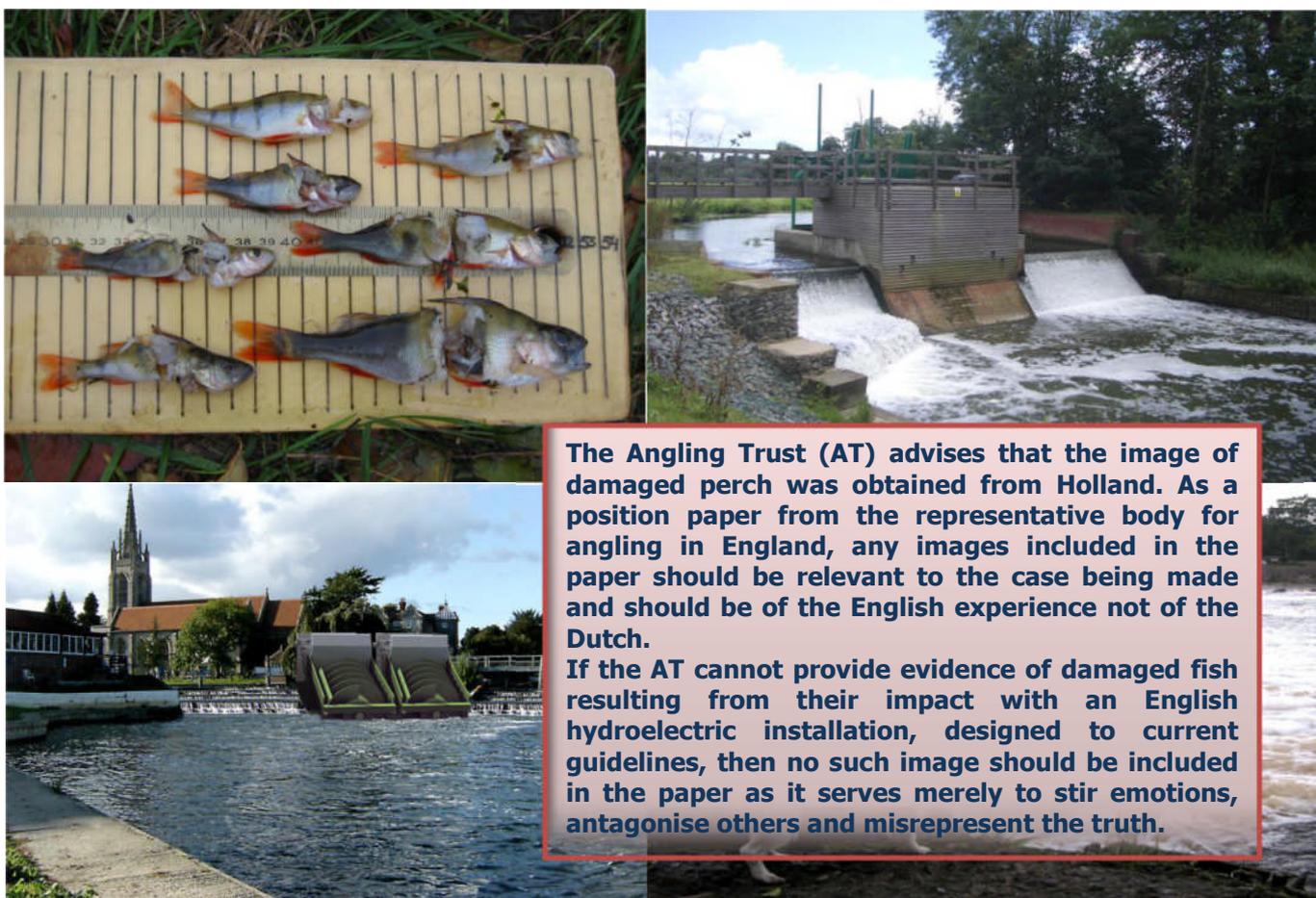


Angling Trust

Position Paper: Run of River Hydropower – BHA Critique



THE VOICE OF ANGLING



The Angling Trust (AT) advises that the image of damaged perch was obtained from Holland. As a position paper from the representative body for angling in England, any images included in the paper should be relevant to the case being made and should be of the English experience not of the Dutch.

If the AT cannot provide evidence of damaged fish resulting from their impact with an English hydroelectric installation, designed to current guidelines, then no such image should be included in the paper as it serves merely to stir emotions, antagonise others and misrepresent the truth.

Clockwise from top left: perch sliced in half by hydro blades; hydro turbines on the River Mole in Surrey; salmon leaping over Hexham bridge footings; an artist’s impression of Marlow weir with Archimedes screws installed.

