



## SECTION 1: THE ENVIRONMENT

### INPUT 1A: DETERMINING THE RELEVANT PHYSICAL PARAMETERS OF THE WATERS OF THE TWEED AND EYE CATCHMENTS

**Rationale:** As fish, and the insects they feed on, are cold-blooded animals, their activity and growth is related to the temperature of the water in which they live. This can therefore have major impacts on their life histories: for example, when the scales of Tweed Salmon were first systematically read in 1929-30, it was found that less than 5% had been three year old smolts while when smolts were netted in the early 1960's, the little surviving data shows that over 50% were three years old. In recent years, smolt ages have returned to being more like those of 70 years ago. The most likely explanation for this is temperature – the 1940s to 1960s were a period of long, cold, winters when the growing seasons for Salmon in the catchment would have been much shorter than at present. The high proportion of three year old smolts in the 1960s would therefore have been due to the large numbers of juveniles that took three years to reach smolting size. However, very few two year old parr (which will become three year old smolts) are now found in the catchment, showing that growth is generally faster – the higher number taking only one year to reach smolting size is another consequence of this. As climate change continues, it is likely that three year old smolts will disappear from the population altogether.

The European Freshwater Fish Directive of 2006 defined prime quality Salmon spawning areas as having temperatures during the spawning season of less than 10°C. A pilot project measuring temperatures around the Ettrick and Yarrow in 2005 and 2006 found that the warming effect of St. Mary's Loch could keep the temperature in the Upper Yarrow above this temperature into the spawning season. Should temperatures generally increase, this area could cease to be classifiable as a prime spawning area. Since shading by bankside trees can reduce water temperatures, areas at risk from increased water temperatures need to be identified so that remedial action (tree planting) can be proposed.

### Policies for the Fifth Edition of the Management Plan:

#### **Policy 1A.1: Collect historical information on changes and variations in physical parameters**

- a. Record anecdotal evidence for floods and droughts affecting spawning streams and tributaries and trends over time.

#### **Policy 1A.2: Record water temperatures within the Tweed catchment**

- a. Record the temperature regimes at key points within the Tweed catchment.
  - (i) At fish counters (*the integral temperature monitors on the VAKI counters are not accurate and vary from machine to machine*)
  - (ii) Where there is wide, open, channel in nursery areas and it is suspected that summer temperatures may reach the upper limits for salmonids
- b. Collect data on the emergence times of salmonid fry to relate to altitude and other factors. This would show how the different temperatures in different parts of the catchment could relate to the formations of distinctive populations. It would also give better guidance on when instream works can take place.

### INPUT 1B: DETERMINING THE RELEVANT CHEMICAL PARAMETERS OF THE WATERS OF THE TWEED AND EYE CATCHMENTS



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**Rationale:** The abundances of Salmon and fry vary within the catchments of the Tweed and the Eye. One underlying factor in this could be the different chemical richness of the waters and this needs to be assessed to see if it is significant or not.

**Policy 1B.1: Map the chemical richness of the waters of the Tweed and Eye catchments**

- a. Take conductivity readings at all electro-fishing sites and relate these to the abundances of Trout and Salmon fry