River Ogmore – Ogmore Fishing Association

An advisory visit carried out by the Wild Trout Trust – July 2012

1. Introduction

This report is the output of a Wild Trout Trust advisory visit undertaken on selected sections of the River Ogmore on waters controlled by the Ogmore Angling Association.

The request for the visit was made by Mr. Ian Finylas, the club's Chairman and Mr. Colin Chapman, the clubs Conservation Officer. Fish migration and habitat quality is heavily influenced by a large number of weirs on the main river Ogmore. Many of these structures were introduced as angling mitigation measures following the construction of the Bridgend flood alleviation scheme.

In addition to the numerous large block stone weirs, the Environment Agency also maintain two flow gauging weirs on club waters. The visit was focussed on inspecting a selection of these weirs with a view to carrying out an assessment of fish passage and the impact that these impoundments might be having on in-channel habitat quality.

Comments in this report are based on observations on the day of the site visit and discussions with Mr. Finylas, Mr. Chapman and Ms. Ida Tavner of the Environment Agency Wales.

Throughout the report, normal convention is followed with respect to bank identification i.e. banks are designated Left Bank (LB) or Right Bank (RB) whilst looking downstream.

2. Catchment overview

The River Ogmore rises at Craig Ogwr as the Ogwr Fawr, meeting with the Ogwr Fach at Blackmill, the River Garw at Brynmenyn, and the River Llynfi at Aberkenfig. The headwaters flow over a mixture of coal measures, and sedimentary bedrock with the middle reaches consisting of limestone and sandstone with overlays of glacial debris and gravels.

The Ogmore above and through the town of Bridgend has a relatively steep gradient baffled by a series of large rock weirs. The channel is heavily engineered as it flows through Bridgend but more natural geomorphology resumes downstream of the town as the river flows in sweeping meanders towards the Bristol Channel.

The catchment is relatively sparsely populated (with the exception of Bridgend). However, population centres in the catchment are predominantly located alongside the river and its tributaries. The main roads of the catchment also conspicuously follow the catchment's main watercourses. This makes the Ogmore a particularly accessible river and hints at the role of the river and its tributaries in the catchment's more industrial past.

The Ogmore has historically suffered from water quality issues but since the halt of mining and related heavy industry in the catchment, the river has recovered to support a diverse population of invertebrates and spawning grounds for salmon and sea trout. In times of heavy rainfall, however, pollution events from emergency sewerage outfalls are still being reported.

The accessibility of the river appears to be a mixed blessing. Whilst the angling club enjoys good access to the river, there have been reports of poaching and fly -tipping

The Water Framework Directive classifications for the Ogmore are set out in the table below. The Ogmore is classified as achieving Good Ecological Status but is failing for chemical quality.

Ogmore - confluence with Llynfi to tidal limit	
Waterbody ID	GB110058026280
Waterbody Name	Ogmore - confluence with Llynfi to tidal limit
Management Catchment	Ogmore to Tawe
River Basin District	Western Wales
Typology Description	Mid, Medium, Siliceous
Hydromorphological Status	Not Designated A/HMWB
Current Ecological Quality	Good Status
Current Chemical Quality	Fail
2015 Predicted Ecological Quality	Good Status
2015 Predicted Chemical Quality	Fail
Overall Risk	At Risk
Protected Area	Yes
Number of Measures Listed (waterbody level only)	1

Summary of WFD information for the Ogmore

3. Fishery overview

The Ogmore Angling Association (OAA) manages its waters as a game fishery, with a particular emphasis on the healthy population of salmon *Salmo sal*ar and sea trout (sewin) *Salmo trutta* that run the stream, as well as resident brown trout. The lower reaches are also fished for bass *Dicentrarchus labrax*, mullet *Chelon labrosus* and flounder *Platichthys flesus*. The club also stocks the river with hatchery derived brown trout, mainly to provide early season sport for the members before the bulk of the sea trout run arrives in the summer.

The OAA is a progressive club with a proactive committee and is actively involved in a number of conservation initiatives including water quality and invertebrate monitoring. The club is also keen to protect wild fish by evaluating current trout stocking practices by undertaking a programme of tagging stocked fish and asking members to provide accurate catch returns of marked fish against wild fish captured. The club has also been involved in a controlled trial of circle hooks versus J hooks, as well as actively promoting catch-and-release tactics.

