Advisory Visit

Bodorgan Estate, Anglesey

April 2012

1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the Bodorgan Estate, Anglesey on, 12th April, 2012. Comments in this report are based on observations on the day of the site visit and discussions with Tim Bowie (General Manager of the Estate), Holly Parry (local graduate of Bangor University), Billy Tweddle (Gamekeeper) and Ian Ferrier (experienced local angler).

Normal convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left hand bank (LHB) or right hand bank (RHB) whilst looking downstream.

2.0 Catchment and Fishery Overview

Bodorgan Estate is on the south-west of the Isle of Anglesey, North Wales, and covers an area of approximately 15,000 acres. Within the Estate is Llyn Coron, a lake of approximately 90 acres (cover picture), which is within the catchment of the Afon Ffraw. The lake contains wild brown trout and sea trout which run the Ffraw. The lake is fished by a small syndicate (and day ticket anglers) and is occasionally stocked with farmed brown trout. The main focus of this advisory visit was the Afon Fraw, Llyn Coron and their tributaries.

Also on the Estate is the Afon Caradog, a tributary of the Afon Crigyll which joins the sea at Rhosneigr. Sections of the Caradog were also inspected during this visit at Y Werthyr (SH373783) and Bryn Glas (SH372781).

Information from the River Basin Management Plan (Water Framework Directive) published by Environment Agency Wales (EAW) is shown in the table below for the Crigyll catchment (including Afon Caradog) and for the Ffraw. More detailed information can be found at http://www.environment-agency.gov.uk/research/planning/33106.aspx. Both the Crigyll and Ffraw catchments are currently designated as being moderate ecological status, with a target of achieving good ecological status by 2027.

The status of waterbodies is based upon the quality of a number of ecological (fish, invertebrates, plants) and chemical elements (concentrations of pollutants), and failure of just one element means the

waterbody cannot be classified as good. In the case of the Crigyll (Caradog), water quality and invertebrate populations are good, but fish are only moderate status with a tentative reason for this given as suspected sediment from diffuse agricultural pollution.

In the case of the Ffraw, upstream of Llyn Coron, invertebrate populations are moderate status, with the reason given as unknown. Downstream of Llyn Coron, the waterbody is transitional (estuarine) and has an overall moderate classification but no further details are given.

Waterbody ID	GB110102058970	GB110102058680
Waterbody Name	Crigyll	Ffraw
Management Catchment	North West Wales	North West Wales
River Basin District	Western Wales	Western Wales
Typology Description	Low, Small, Siliceous	Low, Small, Siliceous
Hydromorphological Status	Not Designated A/HMWB	Not Designated A/HMWB
Current Ecological Quality	Moderate Status	Moderate Status
Current Chemical Quality	Does Not Require Assessment	Does Not Require Assessment
2015 Predicted Ecological Quality	Moderate Status	Moderate Status
2015 Predicted Chemical Quality	Does Not Require Assessment	Does Not Require Assessment
Overall Risk	Probably Not At Risk	Probably At Risk
Protected Area	Yes	Yes

Llyn Coron and the lower section of Afon Fraw are within a Site of Special Scientific Interest (Tywyn Aberffraw SSSI) and a Special Area of Conservation (Abermenai to Aberffraw Dunes SAC), designated for the dune habitat. Llyn Coron is featured in the SAC designation as a naturally eutrophic (nutrient rich) lake. Further information is available from the Countryside Council for Wales (CCW) and here http://jncc.defra.gov.uk/ProtectedSites/SACselection/sac.asp?EUCode=UK0020021 and http://angleseynature.co.uk/webmaps/tywynaberffraw.html.

3.0 Habitat Assessment

3.1 Afon Ffraw downstream of Llyn Coron

This section of river between the lake and the sea is under tidal influence and on big spring tides is said to back up almost as far as the lake. At the time of the visit there was a good flow of clear water, a reasonable depth and an open channel. However, previous surveys (Parry, 2011?) during the summer have found the channel heavily encroached with emergent vegetation (reeds and rushes).

Flowing through an area of dunes, the river here has a low gradient and sandy bed which is naturally suited to the growth of emergent plants (Photo 3). This section of river was reportedly dredged using a hydraulic excavator about 15+ years ago by the then National Rivers Authority; this may have made the river more prone to excessive growth of emergent vegetation by widening the channel and promoting the deposition of fine material on the river bed. A more sustainable way of managing the channel would be to remove a narrow strip of emergent vegetation from the centre of the channel, promoting the development of consolidated berms of fine sediment and vegetation in the margins and creating a narrower, deeper channel.

