2025

Nant yr Wyn, Pentwyn, & River Lugg, near Llangunllo, Powys

Stream Invertebrate Assessments 2025

Mid Wales Ecology

Ecological Consultants

June 2025

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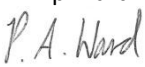
Project Ref: 25.005

June 2025

Report Information			
Mid Wales Ecology project reference:	25.005		
Status:	Final	**Date of Issue:**	12/06/2025
Produced by: **Signature:**	Philip Ward MCIEEM, Principal & Invertebrate Ecologist, Mid Wales Ecology 		
Prepared for:	Radnorshire Wildlife Trust		
Licence details:	NA		
Documentation used:	-		

Stream Invertebrate Assessments 2025

Nant yr wyn & River Lugg, near Llangunllo, Powys

Contents

Summary

Mid Wales Ecology was commissioned in May 2025 by the Radnorshire Wildlife Trust (RWT) to provide invertebrate stream assessments at Pentwyn (two samples on the Nant yr wyn) and the River Lugg (one sample), to gain an understanding of the aquatic invertebrates present and to inform any future stream management works.

This report has been written by Philip Ward MCIEEM, Principal & Invertebrate Ecologist, Mid Wales Ecology, following a site visit on 12th May 2025.

The subject of this report are two watercourses, the Nant yr wyn which is located within the RWT owned Wilder Pentwyn Farm, and the nearby River Lugg, a Site of Special Scientific Interest (SSSI) located near Llugwy Farm, within the vice-county of Radnorshire, Powys. The surveyed watercourses lie approximately 3km north-west of the village of Llangunllo, and are accessed from the B4356 road.

Standard aquatic invertebrate surveys (Benthic surveys) were undertaken of 3 sample locations, two on the Nant yr wyn within the Wilder Pentwyn Farm boundary and one on the River Lugg. This involved undertaking practical 3-minute kick sampling and 1 minute visual and hand searching of stream surface and rocks, and water assessment scoring system following standard guidelines.

Sample 1 location of the Nant yr wyn recorded a high total of 20 invertebrate families, 17 of which qualify with a water quality score. The total score was 109.9 which indicates high water quality (between 101-150, unpolluted, unimpacted).

Sample 2 location of the Nant yr wyn recorded an average total of 11 invertebrate families, 9 of which qualify with a water quality score. The total score was surprisingly much lower than Sample 1 at 62.3 which indicates average water quality (between 51-100, clean but slightly impacted).

Sample 3 location on the River Lugg recorded an average total of 11 invertebrate families, 9 of which qualify with a water quality score. The total score was 70 which indicates average water quality (between 51-100, clean but slightly impacted).

Although the two sampling locations along the Nant yr wyn are only c.430m apart along the stream, are of similar altitude, stream size and substrate, and with similar open bank side habitats, it was very unexpected that they recorded a large difference in total score, 109.9 (upper sample) & 62.3 (lower sample) respectively, and 20 invertebrate families compared to only 11 families. This difference in both score and number of recorded families is significant, and cannot be explained without further investigation.

Likewise, the results of the River Lugg sample compares well with the Nant yr wyn (lower) sample, and similarly recorded only an average total score of 70 and same number of 11 invertebrate families.

1 Introduction

Background

1.1 Mid Wales Ecology was commissioned in May 2025 by the Radnorshire Wildlife Trust (RWT) to provide invertebrate stream assessments at Pentwyn (two samples on the Nant yr wyn) and the River Lugg (one sample), to gain an understanding of the aquatic invertebrates present and to inform any future stream management works.

1.2 This report has been written by Philip Ward MCIEEM, Principal & Invertebrate Ecologist, Mid Wales Ecology, following a site visit on 12th May 2025.

Site location

1.3 The subject of this report are two watercourses, the Nant yr wyn which is located within the RWT owned Wilder Pentwyn Farm, and the nearby River Lugg, a Site of Special Scientific Interest (SSSI) located near Llugwy Farm, within the vice-county of Radnorshire, Powys. The surveyed watercourses lie approximately 3km north-west of the village of Llangunllo, and are accessed from the B4356 road.