4. Habitat assessment

The relatively steep gradient of the Ogmore combined with surface water spates result in highly energised flows and consequent extensive bedload transport. In steep sections, smaller gravels are moved swiftly downstream leaving a bed predominantly consisting of large cobbles and stones.

In the more rural sections of the river, riparian trees provide a good amount of shade and cover with low level branches also helping to deflect flows and further diversify the physical habitat.

The significantly high number of weirs across the river has shaped the habitat into its current formation and locally checks the flow and intercepts bed load material flow through the valley.

Above: The mobile bed load contributes to a shifting and changing geomorphology with shoals of debris being deposited after spate flows.

Riparian trees, where present, provide cover, shade and subtle changes to flow patterns

The weirs consist of layers of large boulders laid onto the bed in a line arching upstream to the centre of the channel and back downstream at the margins.

In places, boulders have also been positioned to form large berms or croys that have deflected flows to form a meandering low-flow channel or 'thalweg'.

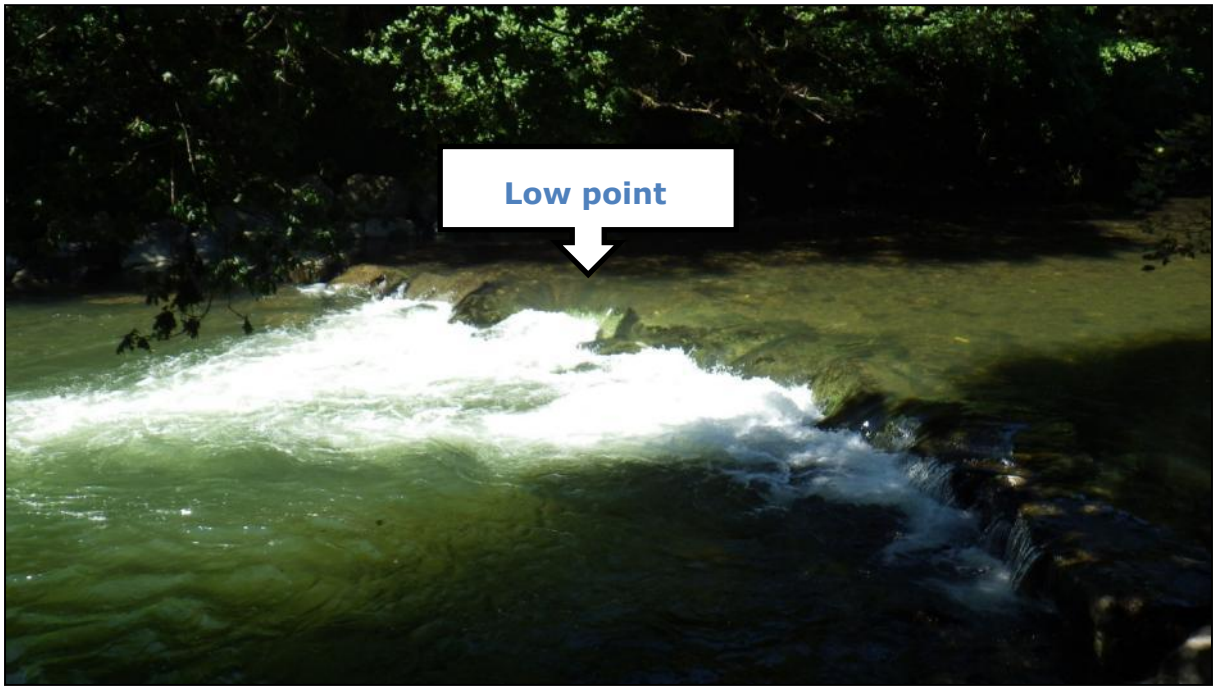
The installation of such structures would have been a substantial project requiring heavy plant machinery to transport and position the stones.

The weirs have altered the geomorphology of the river by way of trapping bed load migrating downstream to create shallow glides upstream of the structures and scouring deep pools downstream. Weir structures on many river systems are notorious for trapping fine sediments above and drowning out potentially good spawning and nursery habitat. Due to the steep gradient and high energy discharge found on the Ogmore, the impounded reaches have re-graded to form shallow, cobble and gravel bottomed glide and riffle habitat, some of which provides valuable spawning and nursery areas for salmonids.