Downstream of Pont Ganel and the confluence of a tributary, the Ffraw has some deep pools that have historically produced large sea trout (Photo 2). When in rivers, adult sea trout seek out deep pool habitat and overhead cover to lie up during daylight hours. Such habitat is generally lacking on the lower Ffraw. Planting low-growing, spreading tree species (e.g. sallow species) immediately adjacent to the channel (particularly on the outside of bends) would create more overhead cover and shade and increase the habitat value for sea trout.

Photo 1 Lower Afon Ffraw a short distance above the estuary at Aberffraw

Photo 2 Afon Ffraw downstream of Pont Ganol. Deep holding pools that have historically produced sea trout over 15lbs.

Photo 3 Afon Ffraw downstream of Llyn Coron showing the dune landscape. The presence of low-growing, bushy willow species in areas like those arrowed would improve the holding capacity for fish and reduce emergent plant growth by shading.

Photo 4 Outflow from Llyn Coron into the Afon Ffraw. The weir and boards were intended to raise lake water levels in an attempt to combat algae blooms.

CCW and EAW should be consulted on any activities here to ensure they do not affect the features of interest of the SSSI and SAC. Ideally the willows planted should be of local origin. The best way to get them established would be to make bundles of willow cuttings from native trees elsewhere along the river; these could then be staked in the margins of the river where they can strike root (Photo 3). This is more likely to succeed than using individual whips which would be vulnerable to grazing.

At the outflow of Llyn Coron there is a concrete crump weir with slots for boards to increase the crest height (Photo 4); this was installed in an attempt to reduce the problem of blue-green algae on the lake by varying water levels. Whilst the structure is not an absolute barrier to fish migration it may influence fish behaviour and delay movements. At present there is one board in place concentrating flows to the right of the channel; this is better than having a shallow flow across the whole crest. It may be worth fitting another board partially across the right side of the crest to concentrate flows through a central notch. A smooth, deep flow of water over a smooth nappe in such a notch would be easier for fish to ascend. One board could be removed in high flows if necessary.

3.2 Un-named tributary of Afon Ffraw

This un-named tributary of the lower Ffraw has its confluence at SH358694 on the right bank just downstream of Pont Ganol. There are two arms of the tributary, referred to here as Henllys-fawr (western arm) and Cae-mawr (eastern arm). Downstream of the confluence of the arms, the river has a low gradient, emergent vegetation (common reed) and was also dredged at the same time as the Ffraw. Ian Ferrier reported having previously seen sea trout spawning in the Cae-mawr arm.

3.2.1 Henllys-fawr arm

Immediately above the confluence of the two arms the watercourse runs through improved pasture (Photo 5) and is accessible to livestock, especially on the true right bank. In contrast upstream of Pont Glan-felin the river is fenced on the right bank and has an un-cultivated buffer strip on the left bank (Photo 6) greatly improving the in-stream habitat for juvenile trout.

Photo 5 Henllys-fawr arm at confluence with Cae-mawr arm

Photo 6 Henllys-fawr arm at Pont Glan-felin. Fencing and an uncultivated buffer strip represent good practice here, but a pathway for fine sediment remains via the stock watering point (Photo 7)

Photo 7 View immediately downstream of Photo 6 – stock watering point and pathway for ingress of fine sediment

Photo 8 Henllys-fawr arm (SH356707)

Photo 9 Henllys-fawr arm (SH356707)

Photo 10 Henllys-fawr arm (SH358712)

However, there is still a pathway for fine sediment ingress at a stock watering point (Photo 7); alternative drinking facilities (mains supplied trough) or a hard standing area alongside the watercourse would improve this situation.

Further upstream at Henllys-fawr (Photos 8 and 9), the watercourse flows through a low-lying, boggy area which is prone to flooding and often under water in winter. The natural situation here limits the value of the watercourse as trout habitat (there are no suitable spawning gravels), but this has been greatly exacerbated by previous dredging of the channel. The channel is straight and wide and parallel ditches take some of the stream flow; this has created a shallow, silty stream, in parts encroached by vegetation, in parts kept over-wide by bank poaching by stock. There is no value here as a trout nursery area and even the successful passage of adult fish through to better habitat upstream is doubtful.

Further upstream, the in-stream habitat is a complete contrast (Photo 10), with the stream in a narrow channel with a gravel bed and good marginal habitat provided by overhanging bushes, long grass and reeds. There was some evidence here of recent bank poaching by cattle which could change this situation if left unchecked.

3.2.2 Cae-mawr arm

The area where Ian Ferrier has previously seen spawning sea trout was inspected (SH359701). The fields on the left bank here have recently been turned over to potato cultivation, following many years of use for grazing, stockholding for a nearby abattoir and silage growing. One field has been cultivated very close to the watercourse (Photo 11) and is an example of very poor practice; there is no doubt that this will be a major source of fine sediment and nutrient input, reducing the quality of river-bed gravels (Photo 12) for fish spawning and invertebrates and promoting growth of algae.

