, d/s Hay, at the midpoint facing downstream

Conclusions

Condition

Analysis of the macrophyte and RHS data is yet to be conducted by NRW, but from the field survey, it is apparent that the Wye and its tributaries are impacted by agricultural use with the surrounding land used mainly for sheep grazing, often right up to the bank top with no buffer zone, and consequent poaching of the banks. Seventeen of the sites are considered to have been impacted by historic channel modification and loss of bank top habitat. At one site, there was arable farming with crops planted within a metre of the bank top.

There were a few sewage treatment works near some sites, and the discharge from these, along with agricultural run-off is likely to have contributed to increased algal cover at these sites, although the high flows reduced the visibility of algal growth and in all likelihood suppressed algal cover. One site had recent in channel works affecting the aquatic flora, with high filamentous algae cover in places, and others had urban development encroaching on the bank tops.

On the JNCC website (https://sac.jncc.gov.uk/site/UK0012642), under the Annex I habitats that are a primary reason for selection of this site, it states that “the Wye, on the border of England and Wales, is a large river representative of sub-type 2. It has a geologically mixed catchment, including shales and sandstones, and there is a clear transition between the upland reaches, with characteristic bryophyte-dominated vegetation, and the lower

reaches, with extensive Ranunculus beds. There is a varied water-crowfoot Ranunculus flora; stream water-crowfoot *R. penicillatus* ssp. *pseudofluitans* is abundant, with other Ranunculus species – including the uncommon river water-crowfoot *R. fluitans* – found locally. Other species characteristic of sub-type 2 include flowering-rush *Butomus umbellatus*, lesser water-parsnip *Berula erecta* and curled pondweed *Potamogeton crispus*. There is an exceptional range of aquatic flora in the catchment including river jelly-lichen *Collema dichotum*. The river channel is largely unmodified and includes some excellent gorges, as well as significant areas of associated woodland". This applies to the whole of the Wye.

In this survey, only one site on the Ithon at Disserth had a reasonable cover of *Ranunculus*, and it was only found in three other sites, the Ithon at Dolberthog, the Wye at Builth Road and the Wye at Builth Wells. No flowering rush was recorded and only one small specimen of water parsnip was recorded in this survey in the River Wye at Boughrood. Curled pondweed, *P. crispus* which occurs mainly in the lower sections of the river, and the river jelly-lichen *Collema dichot* were not recorded. It should be noted that these species could have been present or even abundant at sites where high flows compromised the survey.

INNS

No INNS were recorded in the Wye or its tributaries in the upper reaches, from the furthest upstream site on the Bidno tributary to the confluence with the Ithon downstream, except at Treflyn where Himalayan Balsam was extensive on the bank face and bank top on the River Wye.

Himalayan Balsam was present on the bank face and bank tops at all sites on the Ithon, except at Dolberthog where it was extensive on the bank top. Himalayan Balsam was present on the bank face at all sites on the River Wye downstream of the confluence with the Ithon (except the furthest downstream site where it was extensive on the bank face) and also it was present on the bank top at some sites. There were no INNS on the Dulas Brook site. The Irfon had Himalayan Balsam present on the bank face at all sites and the site on the Edw had Himalayan Balsam present on the bank face and bank tops.

Japanese Knotweed was recorded on the Irfon at all sites, where it was present on the bank face and bank top at all sites except for on the u/s Hafrena where it was absent from the bank top. Japanese Knotweed was also present on the bank faces in the lower reaches of the River Wye at Erwood and Boughrood.

Skunk Cabbage has been recorded as localised in parts of the Ithon (Tristan Hatton, Pers. comm.) but none was recorded in this survey.

Recommendations

Recommendations for restoration interventions have been detailed in the individual site descriptions above, and therefore the following recommendations relate future surveys.

The survey programme was impacted by rain throughout the survey period. Whilst every effort was taken to schedule surveys to avoid times of rain subsequent high flows, the late appointment of the project and limited survey season meant that this was not always possible. Whilst all sites were affected by high flows, most were deemed to be suitable for survey and only impacted within acceptable levels. However, eleven sites are proposed for re-survey of the macrophyte surveys in 2025 to capture the submerged vegetation which was not visible or possible to assess accurately due to high flows following heavy rain. At these sites, the channel was not entered for health and safety.

The sites recommended for repeat macrophyte surveys are presented in table 5 below.

Table 5. Sites Suggested for Repeat Macrophyte Surveys in the Wye catchment.