Figure 1: Aerial photograph showing general Site location

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Figure 2: Location of sampled watercourses (red dots)

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Objectives of the Survey

1.4 To gain an understanding of the aquatic invertebrates present in watercourses.

1.5 To inform any future potential stream activities and management.

1.6 The objectives of this report are therefore to:

- Document the methodologies and findings of the stream surveys.
- Undertake ecological stream assessments.

- Assess the watercourses in regard to stream invertebrates and water quality.

1.7 This report describes the survey methodology, evaluates the survey results, and assesses ecological value.

2 Methodology

Desk study and pre-existing information

2.1 RWT staff were consulted, and Ordnance Survey and Google maps were used to plan and chose survey locations.

2.2 Species records resulting from survey work carried out at the Site will be supplied to the Local Environmental Records Centre.

Surveyor information

Table 1: Surveyor details and competency

Surveyor Name:	Philip A Ward MCIEEM
Competency:	Lead invertebrate ecologist Phil Ward has over 35 years' experience in wildlife survey, species recording and practical habitat management in a wide variety of habitats from wetlands and grasslands to coast, woodlands and uplands. He has formerly worked in the wildlife conservation sector for 22 years where he worked on management of nature reserves being an experienced countryside manager. He is a wildlife identification expert who specialises in invertebrates having undertaken numerous invertebrate surveys and reports including for Natural Resources Wales, Trunk Roads Agency, local councils, Wildlife Trusts and other conservation organisations and ecological consultancies. He also carries out surveys on other species especially plants, having undertaken over 130 Extended Phase 1 Habitat Surveys, as well as on protected species. He is a former invertebrate specialist tutor with Aberystwyth University (for 10 years) where he taught students invertebrate anatomy, identification, sampling & trapping techniques, recording and reporting skills. He is often called upon to provide talks & invertebrate training and ecology courses for organisations and education centres. He specialises in beetles (*Coleoptera*), but has wide specialist invertebrate expertise including identification and ecology of bees & wasps, hoverflies, many other fly families, butterflies & moths, true bugs, dragonflies and other freshwater invertebrates. He also regularly undertakes specialist standard river monitoring sampling methodology and tutors the occasional course. Phil has extensive practical conservation management experience and knowledge and is able to provide a wealth of recommendations for future habitat management for invertebrates. He is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM) and member of many societies including BWARS (Bees, Wasps, Ants Recording Society), Dipterist's Forum, & Coleopterists Society. He is the beetle county recorder and invertebrate county recorder for Radnorshire and secretary of the Radnorshire Invertebrate Group, and committee member of his local Rhayader by Nature wildlife group.

Surveyor Name:	Mike W.J. Paskin BSc, ARCS, FRES (retired)
Competency:	Volunteer assistant invertebrate surveyor Mike Paskin, as well as having over 20 years' experience as an invertebrate scientific wildlife researcher in East Africa, has extensive ecological expertise on all aspects of the UK's flora and fauna. He is an excellent all-round naturalist as well as having good botanical skills but specialises in identification of true flies (Diptera) recording and some other insect groups such as sawflies & caddis flies. He is a professionally trained entomologist and Fellow of the Royal Entomological Society, member of the British Ecological Society, Butterfly Conservation, Dipterist's Forum and Radnorshire Invertebrate Group.

Field surveys

Stream invertebrate assessment

2.3 Standard aquatic invertebrate surveys (Benthic surveys) were undertaken of 3 sample locations, two on the Nant yr wyn within the Wilder Pentwyn Farm boundary and one on the River Lugg. This involved undertaking practical 3-minute kick sampling and 1 minute visual and hand searching of stream surface and rocks, and water assessment scoring system following standard guidelines and in accordance with the requirements of Article 8; Section 1.3 of Annex II; and Annex V of the Water Framework Directive (WFD) (2000/60/EC). Each aquatic invertebrate family has a standard water quality score from between 0 (low) and 12.5 (high), depending on its sensitivity to water quality.

2.4 Equipment used were a standard 1mm mesh long-handled pond net, plastic trays and pots. Specimens were transferred to pots for closer inspection, release or taken for further identification.