In contrast, the next field upstream has a wide margin of uncultivated land between the potato field and the watercourse, providing a buffer for field run-off. Ideally potatoes should not be grown in fields adjacent to watercourses, or at the very least adequate buffer strips (10 metres plus) provided, with no alternative pathways for run-off (tracks, mole drains, etc.).

Photo 11 Cultivation too close to the watercourse, with no buffer strip

Photo 12 Gravel is present, but with a high loading of fine sediment

Photo 13 A wide buffer zone between cultivated fields and the stream provides much better protection for the watercourse

Photo 14 The straightened, ditched nature of the stream makes very poor habitat for juvenile trout

Adjacent land use returns to grazing further upstream (Photo 14) but the channel remains artificially straight and generally very poor habitat for trout. There is scope to improve in-stream habitat (see Recommendations), but this stream is probably not the highest priority given its small size and location.

3.3 Afon Gwna

The Afon Gwna is the main tributary of Llyn Coron and is therefore important in providing a spawning and nursery area for brown trout from the lake and for sea trout. The section of river between the lake and the railway bridge was inspected. Ian Ferrier reported catching 21 trout from a single pool as a boy, 40 years ago. The in-stream habitat here is very good (Photos 15 and 16), with features including:

- a pool and riffle sequence, providing variation in depth and bed substrate type (sorted sediments benefiting a range of invertebrates and fish spawning)
- wooded bankside (RHB), providing bank stability, sunken tree roots and a source of in-stream woody debris
- in-stream boulders, promoting a variety of flow patterns and bed scour
- Low intensity land use protecting the watercourse from bank poaching and agricultural run-off.

Above the railway bridge the river is not part of the Bodorgan Estate until Din Dryfol (Photo 17). The watercourse is much smaller here, but habitat remains generally good with a gravel bed, good cover from bankside vegetation and low intensity land use. It was not possible to inspect downstream of this point, but it is recommended that the section between Din Dryfol and SH395715 is checked; this appears on the map to be straightened compared with the sinuous section further downstream and could be a good area for habitat improvement works (particularly given its proximity to the lake).

Photo 15 Good habitat on the Gwna: a variety of depth; cover and bank stability provided by trees, bushes and scrubby vegetation; well-sorted river bed substrate and an unaltered channel form.

Photo 16 As per Photo 15 – a template for good habitat

Photo 17 Din Dryfol SH399725

Photo 18 Cerrig Engan SH407733 – a straightened channel

At Cerrig Engan the in-stream habitat quality was poorer. The watercourse was more open and artificially straight, with little variation in depth (shallow) or flow pattern (Photo 18). This would be a good site for enhancement, using the techniques described in the Recommendations section.

3.4 Afon Caradog

The Caradog is a tributary of the Cryllig which joins the sea at Rhosneigr. Two areas were inspected at Y Werthyr (Photos 19–22) and Bryn Glas (Photos 23-24).

At Y Werthyr the river is located in fields of improved pasture grazed by cattle and sheep. The channel has been modified for land drainage in the past, having a generally trapezoidal cross-sectional profile, steep banks and a general lack of variation in flow pattern and depth. Despite this, in-stream habitat is reasonably good in some sections; where the banks are fenced the river has narrowed off and there is good marginal cover provided by the vegetation (Photo 19). In these narrower areas, the bed comprises large gravel and cobbles and beds of water crowfoot (*Ranunculus* sp.) and starwort (*Callitriche* sp.) are present (Photo 20).

In other sections, the stream was over-wide and shallow with a bed comprised of fine sediment (Photo 21) – poor habitat for trout. This contrasted with a section immediately upstream (Photo 22) which was less agriculturally improved and more lightly grazed; this has resulted in marginal habitat of shaggy grasses and bushes and a narrower, deeper channel – much better trout habitat.

There were no areas of suitable gravel for trout spawning (10-40 mm diameter) seen in this section and this could be a bottleneck limiting fish populations here (this watercourse is moderate ecological status for fish under Water Framework Directive). It would be a relatively easy project to create spawning areas in this area by introducing gravel – see Recommendations section. There appears to be quite good juvenile trout habitat and invertebrate populations to sustain more trout generated from improved spawning habitat.

Photo 19 Fencing out livestock has improved in-stream habitat on one bank here.

Photo 20 Water crowfoot *Ranunculus* sp.

Photo 21 A section of over-wide, shallow, poor quality stream habitat

Photo 22 Much better habitat resulting from less intensive land use alongside the watercourse

Photo 23 Good in-stream habitat at Bryn Glas, although the channel may have been straightened many years ago, resulting in a lack of pool habitat.