November 2011

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Contents

1. A VISION FOR SUSTAINABLE HYDROPOWER	1
2. CURRENT EXAMPLES OF BAD PRACTICE.....	2
3. SCHEMES WHICH ARE CURRENTLY CAUSING, OR WILL CAUSE DAMAGE	3
4. DETAILED CASE STUDY: SETTLE HYDRO	4
5. CURRENT EXAMPLES OF GOOD PRACTICE	6
6. HOW DOES HYDROPOWER DAMAGE RIVERS AND FISH?	7
7. A 10 POINT PLAN FOR SUSTAINABLE HYDROPOWER	8 1

1. A VISION FOR SUSTAINABLE HYDROPOWER

The Angling Trust believes that climate change is one of the greatest environmental challenges facing humankind. It will have far reaching consequences for our ability to grow crops, supply drinking water and maintain biodiversity. We must transfer our energy generation methods to low carbon alternatives urgently and reduce our use of unsustainable energy.

The BHA agrees completely with the sentiment of this paragraph. The development of run of river hydropower does nothing that would harm the intention expressed. Indeed it will help by reducing the need for fossil fuelled electricity generation.

Generating electricity from river water flow could make a small contribution to that transfer, but most of this contribution will come from storage reservoir schemes. An almost negligible amount will come from run-of-river schemes (small dams, weirs and in-river turbines). This is because England is a relatively flat country, and despite our reputation, it is actually not very wet. There are also very substantial demands on water resources from abstraction for irrigation, industry and public water supply. Therefore river flows are not sufficient to generate any meaningful amounts of electricity for the vast majority of the time. The Government's own advisers confirm that low head schemes will produce insignificant amounts of power, contributing less than 0.5% of our total electricity demand, even if all the available sites were to be exploited. Many will not be exploited as they are not viable for other reasons, and therefore the actual contribution of run-of-river hydropower is likely to be in the region of 0.1 – 0.2% of current electricity demand.

It is important to understand the nature of the electricity generation and distribution system in operation in the UK when considering the position adopted by the AT.

Up to the formation of the Central Electricity Generating Board in 1957 local authorities, and larger estates, across the United Kingdom generated electricity locally and fed that electricity into private local networks. The energy sources were relatively small and there were often incidences of reduced supply, low voltages and frequency variation. The CEGB facilitated the central generation of electricity at large power plants. Demand on the system has increased to such an extent that the central generation and distribution model no longer meets the demand for energy needed to maintain current lifestyles.

In addition our world, as acknowledged by AT in the opening paragraph, is in crisis as a consequence of climate change. The UK government, along with many others, signed the Kyoto protocol and undertook to replace a proportion of its fossil fuelled energy with renewable energy by 2015 increasing that amount by 2020 and recently further increasing the renewable energy base by 2050.

Distributed generation is fundamental to meeting the commitments made in Kyoto within the timeframe allowed. Generation at the point of use not only relieves pressure on the national grid and distribution system, reducing the transmission and distribution losses, but also allows additional capacity from small renewable generation to feed into the network helping meet the Kyoto targets.

Small run-of-river hydro power plants will provide a useful input into the distributed energy network and to the mix of energies that the UK will need as we proceed into

Notes:

- **Hydropower is not a consumptive use of water and all hydropower production predictions are based on the ability of using a proportion of water available after other consumptive and environmental uses are satisfied. Often the reserve hydro flow is based on the naturalised flow so licensing is not treated differently to consumptive abstraction**
- **Of the remaining 1GW UK hydropower potential (1.6 GW is the capacity at present), all will be run-of-river – sufficient for 1 million homes.**
- **Hydropower will provide a total 6.5% of total renewable potential and 1% of 2020 electricity demand.**

the current century. The quantum of the energy produced is going to be small, that is not disputed, however it is an inescapable fact that the majority of English towns and villages are built up on or around rivers and in valleys where the potential for wind and solar power are reduced. Those same towns can contribute to the provision of their own electricity needs from the rivers on which they sit in an efficient and non-polluting way. The local and wider environmental effects of those new run-of-river hydro schemes has to be considered as part of the planning and licensing process and this is managed by the Environment Agency.

We believe that run-of-river hydropower may be acceptable where electricity generation can be carried out in a way which doesn't unduly damage the river environment and where the investment might benefit fish passage over an otherwise impassable barrier which could not be removed. We have provided some case studies where this balance has successfully been achieved. There are also opportunities for hydropower generation on sewage outfalls and in the water distribution network where it will have no environmental impact and there is a predictable supply of water.

We believe that beneficial schemes on our rivers are the exception to the general rule that run-of-river hydropower causes great **cumulative damage** to the ecology and geomorphology of rivers and makes a very small contribution either to electricity supply or CO₂ emissions reduction.