Grid Reference	River Name	Location	Macro-phyte Site Number	New macrophyte Survey Number	RHS Site Number	New RHS Survey Ref
SO0818967209	Clywedog Brook	Brynllygoed	EFMI226	EF24NORM048	SHMI37	EF24NORH038
SO0110055900	Wye	confl Ithon	EFMI216	EF24NORM036	H3260	EF24NORH026
SO0182553453	Wye	Builth Rd	EFMI206	EF24NORM026	SHMI23	EF24NORH016
SN9422847632	Irfon	Llangammar-ch wells	EFMI228	EF24NORM050	H885	EF24NORH040
SN9795049195	Irfon	u/s Hafrena	EFMI221	EF24NORM042	H21570	EF24NORH032
SO0309250698	Irfon	Caer Beris Builth Wells	EFMI207	EF24NORM027	H12353	EF24NORH017
SO0450051500	Wye	Builth Wells	45260	EF24NORM039	H12354	EF24NORH029
SO0980043300	Wye	Erwood	EFMI219	EF24NORM040	H10295	EF24NORH030
SO1373238569	Wye	Boughrood	EFMI209	EF24NORM029	SHMI24	EF24NORH019
SO1730139118	Wye	Glasbury	EFMI210	EF24NORM030	H23245	EF24NORH020
SO2300043000	Wye	d/s Hay	EFMI213	EF24NORM032	H4960	EF24NORH022

A repeat of the RHS surveys at some of these sites is also recommended to capture the in-channel features that were not visible due to high flows and where the survey was conducted from a safe footpath adjacent to the watercourse. These are presented in table 6 below:

Table 6. Sites Suggested for Repeat River Habitat Survey (RHS) in the Wye catchment

Grid Reference	River Name	Location	Macro-phyte Site Number	New macrophyte Survey Number	RHS Site Number	New RHS Survey Ref
SO0818967209	Clywedog Brook	Brynllygoed	EFMI226	EF24NORM048	SHMI37	EF24NORH038
SO0110055900	Wye	confl Ithon	EFMI216	EF24NORM036	H3260	EF24NORH026
SN9422847632	Irfon	Llangammarch wells	EFMI228	EF24NORM050	H885	EF24NORH040
SN9795049195	Irfon	u/s Hafrena	EFMI221	EF24NORM042	H21570	EF24NORH032
SO1373238569	Wye	Boughrood	EFMI209	EF24NORM029	SHMI24	EF24NORH019
SO1730139118	Wye	Glasbury	EFMI210	EF24NORM030	H23245	EF24NORH020
SO2300043000	Wye	d/s Hay	EFMI213	EF24NORM032	H4960	EF24NORH022

Recommendations for actions to restore the watercourses are included in the site descriptions and include siting/moving fencing away from the bank top to allow a more natural flora to develop creating a buffer zone and wildlife corridor, protecting bank tops from urban encroachment and informing local residents of the importance of the bank tops for river habitat quality. It should be kept in mind that some surveys were undertaken in difficult situations when considering the recommendations made.

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Appendices

Data Archive Appendix

Data outputs associated with this project are archived in *Z:\Archive\Sampling Monitoring & Analysis Reporting\Freshwater Monitoring\River Habitat Survey (RHS) and Plant Community surveys of the River Wye SAC (Wales) carried out in 2024* on server–based storage at Natural Resources Wales.

The data archive contains:

[A] The final report in Microsoft Word and Adobe PDF formats.

[B] Appendix 1. Wye Macrophyte SIDD Data_2024_Bywater Ecology in Excel spreadsheet

[C] Appendix 2. Wye New RHS Site Data 2024_Bywater Ecology in Excel spreadsheet

[D] Appendix 3. Wye Simplified Phase I Data 2024_Bywater Ecology in Excel spreadsheet

[E] Appendix 4. Wye New Macrophyte Site Data 2024_Bywater Ecology in Excel spreadsheet

[F] Appendix 5. Wye RHS Forms 2024_Bywater Ecology, in PDF format & Wye RHS Photo Files 2024_Bywater Ecology, in jpeg format. The survey forms and photos have been collated per survey site.

[G] Appendix 6. Wye Macrophyte Survey Sketch Maps 2024_Bywater Ecology, in jpeg format

[H] Appendix 7. Wye Macrophyte Survey Photo Files 2024_Bywater Ecology, in jpeg format.

Metadata for this project is publicly accessible through Natural Resources Wales' Data Discovery Service https://metadata.naturalresources.wales/geonetwork/srv (English version) and https://metadata.cyfoethnaturiol.cymru/geonetwork/cym/ (Welsh Version). The metadata is held as record no NRW_DS161339.

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