Some of the weirs have created a succinct pool and riffle sequence – arguably improving habitat diversity in some sections of the river that might otherwise exhibit an overly-uniform channel. A complete removal of the entire structure may well result in good quality holding pools filling up with river bed material.

Conversely, the weir structures act as an obstacle for migratory fish running up from the Bristol Channel and the cumulative effect of the high number of weirs may significantly impede upstream fish migration, particularly for small salmonids during long periods of low flow.

The weirs vary considerably in terms of their ability to freely pass fish, with some appearing to obstruct passage more than others. Fluctuations in water level during spate, or drought conditions, will also affect the head loss across each structure. In times of low-flow the weirs will be more difficult for upstream migration.



The weir between bridges on the A4063 and the M4. A low point in the weir helps to ease fish passage. Although probably challenging for smaller fish, the weir is unlikely to significantly delay Salmonid migration.

A similar weir between bridges on the A48 and New Inn Road Southwest of Bridgend. Although not impassable in medium-high flows, the weir could become a substantial obstacle during periods of low flow. Weirs near the bottom of the system are a higher priority for action.

In the centre of Bridgend the river channel and margins have been heavily modified for flood defence purposes. Habitat quality is poor, with long sections of relatively uniform shallow glide. However, some variations in depth are to be found on the outside of bends, where deeper runs have formed. The channel is however, chronically lacking in habitat variation and cover.

The vertical concrete flood walls are barren of any significant vegetation and provide very little cover for fish. Some shade is provided by the sheer height of the walls but at midday, especially during low flow conditions, the river channel could be regarded as a poor environment for salmonids.

In one area visited concrete plinths overhang the channel providing some limited shade and cover. However, in some areas these plinths are situated on the shallower side of the channel and not over the deeper sections where fish tend to lie.

Above: The concrete flood defence walls through the centre of Bridgend deprive this stretch of marginal habitat, cover and shade. The straightened channel has created a homogenous bed form broken only by the weir pools.

Overhanging plinths (LB) providing token cover and shade.

In some places through the town the banks consist of large rip-rap style flood defences and here at least some vegetation has colonised and is established enough to overhang the channel. Through such an urbanised stretch of river these pockets of overhanging branches are highly important for fish populations and provide not only cover but also a food source for juvenile fish as terrestrial invertebrates occasionally drop from the overhanging vegetation and into the river.

Above and below: Vegetation growing over rip-rap flood defences providing some cover through the more urbanised stretches of the Ogmore

During the advisory visit two EA flow gauging weirs were inspected. The first was the crump weir situated adjacent to Ynysawdre School, upstream of the confluence of the River Llynfi. Water flows over the shallow crest of the weir structure and down over a smooth concrete ramp to the sill. Flow gauging crump weirs are known to be problematic for migrating fish. Although passable under high flow conditions, the structures are well known for delaying and even blocking upstream passage for smaller salmonids. In addition to the energy sapping nature of the obstacle, the waters at the base of the ramp are visibly aerated and probably provide very little resting opportunity for fish.

The EA are currently planning to install an eel pass on the structure but have no immediate plans to improve connectivity for fin fish.

The weir adjacent to Ynysawdre School; potentially a significant obstacle to fish passage on the Ogmore.

The second EA gauging weir visited is situated next to the Bridgend Recreation Centre just downstream of the A473. This weir appears to have a significant head-loss and generates high flow velocities over the downstream face. As with the gauging weir upstream, the river flows rapid and shallow. On the day of the visit the weir was almost dry on the far right hand side suggesting the depth of water flowing over the structure is critically shallow and that the structure represents a significant barrier to fish passage.

It is likely that only large migratory fish would have the strength to pass over such a barrier during average flows.

The EA gauging weir in the centre of Bridgend. A standing wave hints at the force of the water flowing over the weir and the subsequent obstruction the structure poses to fish passage.

Overall, the Ogmore through the lower reaches supports some good quality habitat for salmonids, but is at present prevented from reaching its full potential by barriers to fish passage and by the barren canalised nature of the more urban sections.

5. Conclusions

The cumulative effect of the weirs on fish migration is difficult to accurately quantify. Salmon and sea trout are able to make their way past the weirs to reach good quality spawning sites but there is currently no way of knowing how many fish are prevented, or at the very least delayed, from freely running upstream. Any delays in upstream migration, especially during warm dry spells will result in additional stress, increased predation pressures, higher mortality rates and ultimately decreased spawning escapement. The relatively steep gradient of the Ogmore (approx. 1m per 200m) will exacerbate these pressures.