Because of this, we believe that permission to develop run-of-river hydropower should only be granted if the scheme can meet the **sustainable hydropower three stage test**:

1. if the development can be proved to have a very low impact on the ecology and other functions of the rivers both individually and cumulatively with other schemes and;
2. if it is installed on an existing weir and;
3. if that weir cannot be removed or eased for technical reasons or because it has some other legitimate and long standing function (such as navigation on heavily used rivers).

Note:

"Cumulative damage" is not fully defined pending research by EA, SEPA and NIEA and it is normally considered as cumulative "impact". Hydropower with fish passage facility improves river connectivity.

Under current regulations the Environment Agency in England regulates the granting of licences for the development of hydropower schemes and is first and foremost obligated to protect the environment from harm. Therefore no new hydropower scheme licensed by the Environment Agency will receive a licence if it would harm the environment. If it did then the Environment Agency would be failing in its duty.

There are a large number of structures on watercourses. Removal may not be possible or could be an expensive or protracted process in order to comply with planning and environmental legislation. (The BHA has published a paper on the legal and regulatory requirements for removal of obstructions in rivers.)

All schemes should also be considered in the context of other planned and potential developments on the same river and as part of an integrated energy strategy. We also believe that subsidies, such as Feed-in Tariffs¹, should only be available to schemes which also benefit the river environment, which is already the case in some EU Countries such as Germany.

The Environment Agency in its role as regulator and in considering the granting of any licence for a hydropower scheme will consider the impact of that scheme on the watercourse including existing licensed abstractions. In this way the cumulative impact of an additional abstraction is considered.

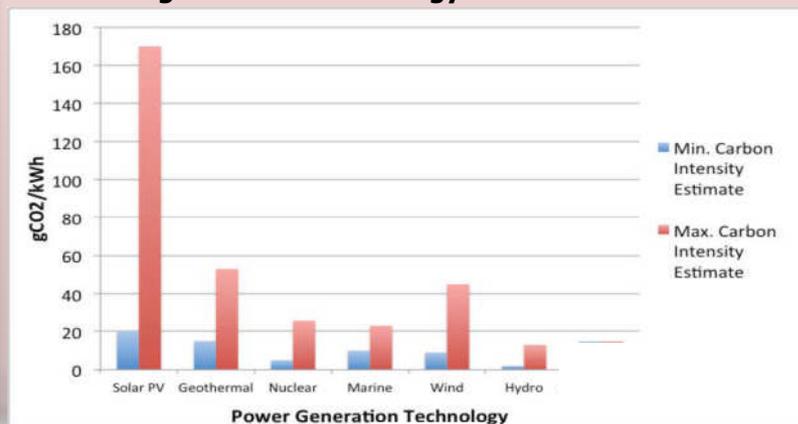
In order to incentivise private investment, in an attempt to meet their undertakings at Kyoto and EU National Renewable Energy Action Plans, the UK Government like many others has introduced the Feed in Tariff scheme. This scheme is engineered to ensure that developers of renewable energy of any kind can achieve a reasonable return on their investment. Without the Feed in Tariff the UK will fail to meet its commitment. The AT uses Germany to illustrate his point that some governments will not grant Feed in Tariff payments to schemes that do not benefit the

environment. By definition a renewable energy scheme that enables a fossil fired scheme to reduce its output and therefore CO₂ emissions gives an environmental benefit. If that same scheme also improves the connectivity of a watercourse there is a second benefit. Many run-of-river hydro schemes are also used as educational aids increasing the awareness of energy generation and conservation among the nations' young people, a further indirect environmental benefit.

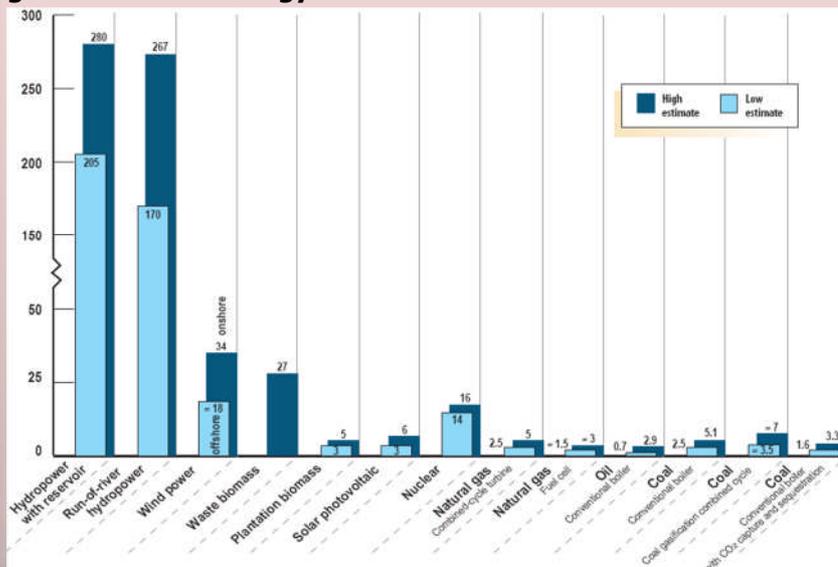
All energy generation has some environmental impact at some point either in the manufacture of the technology (e.g. solar panels), or in the generation of the power (e.g. CO₂ and other emissions from coal-fired power stations). Decisions about which sources of energy to use should be based on the balance between the amount of energy which is generated and the environmental impact of that process, throughout its lifetime.