2.5 Length of the stream section sampled was decided by stream width multiplied by a factor of 7 to give a total length (i.e. a 2m wide stream would give a length of 14m), which follows standard methodology.

2.6 Total length was then measured, and beginning/end of stream length was marked.

2.7 The whole width and length of the stream was covered during kick-sampling, zigzagging across and up stream.

2.8 Water quality and organic pollution can be assessed using standard indices of invertebrates and their presence in samples. These indices form part of assessments for water quality required for planning applications and to assess compliance with the Water Framework Directive.

2.9 Water quality scores are given for invertebrate taxon families present in the sample, each representing their tolerance to organic pollution and taxon richness. Each family has a value between 0 and 12.5 depending upon its sensitivity to water quality, 12.5 being most sensitive. Total score indicates water quality level as follows:

Table 2: Water quality scores for aquatic invertebrates

Total score index	Water quality level
>150	Very high
101-150	High
51-100	Average
26-50	Tolerable
10-25	Low
0-9	Very low

2.10 Natural Resources Wales (NRW) use a colour coded 'traffic light' system to record species sensitivities to water flow, see Table 3 below. Species which are insensitive are left uncoloured.

Table 3: Species sensitivity to water flow

	Low sensitivity to flow
	Potential sensitivity to flow
	Likely sensitivity to flow

2.11 The above species sensitivity is included in the results for information in case any future potential stream management/development schemes are planned, which would affect sections of the stream and thereby the water flow.

3 Site Description

3.1 The two sampled watercourses are set within a rural area. The two Nant yr wyn sampling stations are located within the Wilder Pentwyn Farm which initially flows east through the site before turning south-southeast where it flows for approximately 1.2km from Pentwyn Farm before joining the River Lugg. The single River Lugg sampling station is located approximately 220m north-northeast of Pentwyn Farm and flows south-east through Llangunllo village and on to the town of Presteigne, and then Leominster, before eventually joining the River Wye at Hereford. The watercourses generally flow through agriculturally grazed farmland and are frequently tree-lined.

4 Survey Results and Evaluation

Survey results

4.1 Aquatic invertebrate sampling was undertaken on 12th May 2025. Details of species found in each watercourse sample are listed in the tables below.

Nant yr wyn

Table 4: Sample 1 species list, Nant yr wyn

Sample 1 location (upper) (NGR: SO 1818 7272)		**Stream width:** 1m	**Altitude:** c.278m
Taxon species name	**Taxon common name**	**Taxon family**	**Water quality score**
Baetidae	A swimming mayfly	*Baetidae*	5.3
Ecdyonurus	A stone-clinging mayfly	*Heptageniidae*	9.8
Goeridae	A caddis fly	*Goeridae*	9.9
Limnophilidae	A caddis fly	*Limnophilidae*	6.9
Polycentropodidae	A caddis fly	*Polycentropodidae*	8.6
Rhyacophila	A caddis fly	*Rhyacophilidae*	8.3
Nemouridae	A stonefly	*Nemouridae*	9.1
Perlodidae	A stonefly	*Perlodidae*	10.7
Velia caprai	A water cricket	*Veliidae*	0
Tipulidae	A cranefly	*Tipulidae*	5.5
Ptychoptera	A phantom cranefly	*Ptychopteridae*	0
Chironomidae	A non-biting midge	*Chironomidae*	3.7
Dixidae	A meniscus midge	*Dixidae*	0
Anacaena globulus	A water beetle	*Hydrophilidae*	5.1
Elmis aenea	A riffle beetle	*Elmidae*	6.4
Gammerus	A freshwater shrimp	*Gammeriidae*	4.5
Planariidae	A flatworm	*Planariidae*	4.2
Oligochaeta-Lumbricidae	An earthworm	*Oligochaeta-Lumbricidae*	3.5
Erpobdellidae	A leech	*Erpobdellidae*	2.8
Ancylis fluvialitis	River Limpet	*Ancylidae*	5.6

