Hydropower Good Practice Guidelines Crib Sheet

The responses below are supported by the Salmon & Trout Association (S&TA) and Angling Trust (AT), and are aimed at helping our members with their responses to the Environment Agency Hydropower Good Practise Guidelines consultation.

The deadline is the 23rd September 2011. Please help us make our fisheries voices heard.

Consultation question 1

Are there other effects (both positive and negative) which should be considered on a cumulative basis?

For fish, we believe the cumulative impacts of multiple fish passes as well as weirs, both upstream and downstream, should also be considered. Fish passes are not 100% effective, so in order to improve ecological status of our fisheries in accordance with the Water Framework Directive (WFD), we need to put the use of fish passes within the catchment within the context of removing the barrier/weir altogether.

Consultation question 2

We would value your comments how these cumulative effects should be considered and assessed.

We believe the Government should require the Environment Agency (EA) to produce coordinated catchment strategies, which includes hydropower development opportunities, existing barriers and fish passage opportunities. It makes no sense for the environment for the EA to continue to permit on a first come, first serve basis. The potential cumulative impacts of the hydropower cannot be adequately managed in this way.

If there is any chance of producing these so called 'win-win' scenarios, current barriers to fish migration, along with hydropower opportunities, must be assessed together. We believe without doing so the EA cannot ensure modifications, such as hydropower developments, are not breaching the no deterioration requirements of the WFD. We cannot and should not continue to manage each pressure on our rivers in isolation.

Consultation question 3

Can you suggest ways in which additional protection can be provided for weir pools (where they have been identified as having special importance)?

The text adequately describes the issues, but the Guide makes no attempt to provide an appropriate solution. It correctly highlights the importance of moderate flows to maintain the morphology, and it is the frequency and periodicity of these flows which is lost with the proposed regime (as Table 2) of leaving a minimal "hands off" flow and allowing the turbine to take the remainder up to the mean flow or more.

The first step is to identify those weirpools at risk. This should be a quick and easy task for EA Area staff based on local knowledge, supplemented by relevant angling organisations where possible. Those weirpools will almost invariably be those that provide habitat diversity in an otherwise uniform impounded river reach.

Protection should be relatively straightforward with the following potential options:

1. A proportional distribution of flow, above a “hands-off”, between turbine and river.
2. A “stepped” residual flow.
3. A residual flow of 40-60% of the mean flow (see Q4 response below)

Consultation questions 4
a. Would you propose any changes to the flow tables for low head schemes? Y/N
YES

4b. Please provide your reasons and any supporting evidence
Despite the assurances of the above issues, the abstracted flow regimes do not take account of ecological and fisheries issues. The “scenarios” in Section 4 do adequately describe the issues for the common types of hydropower schemes, yet the guidelines fail to translate these to the “flow table” (Table 2).

Current expert scientific opinion highlights the importance of leaving a naturalistic flow regime – consisting of high, moderate and low flow events – in any reach depleted of water. The type of flows prescribed by the “flow table” – a “hands-off” quantity and turbine take up to the mean – has been demonstrated in peer-reviewed scientific papers to adversely effect the biomass and density of fish in the depleted reach as well as change the structure of the population.

The examples of hydrographs and flow duration curve presented in Figures 2 & 3 are of an extreme “flashy” low baseflow river. An example using a more typical moderate baseflow river would be more representative.

There have been a large number of attempts to define minimum flows. Those which provide a naturalistic flow regime are:

1. A proportional flow split above a “hands-off” allocation. If the depleted reach is the principle fish migration route, then that should always have a majority flow.
2. A system widely adopted in the US and adopted by Germany; the “Montana method” (Tennant 1976). This specifies a “hands-off” flow of between 40 and 60% of the annual mean. 40% provides “good” instream habitat, 50% “excellent” and 60% “outstanding”.

Consultation question 5
What are your views on including a requirement to ensure fish passage around all new weirs?
WFD prescribes that Good Ecological Status (GES) or Good Ecological Potential (GEP) depends on free upstream and downstream movement for all species of fish. It is unfortunate that the recently proposed legislation to secure this was has been delayed due to ill-informed lobbying. Nevertheless, any new weirs should include provision for all-species fish passage. However, this question should never arise as the presumption should be against the construction of new, or increased, impoundments.

The provision of technical or naturalistic fish passes is never the best solution for fish passage as they rarely prove to be 100% efficient or cause no delay, whether upstream or down (see for example *Hydropower Generation in the context of the EU WFD*). Therefore the default principle for all obstructions should be their removal, resulting in free passage for fish, invertebrates and sediments and improvement to the upstream morphology. Where removal is not possible for valid reasons, any

development on or adjacent to them should include a facility to allow passage of all fish species.

Consultation question 6
Are these revised screening and by wash requirements adequate for the protection of fish as part of the design of hydropower schemes? Y/N
NO

Please provide your reasons and supporting evidence
Crossflow turbines, a variety of impulse turbines, are correctly described as causing virtually 100% mortality to fish. Why, therefore, is their screening requirement seen as different to the other types of impulse turbine? If 3mm is necessary for other impulse turbines, then it should be for Crossflow. Any other option is illogical.