This statement is correct in that all energy generation has some environmental impact. This acceptance of the reality of the situation is welcomed. It has been shown that in terms of energy balance a run of river hydropower will return many more times the energy used to develop it and in fact has the lowest whole life carbon footprint of any non-fossil fuelled generation technology with the possible exception of nuclear, but without the legacy problems associated with nuclear power plants.

Hydro fact 1:
Hydropower has the least carbon intensity of any renewable generation technology:



Hydro fact 2:
Hydropower has by far the best energy payback ratio of any generation technology:



Post 2011

SECTIONS 2 to 6 inclusive

Only specific comments are made by the BHA to sections 2 to 6 on good or bad practice examples.

It must be appreciated that correctly designed, monitored, regulated and operated schemes will not result in the potential for environmental harm. On occasions there can be difficulties in the operation of some schemes and, under such circumstances, the Environment Agency has the authority to require changes to the scheme operation and will make such demands of the operator as it sees fit.

2. CURRENT EXAMPLES OF BAD PRACTICE

1. The Good Practice Guidelines for hydropower developers have been found by the Environment Agency's own advisers to be "unfit for purpose" and were initially drafted only with the input of hydropower developers rather than any other interests. They are not written on a scientific evidence base, but are instead the result of negotiation with developers. They are now being reviewed following pressure from the Angling Trust.

Notes:

- **Who are the Environment Agency's "own advisers"?**
- **The Good Practice Guides (GPGs) were not initially drafted "only with the input of hydropower developers rather than any other interests". There was complete consultation with the EA's Fisheries Division which represented the fishing interests.**
- **The Guidance was written with all the available scientific evidence –most of which was provided by the EA Fisheries Division.**
- **The GPGs are not now being reviewed "following pressure from the Angling Trust". A review was always planned to monitor use of the Guidance and make improvements as necessary**

2. The current strategy is based on an approach of "first come first served" rather than any strategic assessment of the viability of sites and their cumulative impact on ecology and river functions.

3. Some hydropower licences have included conditions which allow for up to 110 fish to be killed in each 24 hour period (up to 100 coarse fish and eels and up to 10 salmon or sea trout). One recent draft licence proposes an 'allowance' of a 20% deterioration in fish welfare and movement on a river already 'probably at risk' of failing its Salmon Conservation Target in 2014. This is completely unacceptable and seems to be impossible to enforce in any case.

Individual licence applications should not be taken in isolation and the full facts why certain decisions are taken must be reviewed

Note:

- **The BHA believes that the reference to "'allowance' of a 20% deterioration in fish welfare" is misrepresented and that further study has been requested by the EA. The hydro scheme in question will not be allowed to degrade the river after the studies but the 20% level is an immediate stop. This is with regard to numbers of Salmon Redds in the deprived reach which are subject to significant inter-year variation. Basically 20% is meant to be the threshold which is agreed to be the natural variations during the study period**

4. The cost of applications for licences (£175) in no way reflects the vast costs incurred by the Environment Agency on regulating applications. For example, the Agency admitted that it had spent more than 8,000 man hours dealing with an application on Beasley weir (and has since spent many more). This scheme will generate a maximum of 85 Kw.

The cost of licencing is a matter for EA policy and is being reviewed at present. The BHA would not consider that it is its right to question any of the licencing charges or costs for any of the EA's activities which do not relate to hydropower. The above AT statement is inflammatory and must be regarded as such.

5. A draft community scheme has been developed on the River Lyn in North Devon to install a new concrete weir to generate hydropower. One of the last healthy salmon rivers in the country, this beautiful river is a Site of Special Scientific Interest. North Devon Council has wasted almost £150,000 on the development of plans for this scheme, which is now not going ahead.

Note:

- **The River Lyn scheme did founder on engineering costs generally. By the time an engineering consultant had input there was to be no new impoundment. The only impact was flow depletion in the deprived reach which was fully investigated - which the BHA commends.**

6. If a licence application is rejected, the developer has the right to appeal. However, if a legitimate affected party objects and the development is still approved, the person affected has no right of appeal. He may have a right to judicially review the decision but there are too many hurdles to cross and taking such cases is often prohibitively expensive. This obviously favours developers over those who stand to be affected by the schemes.

Within a planning or licencing appeal, any "legitimate affected party" may "object" or make representation within the appeal process. If, however, the appeal is successful as decided by an independent inspector from the Planning Inspectorate, then it is legally correct that there should be no further objection on the same grounds.