Some of the rock weirs and the EA gauging weirs observed would be an energy sapping challenge for any fish attempting them.

The rock weirs in the most urban and modified parts of the river are actually providing much needed variation to an otherwise homogenous habitat. This in reality reflects the sterility of the straightened concrete-sided channel, as opposed to the benefits of the weirs.

There is scope to improve connectivity on OAA waters by the removal, or modification of certain weir structures. There is also an opportunity to enhance the habitat quality in the more urban reaches. These options are appraised in section 6 below.

6. Options Appraisal

6.1 Weirs

Option 1: Do nothing

All weirs to be left *in situ* and unmodified. Some weirs including the EA gauging weirs may continue to act as potential barriers to fish migration.

No cost: No money to be spent. Significant financial loss associated with under-performing fishery.

Medium risk: The town reach could adversely impact on the river meeting local fishery and WFD objectives.

Option 2: Removal of all weirs

This would be a major project requiring significant funding. Removal of all weirs would most likely have to be undertaken in stages working from downstream up.

High cost: Each removal will require significant logistical considerations and

will require heavy plant machinery. The whole project would take several weeks to complete.

High risk: Removal of all rock weirs would increase overall flow velocity. Geomorphology would rapidly change as the river adjusted to the new flow regime.

Complete removal of the gauging weirs would seriously hamper effective flood and drought monitoring and severely impact EA operations although removal of the crump weirs and a move to modern alternative flow gauging methods should be explored by the EA.

Potential benefits will be in the form of increased connectivity for fish populations on the Ogmore and easier fish migration. As natural geomorphology resumes, the weir pools will most likely start to become filled in by bed material migrating downstream. To mitigate this some of the large boulders from the weirs could be re-positioned in-channel to form small habitat features to promote localised scour – creating new pools and small spawning riffles.

Tangible flood risk benefits associated with complete weir removal.

Through the more urbanised reaches of the river, the weir structures are virtually the only features providing diversity in the bed profile and their complete removal should only be considered in combination with mitigating habitat enhancements.

Option 3: Modification of all weirs

Removal of the central boulder or two from each weir, or repositioning of stones to configure a low central plume. The shape of downstream pools would change but they are likely to be effective holding pools for angling without delaying active migration.

Medium High cost: Such a project would require heavy plant machinery but would have significantly reduced logistical considerations compared to option 2.

Medium Low risk: The substantive part of the structures would remain intact with very little change to overall flow velocities and geomorphology.

Proposed easement by removing or lowering a central boulder in the rock weir creating a solid central flume of water for easy fish migration.

As with option 2, habitat benefits would be in the form of improved connectivity and easier migration of fish populations. The pool diversity would remain and the rock structures through the urbanised reaches will continue to provide much needed habitat diversity. Any large stones removed to form central notches could be relocated onto shallow glide habitat to form individual lies and create useful habitat diversity.

If the complete removal of the EA gauging weirs is deemed unacceptable in the short term, modifications to ease fish passage by installing a low cost baffle system to the downstream slope should be explored. It is possible to slow flows on the downstream face of the crump weir by installing low cost baffle systems. This can be achieved without adversely impacting on the efficacy of the structure to measure flows. Projects exploring opportunities for

improving fish passage on gauging weirs have been trialled by the EA at various locations.

Low cost baffles installed onto an EA gauging weir on the River Enbourne.

Option 4: Trial removal and assessment.

The removal of one selected weir followed by a period of close monitoring

Medium Low cost: Will require heavy plant machinery and logistics but only at one location and costs can be limited by the careful selection of an accessible trial site.

Medium low, to low risk: Careful selection of a trial site will limit associated risks. Selection will, however, also have to consider logistics and plant access

and the final selection may have to be a compromise between cost, risk and anticipated habitat benefit.
The measurement of ecological benefits would be limited to the immediate habitat upstream and downstream of the selected structure. However, carefully monitoring and assessment of the effects of a trial removal will be extremely useful for future feasibility planning.

Option 5: Trial modification

A trial modification of one selected weir in combination with close monitoring and assessment.

Low cost: May require heavy plant but the small scale of the operation will keep costs down. Only minimal logistics involved (plant delivery and access to river).

