Environment Agency

Evidence

River macrophyte sampling: methodologies and variability

Project summary SC070051/S1

The Environment Agency has published a report reviewing current strategies in the sampling of river macrophytes across Europe. The optimum sampling length is examined along with number of surveys per water body and the factors that are responsible for variability in reported results.

River macrophytes - water plants visible to the naked eye – vary considerably, both spatially and temporally. This variation, combined with the difficult sampling environment of moving waters, can lead to much larger sampling errors in river monitoring surveys than those associated with land-based surveys.

Few studies have investigated the sampling errors associated with surveys of river vegetation. Major difficulties include variable river depths, uncertainty regarding the aquatic/terrestrial boundary for plants, difficulties in identifying taxa within critical plant groups, and variable, potentially low, detection rates.

This report reviews the current sampling strategies for river macrophytes in Europe, along with the optimum size of sampling unit for a river. Surveyors use a reach length ranging from two to 500 metres, with 100 metres being the most popular. These lengths are not justified in terms of species/area relationships, as they tend to be in terrestrial ecology, and there is a lack of evidence to justify the reach lengths used. Reach length could be varied to standardise the area surveyed, but this may not be appropriate given the dependency of river plants on some habitat features.

Fixed reach lengths of 100 metres have some advantages (for example in lowland areas where land use mosaics are on a scale of one kilometre or less), but may limit the comparability of surveys when habitat features vary over large scales. In upland rivers that vary physically over tens of metres, a fixed 100-metre survey length may be less problematic as uncommon habitat features, such as debris dams or waterfalls, are likely to account for only a small proportion of the total survey length.

Ideally, the length of river assessed should be a fixed multiple of river channel width to reflect the changing periodicity of major features, such as riffle and pool sequences. In lowland rivers, a longer survey length would also be consistent with the increasing size of individual plants and the beds that they form, compared to the vegetation of small upland streams. The significance of the effect of survey length on survey results is very dependent on the purpose of a survey and how the data is to be interpreted.

The number of surveys per water body varies with the purpose of the survey but is low in most EU countries. Relatively little research has been carried out on levels of species turnover between surveys in rivers of different types, or on the number of surveys necessary to characterise sufficiently a river's vegetation.

Factors that produce variations in monitoring results are reviewed in the report. There are little data on the variability of primary metrics such as species cover and richness, but some simulation exercises indicate that, as far as water quality metrics such as MTR (Mean Trophic Rank) are concerned, misidentification of species by a surveyor will in general lead to larger errors in the final classification of a river's ecological status than inaccurate plant cover estimates.

The report identifies areas for further study and highlights the particular need to examine spatio-temporal variations in macrophyte communities. A replicated hierarchical study within river basin(s) is recommended to help clarify the variability between reaches, seasons and years.

This summary relates to information from Project SC070051, reported in detail in the following output(s):

Report: SC070051/R1
Title: River macrophyte sampling: methodologies and variability
ISBN: 978-1-84911-139-3 **November, 2009**
Report Product Code: SCHO1109BRHI-E-P

Internal Status: Released to all regions
External Status: Publicly available

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This project was funded by the Environment Agency's Evidence Directorate, which provides scientific knowledge, tools and techniques to enable us to protect and manage the environment as effectively as possible.

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