Photo 24 A deep lateral scour pool with abundant cover low over the water – superb adult fish habitat.

At Bryn Glas (Photos 23-24) the in-stream habitat was reasonably good. There was some evidence of past channel modification in the form of old spoil heaps on the banks, but these may only be associated with a short section where a bridge has been constructed. Also the channel was straight in places and lacking pool habitat, suggesting modification at some point in the past. There is more tree cover in this section providing shade and bank stability, and the opportunity to introduce some large woody debris to promote scour and pool formation (Appendix 1).

There are some deep pools located on the outside of bends (lateral scour pools) with excellent overhead cover provided by overhanging bushes (Photo 24). The combination of a sinuous channel (creating scour on the outside of bends) and good bank stability provided by tree roots is unbeatable in creating deep holding pools which persist for many years; this kind of habitat greatly increases the carrying capacity of fish in a stream.

4.0 Recommendations

Reducing the impact of adjacent land use upon the watercourse is a general recommendation pertaining to all the streams inspected during this visit. Fencing out livestock and providing drinking troughs or cattle drinks with hard standing areas is recommended. Mains supplied troughs are ideal but can be relatively expensive (capital cost of installation plus increased water costs). Pasture or paddle pumps are an option but generally only suitable for smaller herds (one installation per 20 head of cattle is required). Cattle drinks in streams can require maintenance (particularly after high flows) and may become access points for livestock to get around the fence if neglected.

Potato cultivation is a concern given the potential for this form of agriculture to greatly increase the amounts of fine sediments entering watercourses and having a negative impact upon salmonids spawning, invertebrates and plants. Ideally potatoes should not be grown alongside watercourses, or wide (10m +) uncultivated buffer zones left at the field margin. Environmental stewardship schemes may have options for buffer zones and there may be scope for their creation as game cover as part of the Estate's shooting interests. Pathways for fine sediments reaching watercourses include gateways, tracks, roads, drains and culverts which can bypass buffer

zones, often over long distances from the original sediment source; these pathways should also be taken into account.

Sections of stream affected by past channel modification (straightening, bed lowering) could be improved by the introduction of boulders and/or logs to create flow deflectors and channel pinch points; this will encourage scour which will promote depth variety and sorting of river bed substrates (Photo 25).

Photo 25 Example of a pinch point created using logs and stone to encourage bed scour and sorting of gravel. On the smaller watercourses on the Bodorgan Estate, large boulders could quickly and easily be positioned with an excavator to create the same effect.

Where suitably sized spawning gravel (10 – 40 mm) is lacking, this could be introduced in conjunction with the in-stream structures (Photo 26). It is understood that there are quarries on the Bodorgan Estate so supply and transport of boulders and gravel could be relatively easy.

Photo 26 A trout redd cut on introduced gravel in a spawning stream entering Lough Corrib, western Ireland.

The areas where improvement work would be the highest priority are:

- The Gwna upstream of Llyn Coron in the vicinity of Cerrig Engan and (subject to inspection) the reach downstream of Din Dryfol. Improved habitat for spawning and juveniles in this area would improve recruitment of trout to Llyn Coron.
- Afon Caradog is also a good site because it is a "quick win" – easy access, some materials already on site (boulders) and reasonably good existing juvenile habitat which could benefit from improved spawning habitat (gravel introduction).
- Afon Ffraw downstream of the lake – strategic planting of local, native willow bundles to promote low overhead cover alongside deeper areas. Also (subject to inspection in summer), carefully targeted removal of emergent vegetation to keep a clear, narrow, central channel open. Liaison with CCW regarding works in the SAC/SSSI is essential here.

Works on the Ffraw tributary (Henllys-fawr / Cae-mawr) should focus on reducing agricultural impacts as described above.

Please note, it is a legal requirement that all the works to the river require written Environment Agency Wales (EAW) consent prior to undertaking any works, either in-channel or within 8 metres of the bank.

5.0 Making it Happen

The WTT can provide further assistance to help implement the above recommendations. This includes help in preparing a project proposal with more detailed information on design, costs and information required for obtaining consents to carry out the works. If required, a practical visit can be arranged to demonstrate habitat improvement techniques. Demand for these services is currently high but WTT is able to provide further advice and information as required. Please contact Tim Jacklin for more information.

It is recommended that this report is discussed with Joel Rees-Jones of the Environment Agency Wales (joel.rees-jones@environment-agency.wales.gov.uk).

6.0 Acknowledgement

The Wild Trout Trust would like to thank the Environment Agency for the support which made this visit possible.

7.0 Disclaimer

Appendix 1

Large Woody Debris