General comment on items 7, 8 and 9:

All conditions and stipulations on a hydropower developer in these clauses are within the legal remit of the EA.

7. There is no substantial monitoring of the impact of hydropower developments on the ecology and other functions of rivers being carried out despite hundreds of applications throughout the country.

8. No consideration is given to changes in future flows either because of increased abstraction or the effects of climate change itself.

9. Some hydropower schemes breach their licence and permit conditions and yet there is no enforcement from the Environment Agency as the breaches of each condition are not regarded as significant enough on the Compliance Classification Scheme to warrant action by the Agency. This means that a developer or operator could breach every single condition consistently is individually significant enough to cause damage to the environment (see example of Settle hydro below and detailed case study on page 4).

3. SCHEMES WHICH ARE CURRENTLY CAUSING, OR WILL CAUSE DAMAGE

The BHA takes these reports very seriously and has requested a response from all stakeholders in order to provide detailed and relevant comment.

1. On the River Mole in Surrey, overly large turbines at times reduce the upstream water level to below the level of the weir. The turbines then cut out, and there is then no water flowing over the weir until the upstream levels build up again. This results in large fluctuations of flows and levels which are visible at an EA gauging station several km downstream.

2. On the River Trent at Beeston, hydropower generation has caused great fluctuations in the flow which has apparently led to boats running aground. An excellent stretch of water for barbel fishing has been ruined.

3. At Settle Weir on the River Ribble, a community-funded turbine development was designed to produce a maximum of 49kW, has never achieved more than 39kW and up to mid-October 2011 has generated an average of 9.1kWh. It is regularly breaching its licence conditions, but no enforcement action is being

taken by the Environment Agency because none of the multiple breaches of each of the conditions of the permit in themselves is regarded as severe or causing environmental damage. This renders the conditions meaningless as, following this example, developers can simply operate outside the parameters of the conditions [See case study in box overleaf]

4. Another community scheme on the River Goyt at Torrs Mill was designed to produce an average of 27kWh, but in its first 2 years of life only produced an average of 17kWh, enough to supply the average electricity demand to just 30 houses.

Notes:

- **The reference to Torrs Mill is not relevant to "Schemes which are currently causing, or will cause damage".**
- **From an angling point of view the AT has conveniently forgotten that the 3m high vertical weir was built in 1790 and, until the hydro was installed in 2008 with a fish pass, no migration was possible. So where is the damage?**

5. On the River Lugg in Herefordshire, a Site of Special Scientific Interest, a scheme proposed to leave only an amount of water equivalent to low summer flows passing through a 300m stretch, which will ruin vital spawning habitat and destroy the salmon fishing rights of the riparian owner.

4. DETAILED CASE STUDY:SETTLE HYDRO

Notes:

The AT issued a separate Press Release on this project on 3 November 2011 on which the BHA had the following comments (AT issues in italics):

- *A failure to provide a detailed environmental assessment of the impact on fisheries and other aquatic ecology, but the EA issued a licence anyway;*

There was considerable work done on the fishpass to work out what best to do to it, and this was carried out. Too often when regulations imposed by the EA which answer specific concerns, the angling lobby criticizes the EA in that it is not a formal Environmental Assessment

- *Staff gauges had not been installed, as required in the plans.*

It is the BHA's understanding that the EA couldn't decide for some time where to put gauges and used a specific location in the meantime.

- *Markers on the fish pass were not maintained.*

Damage occurred during a flood which was rectified, but only after the river receded (it is not in an accessible location). For both of these the criticism is true, but pedantic

- *Water abstracted was not recorded on a daily basis.*

It was recorded, as implied by the point below

- *There were missing periods of data which appear to have been lost!*

Logging is automatic. There could have been a technical problem, but it demonstrates that the above point is untrue - penultimate point seems to contradict this statement

- *The control point for abstraction does not conform to the Detailed Project Plan.*

There are two sluices, one at the point of abstraction (manual) and one 10m down a short channel which is automatic. The top one can be closed, and the EA felt it appropriate that it was listed as the point of control. Practically the other sluice actually modulates the flow. But there is no way that in shutting the auto gate that water can flow in past the point of abstraction – so the point of abstraction is the point where the abstraction starts to be controlled.

- *Another gate to control abstraction is not watertight and therefore allows water to flow through the screw when it should be flowing through the fish pass.*

Flow was measured. It was 7l/s when shut, on a total licensed abstraction of 2800l/s, and a reserve fishpass flow of c. 700l/s.

- *The turbine sometimes operates for just 30 seconds, creating pulses of flow and rapid rises and fall in water levels which disrupt fish migration.*

This possibly relates to failed connection attempts in high water. The BHA is advised that the machine is within license when it does this.

