UKTAG – Biological Status Methods
Rivers – Macrophytes

WFD UK TAG
Water Framework Directive
www.wfduk.org

What do we use as an Indicator?
Macrophytes (water plants visible to the naked eye)

Why do we use macrophytes?
Macrophytes provide habitats for fish and smaller animals, they bind sediments, protect banks and absorb nutrients. Macrophytes can indicate the impact of increased nutrients in rivers and are also influenced by other pressures such as channel engineering, water abstraction, flow impoundment or acidification. The types and amount of macrophytes present in a river can tell us how well that river is working. This method uses the principle that different macrophytes are associated with different amounts of nutrients (especially phosphorus) and flow conditions. Different combinations, quantity and numbers of macrophytes are expected to be present depending on the river type and its fertility.

Sampling
100 metre stretches of river are sampled during the summer in order to establish the presence of each macrophyte taxa[1] and to estimate its percentage cover in the area of the river channel surveyed.

What do we measure?
We measure 5 characteristics of the vegetation:

River Macrophyte Nutrient Index (RMNI)
This is a measure of which plants grow in the river and their association with high nutrients and is measured on a scale from 1-10. High scores are associated with species that dominate under enriched conditions. For example, fennel-leaved pondweed has a high RMNI score (9.6) and is therefore expected to dominate in highly enriched rivers. Other plants, such as broad-leaved pondweed have a lower score (5.7) and are replaced as nutrients increase. The overall observed RMNI score for the river is the cover weighted average of the individual scores of the different species found there.

River Macrophyte Hydraulic Index (RMHI)
This is a measure of which plants grow in the river and their association with flow and is measured on a scale from 1-10. High scores are associated with plants of low energy flow velocities. For example, arrowhead has a high RMHI score (9.3) and is therefore expected to dominate in sluggish rivers whereas water crowfoot has a lower score (6.7) and would be expected to dominate in faster flowing reaches. The overall observed RMHI score for the river is the weighted average of the individual scores of the different species found there.

Number of macrophyte taxa
The number of different aquatic macrophytes present.

Number of functional groups of macrophyte taxa
A measure of how many different growth forms of aquatic plants are present in the river.

Percent cover of filamentous algae
The extent of green filamentous algae in the channel.

How do we decide the Biological Status?
Statistical models are used to predict the community structure of macrophytes in a river. For each of the five characteristics, a ratio is calculated to compare what is observed in the river with what would be found in a similar river with no or very low human disturbance. The five ratios are combined into a single number, the Ecological Quality Ratio (EQR), that ranges from 1 (unimpacted or natural state) to 0 (highly degraded by pollution or other disturbance). This is subdivided equally into the five bands as required by the Water Framework Directive.

Biological Status Boundary Values

Status	EQR Values
High	0.8
Good	0.6
Moderate	0.4
Poor	0.2
Bad	<0.2

Depending on the type of river, a diverse flora of submerged and floating-leaved plants would represent a high status site (below left). A similar type of site which had only a few different species and large amounts of filamentous algae (below right) would be classed as poor or bad status.

For more details see -(UKTAG River Assessment Method MACROPHYTES (RIVER LEAFPACS) ISBN 978-1-906934-06-4

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

ENVIRONMENT AGENCY
NIEA Northern Ireland Environment Agency www.ni-environment.gov.uk
SEPA Scottish Environment Protection Agency