Medium low risk: The operation should be assessed by a qualified structural engineer as removing one or two of central stones may affect the structural stability of the rest of the weir. The likely worst case scenario is that the notch might become wider than originally planned, as large stones peel away from the central notch. Given the size of the rocks, these are likely to naturally form a double croy like structure eventually becoming stable.

As with option 4, ecological benefits will be localised but could have wider implications in terms of addressing other obstructions on the Ogmore.

6.2 Further habitat enhancement options

The large boulders used to create the rock weirs appear to have stood the test of time and stayed put despite the steep gradient and occasional flood flows of the Ogmore. Boulders from the same source as those used to make the weirs, or from the weirs themselves (should they be dismantled) could be used as habitat features to break up more uniform sections of channel. This will bring much needed flow diversity into the system and provide a more dynamic habitat.

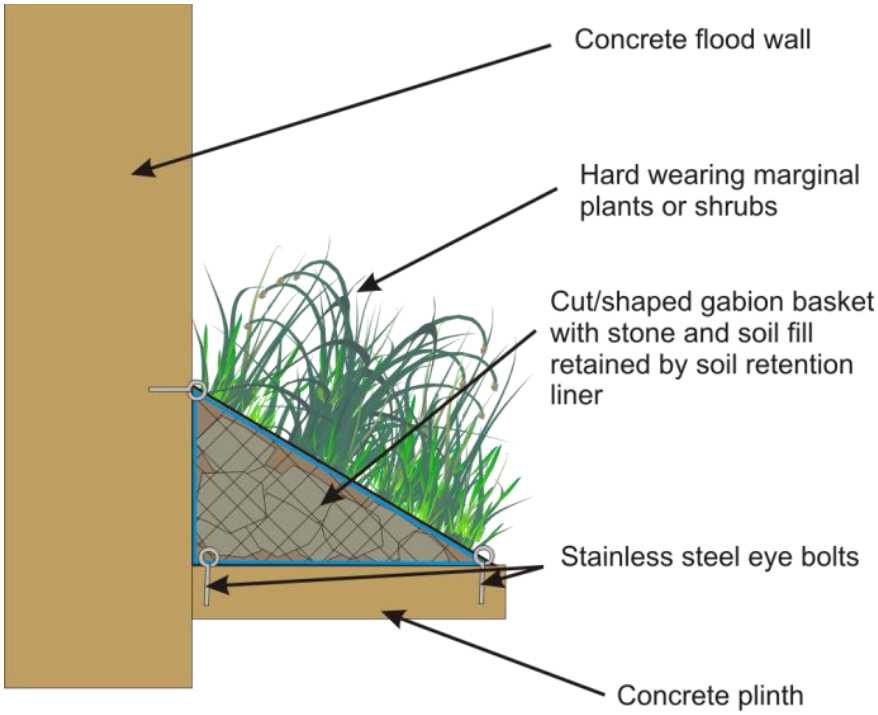
Boulders in the direct flow path will force water around them and create local scour pockets that will provide excellent resting and holding areas for fish. Thoughtfully positioned as a cluster of boulders or dotted across a shallow glide, these could promote some valuable variations in channel shape.

Moving such large objects about the channel would be a considerable task requiring heavy plant machinery and most likely the involvement of a civil engineering firm or river restoration contractor.