Total water quality score			**109.9 =High water quality**

Table 5: Sample 2 species list, Nant yr wyn

Sample 2 location (lower) (NGR: SO 1846 7256)		**Stream width:** 1.5m	**Altitude:** c.272m
Taxon species name	**Taxon common name**	**Taxon family**	**Water quality score**
Baetidae	A swimming mayfly	*Baetidae*	5.3
Ecdyonurus	A stone-clinging mayfly	*Heptageniidae*	9.8
Goeridae	A caddis fly	*Goeridae*	9.9
Rhyacophila	A caddis fly	*Rhyacophilidae*	8.3
Leuctra	A stonefly	*Leuctridae*	9.9
Velia caprai	A water cricket	*Veliidae*	0
Tipulidae	A cranefly	*Tipulidae*	5.5
Ptychoptera	A phantom cranefly	*Ptychopteridae*	0
Gammerus	A freshwater shrimp	*Gammeriidae*	4.5
Oligochaeta-Lumbricidae	An earthworm	*Lumbricidae-Oligochaeta*	3.5
Ancylis fluvialitis	River Limpet	*Ancylidae*	5.6
Total water quality score			**62.3 =Average water quality**

River Lugg

Table 6: Sample 3 species list, River Lugg

Sample 3 location (NGR: SO 1846 7298)		**Stream width:** 4.5m	**Altitude: c.**281m
Taxon species name	**Taxon common name**	**Taxon family**	**Water quality score**
Baetidae	A swimming mayfly	*Baetidae*	5.3
Ecdyonurus	A stone-clinging mayfly	*Heptageniidae*	9.8
Ephemera	A burrowing mayfly	*Ephemeridae*	9.3
Glossosomatidae	A caddis fly	*Glossosomatidae*	6.7
Rhyacophila	A caddis fly	*Rhyacophilidae*	8.3
Perlidae	A stonefly	*Perlidae*	12.5
Leuctra	A stonefly	*Leuctridae*	9.9

Chironomidae	A non-biting midge	*Chironomidae*	3.7
Diptera	Unidentified larvae	-	0
Velia caprai	A water cricket	*Veliidae*	0
Gammerus	A freshwater shrimp	*Gammeriidae*	4.5
Total water quality score			**70 =Average water quality**

Sample 1 Nant yr wyn (upper)

4.2 Sample 1 location of the Nant yr wyn recorded a high total of 20 invertebrate families, 17 of which qualify with a water quality score. These included two mayfly families (*Baetidae, Heptageniidae*), four caddis fly families (*Goeridae, Limnephilidae, Polycentropodidae, Rhyacophilidae*), two families of stonefly (*Nemouridae, Perlodidae*), a water cricket (*Velia caprai*), a cranefly (*Tipulidae*), a phantom cranefly (*Ptychopteridae*), two midges (*Chironomidae, Dixidae*), a water beetle (*Anacaena globulus*), a riffle beetle (*Elmis aenea*), a freshwater shrimp (*Gammerus*), an aquatic earthworm (*Lumbricidae*), a leech (*Erpobdellidae*), and river limpet (*Ancylis fluviatilis*).

4.3 The total score was 109.9 which indicates high water quality (between 101-150, unpolluted, unimpacted).

4.4 Five families have likely sensitivity to flow (*Heptangeniidae*, *Goeridae*, *Rhyacophilidae, Perlodidae, Ancylidae)*, one family (*Baetidae*) has potential sensitivity to flow, with the remaining families being flow insensitive.

Sample 2 Nant yr wyn (lower)

4.5 Sample 2 location of the Nant yr wyn recorded an average total of 11 invertebrate families, 9 of which qualify with a water quality score. These included two mayfly families (*Baetidae, Heptageniidae*), two caddis fly families (*Goeridae,Rhyacophilidae*), one family of stonefly (*Leuctridae*), a water cricket (*Velia caprai*), a cranefly (*Tipulidae*), a phantom cranefly (*Ptychopteridae*), a freshwater shrimp (*Gammerus*), an aquatic earthworm (*Lumbricidae*), and river limpet (*Ancylis fluviatilis*).

4.6 The total score was surprisingly much lower than Sample 1 at 62.3 which indicates average water quality (between 51-100, clean but slightly impacted).

4.7 Five families have likely sensitivity to flow (*Heptageniidae*, *Goeridae*, *Rhyacophilidae, Leuctridae, Ancylidae)*, one family (*Baetidae*) has potential sensitivity to flow, with the remaining families being flow insensitive.