- *No data has been released, despite numerous requests, about the flow of water coming out of the turbines. This is important because if it is too strong, it could attract fish away from the fish pass.*

Data does exist. We assume the EA is the agency to which it would be released as the regulator.

By David Hinks, Chairman of the Ribble Fisheries Consultative Association

Introduction

Settle Hydro is on the River Ribble and is placed on an old mill leat adjacent to Settle fish pass. The fish pass requires sufficient flow passing through it to make it passable to fish. The Ribble is one of the top six rivers in England and Wales for both salmon and sea trout. The Ribble Fisheries Consultative Association opposed the building of the hydro since we feared it would impede runs of migratory fish. The hydro started operating in Jan 2010. Since then we have constantly objected to the EA about its working. Our main objections:

We believe the hydro impedes the run of salmon through the fish pass.

In 2010 there were 238 violations of the Hands Off Flow (HOF), which is the required amount of water that should be left in the main channel. These occurred when the hydro was still working and abstracting water when the flow had dropped below the HOF. This is water lost to the fish pass thus preventing fish from ascending.

Even when the gate is supposedly shut on the screw because the level is below the HOF water is still passing through the turbines thus denuding the fish pass of water and preventing migration. No fish have

been seen to go through the fish pass when the hydro is working, but it is not clear why. This means at best a delay in migration and at worst the fish drop back down the river and do not spawn.

Environmental Assessment

The environmental assessment produced by Settle Hydro was not worth the paper it was written on, as it focussed on terrestrial ecology and did not analyse in any detail the impact on migratory fish. This seems to be a common feature of hydro schemes yet the EA nearly always accept these inadequate assessments when issuing licences.

The hydro is poorly managed

The first audit held in June 2011 showed up numerous faults. The transducer had not been correctly maintained thus leading to faulty operation. Staff gauges had not been installed. Markers on the fish pass were not maintained. Water abstracted was not recorded on a daily basis. There were missing periods of data which appear to have been lost! Plus of course the 238 violations for running and abstracting when the river was below the hands off flow.

The control point for abstraction does not conform to the Detailed Project Plan

According to the Plan the “existing sluice gate will be fitted with a mechanical actuator and position limit switches in order to allow it to be automatically operated by an electronic control system”. The document went on to give all the reasons for this. This was never done and the existing sluice gate (Point A on the plan) is a manual operation. This sluice gate is left in a semi open position therefore the inlet sluice is permanently filled with water thus providing a permanent start up flow on tap. We believe that a lot of the problems stem from this failure to electrify point A as specified.

Control point B has never worked

Point B is the entrance to the screw and is not water tight and allows water to run constantly through the screw even when not generating electricity. This is water which should be going down the fish pass and thus cuts into the window of opportunity for fish to ascend. This was the first time we had looked for this since previously we had been looking for pulsing (see below). Settle Hydro eventually got someone to look at it and then said it was fixed but the problem continued in total for almost 30 hours.

The hydro pulses

This is a condition where it will run for a very short time, sometimes as short as 30 seconds. The pulsing affects the fish pass with the water level changing rapidly and thus affecting the ability of fish to run. After the first audit we were assured it would not happen again but immediately it did.

Effect on the pool immediately above the weir.

The hydro effectively uses the pool above as its mill leat and draws water from this pool causing severe changes in height. The pulsing in this connection has a particularly deleterious effect. The habitat and environment of this pool is affected as is the fishing.

We still after 22 months do not know the exit flow volume from the outfall of the hydro

This is a crucial piece of information in terms of how the fish pass works. The principle here is that fish are attracted to the high volume of water and then easily find the more energetic flow from the fish pass. According to the terms of the abstraction licence the hydro outflow should not exceed 0.5m/s. We have asked the operating company and the EA for this information, but have still not received it. There are no screens to prevent fish entering the turbines from downstream.

Monitoring

No one monitors the performance of the hydro. Settle Hydro leave everything to the “instruments” and pick nothing up themselves so faults go totally undetected. Despite constant complaining by ourselves to the EA nothing was done until the first audit held June 2011, 17 months after the hydro started operating. This audit showed numerous problems and at least now the EA contact Settle Hydro when we report something. It is not our responsibility to monitor the working of Settle Hydro. It should be up to Settle Hydro to monitor its performance, something at which it has proved singularly inept.

Licence Breaches

Throughout the 22 months of working there have been numerous breaches of licence. The EA takes the view that they are minor thus giving the operator the impression they can do what they like and fish and fisheries do not matter.

We have questioned how many “minor” breaches it needs to take to add up to a major breach of the licence?

Environmental damage

We are constantly told by the EA that we need to prove environmental damage. We do not believe it is up to us to prove damage but that the hydro operator should prove that they are not causing damage and that they are operating within the terms of their licence.