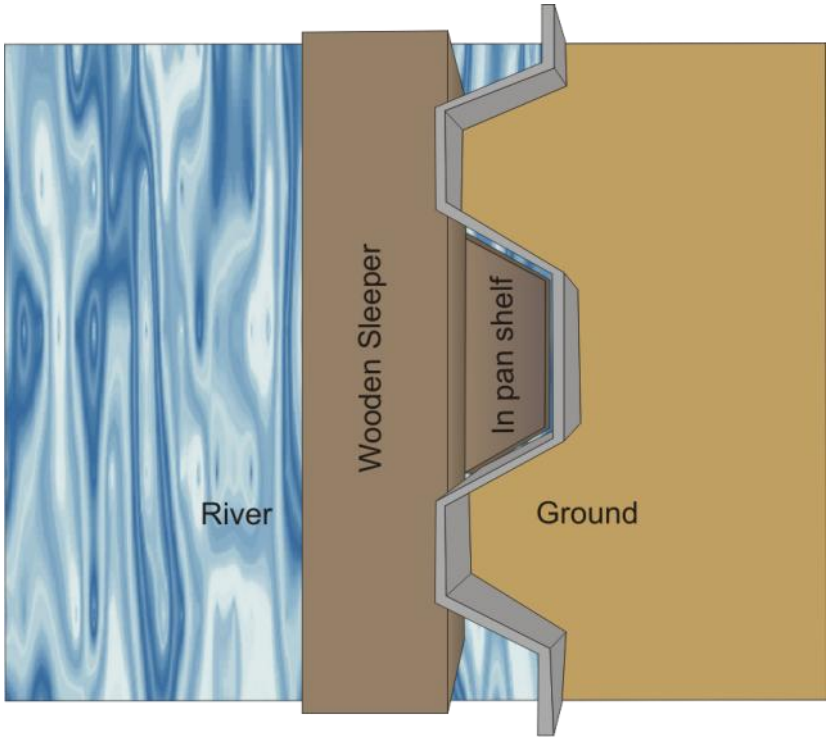
Through the centre of Bridgend the channel is desperately exposed and in need of improved marginal cover. There are a number of opportunities to 'green up' the channel margins through the town centre.

The concrete plinths observed in the channel could be used as bases for growing marginal plants. Gabion baskets could be purchased and cut and shaped to form a sloping basket, filled with stone and soil, and planted up with local willow, sallows or similar firm-rooted plants.

Provided the baskets are securely bolted to the plinth and wall, and are lined with a soil retention fabric to prevent wash-out, a man-made marginal shelf could be constructed that would create extra cover, invertebrate habitat, and improve the aesthetics of the sterile channel.



Above: A suggested technique for 'greening up' the concrete plinths overhanging the channel in Bridport centre
Below: In pan shelves fixed to the sheet piling to hold overhanging plants



Another option for greening up the engineered channel could be to fix shelves into the in-pans on the sheet piling revetments. This technique has been installed in other parts of the country with some success.

Shelves to fit into the sheet piling can be cut from marine ply and attached to a wooden sleeper. The sleeper can then be bolted onto the sheet piling and each shelf lined to prevent soil wash-out and planted with hard-wearing species that will overhang the channel

Once planted, a cage of rock netting (gabion basket material) could be fixed onto the sleeper to ensure the plants are not pulled free by cavitation forces during flood events.

Some sections of bank consist entirely of smooth vertical concrete flood walls. Here it might appear that there are very few opportunities for habitat enhancement. However, the concrete walls themselves do provide an opportunity.

In such a spate-prone catchment, flood risk is an overriding issue and must be considered carefully when planning habitat works. Enhancements such as woody debris installations must be securely fixed in place and able to withstand rapid flow rates.

This is where the concrete flood walls may provide an opportunity. Brushy boughs cut from nearby trees could be fixed to the concrete banks by short steel cables attached to large ring bolts. These floating structures would provide cover for fish whilst also being able to move up and down with rising and falling water levels.

7. Recommendations

The lowest risk options are options 4 and 5, the trial removal or modification of selected weirs.

The lowest cost option is option 5, as option 4 is not only a larger operation to undertake, but may also result in the weir pool filling-in and such a project may have to consider extra habitat enhancements (such as repositioning the removed stones) to mitigate the loss of the pool.

Both options will only produce local habitat benefits in terms of connectivity but will provide valuable monitoring and assessment that could provide a template for further works and improve the chances of securing backing and funding for a larger project.

A project involving both options 4 and 5 could make a very interesting comparison study and may attract interest (and perhaps funding) from an academic institution.

The modification of the EA gauging weirs mentioned in option 3 should be considered a priority. The bottom weir was the largest obstruction to fish passage observed on the day of the visit. It is recommended that the EA's National Fish Passage Panel is consulted for ideas in this regard.

A project to ease fish passage over the weirs without inhibiting the performance of the gauging stations could perhaps be designed and delivered in partnership with the EA as part of their Water Framework Directive obligations.

The recommended action is to trial the modification of one or two rock weirs and one EA gauging weir in order to ease fish passage.

If funding permits, a trial removal of one of the rock weirs could also be undertaken as a comparison study. The impact of these works should then be carefully monitored and assessed and the conclusions used to inform decision making for the other obstructions.

Acknowledgement

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