Screening for propeller and Francis turbines should be based on the size of fish at risk, not on the migration size of smolts. To have a differentiation between Regions is confusing and nonsense. The default screening size for larger propeller/Francis types should be 10mm throughout, or 9mm where there is a predominance of male silver eels. For smaller turbines of these types, 6mm screens should be the default. The guide rightly describes the impact of the small “polymer” variant of Francis turbines as being similar to Crossflow turbines and will therefore also require 3mm screens.

Top and breast shot waterwheels require similar screening to larger propeller/Francis turbines, as may 4 or 5 blade Archimedean screws depending on the results of current testing.

All developments, including waterwheels and Archimedean screws, require an adjacent bywash.

Table 3b provides for physical bar screens to access to turbines by upstream migrating fish. As waterwheels and Archimedean screw turbines are as dangerous as other types of turbines, it is illogical to exempt them from this requirement. Therefore a similar sized screen would be required to prevent fish entering the turbine.

The screen orientation, approach velocities and bywash as described in 9.3 and 9.5, are acceptable and schemes not complying with this should be rejected.

Consultation question 7
New weirs: Do you agree with this? Y/N
YES

Please provide your reasons and any supporting evidence
We wish to see clarification of the distinction between lowland rivers and upland streams, with clear reference to river type (size, gradient, fish zone) to avoid misinterpretation.
We agree with the EA presumption against the creation of new weirs solely for hydropower on lowland rivers. Any new weir is likely to affect adversely the river geomorphology and ecology with a risk of deterioration in Ecological Status, contrary to the requirements of the WFD.
For the same reason we would presume against the creation of new weirs on upland streams for high head schemes, unless it could be demonstrated that the effect would be undetectable or totally mitigated.

Consultation question 8

Do you agree with our general approach towards raising weirs as of hydropower schemes? Y/N
NO

Please provide your reasons and any evidence to support them
We would be against the raising any weirs, unless it could be demonstrated that the effect would be undetectable or totally mitigated.

Scenario 1 (weir raised to compensate for drop in water level as a result of the proposed scheme) is acceptable provided it does no more than compensate, ie the upstream water level is not raised.

Scenario 2 (weir raised by more than Scenario 1 to increase generating capacity) is unacceptable. Raising the water level will increase the length of the impounded reach with adverse effects on the geomorphology and ecology with a risk of deterioration in Ecological Status, contrary to the requirements of the WFD.

Consultation question 9
Do you have any suggestions for criteria which might be helpful when assessing more than one application for hydropower schemes on the same weir or impoundment?
Multiple schemes on one weir pose a number of problems:

- How is the 'available water' allocated?
- Who has prior call on any allowable abstraction above a Hands Off Flow?
- Who is liable if a Hands Off Flow or other licence condition is breached?
- Who would be the defendant in any case taken by interested parties whose legitimate interests were damaged?
- Who is liable if the part of the weir owned by one person is damaged by a scheme on the part owned by another?
- How is the potential divided attraction to upstream and downstream migrating fish towards offtakes/outfalls instead of the desired route to be prevented? It is more difficult even than single schemes.

Given the difficulties posed by these questions there is no sense in allowing more than one development especially as it effectively splits the generating potential with no overall renewable energy benefit. In principle this is no different from the means by which water available is shared for consumptive abstractions along a river, i.e. first come first served. The EA's regulatory responsibilities are not well served by it attempting to act as a broker between potential developers.

Consultation question 10
Do you agree with this approach to the permitting of high head schemes? Please explain with evidence what other model/criteria we should use.
High head schemes are normally in the upper reaches of river catchments, and as they are often above natural obstructions impassable to migratory fish, they are often treated as of little ecological value. However, they often contain populations of genetically unique brown trout populations which may also contribute to downstream populations. New obstructions, even low ones, may compromise free movement of these fish and must always include provision for fish passage as a default. These schemes often have very long depleted reaches, and therefore the default flows described in the tables are unsuitable. A flow regime following the Montana/German model (as previously described) of a residual flow of 40% of the mean flow should be the default.

Consultation question 11

a. Under what circumstances should environmental monitoring (pre and post scheme) be required in association with the development of a hydropower scheme?
We believe pre and post environmental monitoring should be required to gain information on all schemes where we do not already have sufficient information to show no/minimal impact of the scheme on the surrounding ecosystem and associated species. At the moment we do not believe this information exists for any scheme designs, and therefore we seek an extensive programme of monitoring to reduce this uncertainty.

b. What aspects of the environment should be monitored?
A full Environmental Impact Assessment (EIA) should be required.

c. Who should fund this monitoring?
The cost of monitoring should be incorporated into the cost of the scheme, therefore the developer.

The Government and its associated bodies, e.g. the EA and Defra, should fund the catchment planning and cumulative impact research.

Consultation question 12
Please let us know of any further points that you feel have not been captured in this consultation. If it relates to a specific piece of text it would be useful if you could cross reference it. If not please identify the issue clearly and provide any supporting evidence.
The presumption of the guidelines is that if schemes are compliant then they will be "fast-tracked" for licensing and will require no post-scheme monitoring. Therefore, the default position must be that the guidelines are fit for purpose and be at least ecologically neutral. The present iteration is therefore not acceptable. Any variation from the guidelines must be fully justified.