Sample 3 River Lugg

4.8 Sample 3 location on the River Lugg recorded an average total of 11 invertebrate families, 9 of which qualify with a water quality score. These included three mayfly families (*Baetidae, Heptageniidae, Ephemeridae*), two caddis fly families (*Glossosomatidae, Rhyacophilidae*), two families of stonefly (*Perlidae, Leuctridae*), a non-biting midge (*Chironomidae*), an unidentified Diptera larva, a water cricket (*Velia caprai*), and a freshwater shrimp (*Gammerus*).

4.9 The total score was 70 which indicates average water quality (between 51-100, clean but slightly impacted).

4.10 Four families have likely sensitivity to flow (*Heptageniidae*, *Rhyacophilidae, Perlidae, Leuctridae)*, one family (*Baetidae*) has potential sensitivity to flow, with the remaining families being flow insensitive.

Evaluation

4.11 Although the two sampling locations along the Nant yr wyn are only c.430m apart along the stream, are of similar altitude, stream size and substrate, and with similar open bank side habitats, it was very unexpected that they recorded a large difference in total score, 109.9 (upper sample) & 62.3 (lower sample) respectively, and 20 invertebrate families compared to only 11 families. This difference in both score and number of recorded families is significant, and cannot be explained without further investigation.

4.12 Likewise, the results of the River Lugg sample compares well with the Nant yr wyn (lower) sample, and similarly recorded only an average total score of 70 and same number of 11 invertebrate families.

4.13 There may be a significant difference in adjoining land use between the two Nant yr wyn sampling locations, and indeed the River Lugg, and it would be useful to undertake further water quality testing and analysis of stream water to include tests for phosphate, pH, nitrate, and electrical conductivity. It may also be useful to undertaken soil testing of the adjoining land.

4.14 It is interesting to compare the higher scoring species of mayflies (*Ephemeroptera*), caddis flies (*Trichoptera*) and stoneflies (*Plecoptera*) in each sample. Collectively known as 'Riverflies', these three insect orders have truly aquatic larvae, breath underwater and are generally much more sensitive to water quality. They also total the greatest abundance of specimens within stream samples.

4.15 Table 7 below compares the Riverfly families in each sample. Sample 1 had 8 riverfly families and a total score of 68.6 which is not significantly higher than Sample 3 with 7 families and score of 61.8. However, the more significant difference in total water quality score between 109.9 and 70 is reflected in the fact that Sample 1 recorded 9 other non-riverfly scoring families compared to just 2 of Sample 3. Sample 2 recorded 4 other non-riverfly scoring families. This mirrors the much higher diversity of recorded families (20) in Sample 1 compared to Samples 2 and 3 (both with 11).

Table 7: Riverfly families and water quality score recorded in the three samples.

Riverfly families recorded	**Sample 1 Nant yr wyn (upper)**	**Sample 2 Nant yr wyn (lower)**	**Sample 3 River Lugg**
	Water quality score		
Ephemeroptera (mayflies)			
Baetidae	5.3	5.3	5.3
Heptageniidae	9.8	9.8	9.8
Ephemeridae			9.3
Trichoptera (caddis flies)			
Glossosomatidae			6.7
Goeridae	9.9	9.9	

Limnophilidae	6.9		
Polycentropodidae	8.6		
Rhyacophilidae	8.3	8.3	8.3
Plecoptera (stoneflies)			
Leuctridae		9.9	9.9
Nemouridae	9.1		
Perlodidae	10.7		
Perlidae			12.5
Riverfly Total	**68.6**	**43.2**	**61.8**
(Total water quality score)	**(109.9)**	**(62.3)**	**(70)**

Constraints on the survey

4.30 This report cannot be considered to provide a full comprehensive analysis of the ecological interest of the streams. However, it does provide an ecological assessment for aquatic invertebrates on the day of the survey visit.

6 Bibliography

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Appendix 1: Site Photographs

Photo 1: Sample 1 station Nant yr wyn (upper).

Photo 2: Sample 2 station Nant yr wyn (lower).

Photo 3:Sample 3 station River Lugg.