5. CURRENT EXAMPLES OF GOOD PRACTICE

Whilst the BHA welcomes the inclusion of projects which the AT regards as examples of good practice, the final comment; "These are exceptional cases – most hydropower developments have a negative impact on fisheries. If in doubt, weirs should be taken out!" is counterproductive and negates any of the current work which is continuing in the review of the Good Practice Guidance.

1. On the River Teign a completely unsatisfactory scheme at Sowton Mill, granted a new licence without proper fisheries protection by the Environment Agency, is to be replaced by a much-improved scheme as a result of negotiations between the owner and the Teign Fisheries Association.
2. On the Duke of Northumberland's stretch of the River Aln which contains three challenging weirs for migrating salmon that cannot be removed for heritage reasons, a hydropower scheme will be used to fund efficient modern fish passes.

Note:

- **The AT states most weirs are unsuitable for hydro and should be removed. However it cites that the Duke of Northumberland owns three "challenging" weirs and they are all suitable for hydro! The introduction of fish passes which on any developed and proposed schemes fall into the same category so a blanket condemnation is completely out of place!**

3. A high weir on the River Monnow, a tributary of the River Wye, had been virtually impassable to migrating salmon for many years. A fish pass, funded by the Agency, has been installed adjacent to a new hydropower scheme, opening up the river for spawning salmon and many miles of juvenile habitat.
4. A hydropower scheme proposed by Gateshead Council on an impassable weir on the River Derwent, a tributary of the Tyne, will include a fish pass, opening up the river for migrating salmon and sea trout.
5. On the Dart, Totnes Weir at the head of tide, currently has an unsatisfactory fish pass. A new fish pass, complete with fish counter, is to be installed alongside an Archimedes Screw turbine. Funding of the fish pass and counter is coming from the developer who has worked closely with local fisheries interests.

These are exceptional cases – most hydropower developments have a negative impact on fisheries. If in doubt, weirs should be taken out!

6. HOW DOES HYDROPOWER DAMAGERIVERS AND FISH?

☒ By damaging and killing fish that pass through turbines either through poor screen design, or absence of screening.

Note:

- **All these points are addressed in the EA's Hydro Good Practice Guidance and its current review. If alterations are required to the first version (August 2009) the consultation and ongoing drafting work in which the AT is involved will implement these on the basis of hard evidence or best available opinions and decided by the EA.**

Put simply, hydropower can have the following impacts on fish and other wildlife and river functions:

The European Commission's Environment Directorate commissioned expert consultants to study the implications of low head hydropower on the potential for implementing the Water Framework Directive: *"Hydropower Generation in the context of the EU WFD. Project number 11418 | version 5 | 12-05-2011"*. In the report, the consultants describe the impacts of hydropower on rivers.

"Impacts of hydropower schemes can be distinguished in hydromorphological, physico-chemical and biological impacts on rivers and can be considered within a framework of interconnected effects:

☒ First order impacts: Immediate abiotic effects that occur simultaneously with dam closure and influence the transfer of energy and material into and within the downstream river and connected ecosystems (e.g. changes in flow, water quality and sediment load).

☒ Second order impacts: Changes of channel and downstream ecosystem structure and primary production, which result from the modification of first order impacts by local conditions and depend upon the characteristics of the river prior to dam closure (e.g. changes in channel and floodplain morphology, changes in plankton, macrophytes and periphyton). These changes may take place over many years.

☒ Third order impacts: Long-term, biotic, changes resulting from the integrated effect of all the first and second order changes, including the impact on species close to the top of the food chain (e.g. changes in invertebrate communities and fish, birds and mammals)."

☒ By creating, or perpetuating, structures in rivers which prevent fish from completing their life cycle. Nearly all fish, from minnows to salmon, need to move up and down stream to breed and feed.

☒ By trapping fish against screens.

☒ By reducing the amount of time that flows are suitable for migration of fish. Where there are several installations on a single river this can mean that fish are unable to reach their spawning or feeding grounds.

☒ By increasing the vulnerability of fish to predation from cormorants, otters and other fish by funnelling them through fish passes, or disorientating them by passing them through turbines.

☒ By depleting the flow of water in the stretch of river out of which water is taken to power the turbine. This has impacts on invertebrate life and the ability of fish to migrate through this depleted reach.

☒ By preventing the natural movement of sediment and gravel down the river.

These impacts increase with the number of schemes on a particular river. They should also be considered in the context of the fact that low head hydropower will generate an almost negligible amount of renewable electricity on a national scale.

7. A 10 POINT PLAN FOR SUSTAINABLE HYDROPOWER

The Angling Trust is calling for the following changes to policy and practice:

1. The Government should set out a clear vision for an integrated sustainable energy generation strategy. The absence of this strategy is leading to the current piecemeal and haphazard development, which is costing the nation dearly in vast public subsidies, regulatory costs and environmental impact.

