UKTAG – Biological Status Methods Lakes – Benthic Invertebrate Fauna

What do we use as an Indicator?

Chironomid pupal exuviae (cast-off skins of the pupae of non-biting midges)

Why do we use Invertebrates?

Aquatic benthic invertebrates, of which chironomids are the largest family, are good indicators of nutrient enrichment and can be used to assess lake water quality. Passively drifting pupal skins accumulating at the lake leeward shore are easily collected. Among over 600 species of UK chironomid there will be the complete range of tolerances and sensitivities to nutrient enrichment, as well as other perturbations.

Sampling

Four samples of two hundred chironomid pupal exuviae are collected in different months from April to October. The water surface at the leeward shore is skimmed with a hand net to collect the floating skins (nominal mesh size: 250 µm). A list of taxa[1] present in the lake is collated from identification of the exuviae down to genus level.

What do we measure?

We measure the Average Score per Taxon

This is the average of the nutrient sensitivity scores of chironomid taxa found in the biological sample: calculated by dividing the total of the scores by the number of scoring taxa.

How do we decide the Biological Status?

The observed average chironomid scores at twenty, physically-contrasting reference lakes was modelled from the best set of predicting variables; lake surface area, mean depth, catchment area and retention time.

[1] Taxon (pl.taxa) taxonomic unit e.g. family, genus, species

With these physical data the average chironomid score can be predicted for any lake surveyed. The observed chironomid score is compared with the predicted score to calculate the Ecological Quality Ratio (EQR). EQR range from one, indicating invertebrate communities close to the natural state, to zero indicating a high level of human impact.
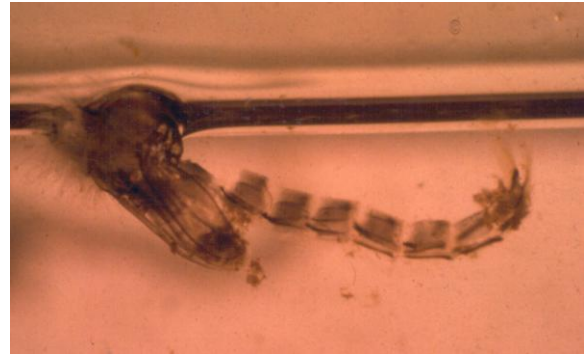
Close up of an exuviae

The Water Framework Directive requires EQR to be divided into 5 quality classes. For chironomids the boundaries between classes were derived from the proportions of sensitive to tolerant taxa that are found across the range of EQR.

A sample of exuviae

Biological Status Boundary Values

Status	EQR Values
High	0.77
Good	0.64
Moderate	0.49
Poor	0.36
Bad	<0.36

For more details see - (UKTAG Lakes Assessment Method, BENTHIC INVERTEBRATE FAUNA, CHIRONOMID PUPAL EXUVIAE TECHNIQUE (CPET) ISBN 978-1-906934-04-0))