The river basin management plan for the Scotland river basin district 2009–2015

Chapter 4 Appendix

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Appendix A: Technical background information to heavily modified and artificial water bodies

Assessment of Heavily Modified Water Bodies and Artificial Water Bodies

To classify the ecological potential of heavily modified water bodies, account was taken of:

- measures already taken to mitigate the ecological impacts of the physical modifications to the water bodies;
- the extent to which additional mitigation:
  - would significantly improve the water bodies' ecological potential;
  - be practicable;
  - could be implemented without significant adverse impacts on the designated water use or the wider environment.

To make these judgements for the large number of water bodies concerned, SEPA used information from a variety of sources, including information provided by the water users and by other interested parties. To facilitate this, it organised a series of workshops to discuss the water bodies with their main users and with other organisations with relevant knowledge and interest.

To ensure that these first assessments could be made in time and consistently, given the information available, SEPA applied a series of assumptions. These were designed to help SEPA identify water bodies where additional mitigation is most likely to be needed to achieve good ecological potential.

The key working assumptions are summarised in Table A1 below.

Table A1: Assumptions used when assessing the ecological potential of heavily modified water bodies for this river basin management plan

Category of adverse impact	Assumptions used in deciding if additional mitigation is likely to be necessary to achieve good ecological potential
Adverse impact on the movement of Atlantic salmon and sea trout between habitats important in their life cycles.	In the absence of evidence to the contrary from an existing site-specific study: (a) If there was a known natural barrier downstream of the impoundment, it was assumed that the impounding works had no adverse impact on the movement of salmon or sea trout. (b) If the catchment upstream of the dam was less than 10km^2, it was assumed that any adverse impact on salmon or sea trout populations was likely to be no more than slight and consequently did not require mitigation to achieve good ecological potential. (c) If the catchment upstream of the dam was marginally greater than 10km^2 but very steep, it was assumed that any adverse impact on salmon or sea trout was likely to be no more than slight and consequently did not require mitigation to achieve good ecological potential.
Adverse impacts in the river downstream of the impoundment: (i) river flows necessary to maintain river habitats and their associated aquatic plants or animals; (ii) morphological characteristics; or (iii) water quality.	(a) If the length of river downstream of the impoundment in which any standards or condition limits for good ecological status were failed was less than 1.5km, it was assumed that the adverse impacts on the river water body were no more than slight and consequently did not require mitigation to achieve good ecological potential.
Mitigation measure	**Assumptions used to estimate what would be needed to deliver required mitigation**
Where structures or other mechanisms are in place to enable fish to access waters upstream of the impounding works, the volume and timing of flow releases is sufficient to enable and, where relevant, trigger fish migration.	(a) Fish passes only need to operate during periods of the year in which fish movements would be expected to occur and on days within those periods when, in the absence of water abstractions, river flows would be sufficient to enable fish movements: The proportion of the year in which a fish pass needs to operate will be lowest at impounding works located in the headwater areas of river catchments that have no spring runs and where downstream migration is provided for by other means (eg through turbines). It will be highest at impounding works located in the lower reaches of river catchments with spring runs and where downstream migration is not provided for by other means. Water needs were assumed to be between 40% and 75% of the volume required for year round operation, depending on the specific

	circumstances. (b) Different designs of fish pass use different volumes of water. It was assumed that Boreland passes would require less water than pool and traverse passes (6–7 million litres per day) which, in turn, would require less water than Alaskan baffle passes (17–18 million litres per day).
Establish an appropriate baseline flow regime.	(a) An appropriate baseline flow regime in the river downstream of the impoundment was assumed to comprise: (i) a minimum flow equivalent to at least Qn_{95}; and (ii) periods of variable flow higher than the minimum. (b) The presence of smaller streams joining the river downstream of the impoundment was taken into account in assessing variability of flows to the main river. This took into account size of the streams and also how close their confluences were to the impoundment.
Designated use	**Assumptions used to estimate if mitigation would have a significant adverse impact on the designated use**
Public water supply	(a) For single source water supply zones (ie no potential to balance demand using several sources) identified as being in deficit, any mitigation requiring a reduction in abstraction was assumed likely to have a significant adverse impact on the use. (b) For water supply zones with multiple sources, consideration was given to the overall effect of mitigation on the supply/demand balance for the zone.