Government has set out its path to 2020 policy. However, as the energy industry is privatised in the UK, Government cannot be prescriptive on how the targets are met. Central government has cascaded renewables targets down to local authorities who have had to develop regional renewable strategies and plans to include renewable energy generation schemes. These strategies and plans are then fed back to Government and monitored. The Feed in Tariff system relies on funds from the electricity supply companies not the public purse

The FIT Order, which applies to Great Britain, makes provision for the purposes of a feed-in tariffs scheme ("FIT scheme"), under which licensed electricity suppliers will pay small-scale generators of renewable electricity at prescribed tariffs for the amounts of electricity that they generate and the amounts that they export to the distribution network. http://www.fitariffs.co.uk/library/regulation/uksi_20100678_en1.pdf

2. The Environment Agency should ensure that the Water Framework Directive is implemented. This requires our rivers to achieve Good Ecological Status and for none of them to deteriorate. In most cases low head hydropower is not compatible with these aims.

The Water Framework Directive allows for some deterioration in ecological status of a water body within a classification so long as migration to a lower classification does not occur

3. The Environment Agency should prioritise its various duties to protect the environment above and beyond its requirement to promote economic development. It should not be involved in promoting opportunities for hydropower schemes, but should focus entirely on the protection of the ecology and other functions of rivers. For example, instead of drawing up a map of all the possible opportunities for hydropower development (which it has done) it should have drawn up a map of all the weirs which should be removed to improve rivers and the costs of so doing (which it has not done).

The Environment Agency exercise in mapping all obstructions in rivers in England presented a problem in terms of the number of obstructions within those water courses that disconnected them. The Water Framework Directive requires that the connectivity of watercourses should be improved where possible. The EA faced with this problem turned it into an opportunity for the hand-in-hand reconnection of watercourses and development of renewable energy where it was thought to be appropriate. The initial report showed 25,935 barriers and broke down this number as per the following table:

Total number of barriers	25935
Maximum power potential/MW	1178
Average maximum power potential/kW	45
Number of potential win-win schemes	4190
Number of low environmental sensitivity opportunities	1092
Number of medium environmental sensitivity opportunities	5631
Number of high environmental sensitivity opportunities	12040

4. The Government should only pay Feed In Tariffs (FITs), which are a subsidy to pay for renewable energy generation, to hydropower developers if the development passes the sustainable hydropower three stage test. These subsidies should only be spent on renewable energy generation which is not causing more problems than it is solving.

This is already happening. All new schemes being licensed have to comply with the Environment Agency's requirements which necessarily mean that they do not cause more problems than they solve, if they did then they would not be licensed.

5. The precautionary principle should be applied and developers should have to prove that their scheme is not damaging, rather than objectors having to prove that it will be damaging, before they are granted a licence.

The Environment Agency has taken the view that a risk based approach is more appropriate. There is a requirement on developers to provide sufficient information to demonstrate that the risks presented are outweighed by the potential benefits to the wider environment in ecological and socio economic terms.

6. Operating licences must not permit the killing of any fish in turbines.

- or by any other form of intervention on rivers??

7. No Go areas must be identified and a decision about the number and location of all developments on each river system should be established before any developments go ahead.

There is, as the AT knows perfectly well since it is involved, an active discussion around this topic area already

8. There must be a right of appeal for objectors who are legitimately affected parties to developments which are approved without addressing their objections.

This right already exists as stated in the BHA critique on Section 2, item 6. The AT seems wants the right to appeal the appeal outcome where the objections raised have been considered but overruled. This situation cannot be allowed to exist as it would only add to costs which the writer, from his own text, clearly does not wish to see. It would also make a nonsense of the appeal process

9. Abstractions for hydropower generation should no longer be regarded as non-consumptive. They should also be charged by volume.

The European Environment Agency definition of a consumptive use of water is:

"Water abstracted which is no longer available for use because it has evaporated, transpired, been incorporated into products and crops, or consumed by man or livestock. Water losses due to leakages during the transport of water between the point or points of abstraction and the point or points of use are excluded." [definition source: Joint OECD/Eurostat questionnaire 2002 on the state of the environment, section on inland waters.]

Run-of-River hydropower installations return all of the water abstracted from the watercourse and are therefore not consumptive under the definition, of consumptive use of water, agreed by all EU member states.

The question of abstraction charges was first argued in the UK in 1974 and ruled out for hydropower schemes on the very fact that it is a non-consumptive use of the water. No new evidence or good reason exists that this should be changed. To repeat an earlier comment, the BHA would never presume to interfere with charges levied by any regulator which does not appertain to the development of hydropower projects.

10. All hydropower developments should be closely monitored to ensure that licence conditions are being met and if they are not, then electricity generation must cease immediately until remedial action has been taken. All breaches of permit or licence must be actively enforced.