

UKTAG TRANSITIONAL WATER ASSESSMENT METHODS MACROALGAE

FUCOID EXTENT

by

Water Framework Directive - United Kingdom Technical Advisory Group
(WFD-UKTAG)



Publisher: Water Framework Directive - United Kingdom Technical Advisory Group (WFD-UKTAG)

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March 2009

ISBN: 978-1-906934-11-8

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HEALTH AND SAFETY STATEMENT

WARNING— working in or around water is inherently dangerous; persons using this standard should be familiar with normal laboratory and field practice. This published monitoring system does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate health and safety practices and to ensure compliance with any national regulatory guidelines.

It is also the responsibility of the user if seeking to practise the method outlined here, to gain appropriate permissions for access to watercourses and their biological sampling.

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1. INTRODUCTION

This method statement describes a monitoring system for monitoring, assessing and classifying transitional waters in accordance with the requirements of Article 8; Section 1.3 of Annex II; and Annex V of the Water Framework Directive (2000/60/EC).

1.1. Geographic application of the method

The method can be applied to transitional waters in England, Scotland and Wales.

1.2. Quality element assessed by the method

The method enables an assessment of the condition of the quality element, "macroalgae", listed in Table 1.2.3 of Annex V to the Water Framework Directive.

1.3. Pressures to which the method is known to be sensitive

The method has been designed primarily to detect the impact of toxic substances on the quality element.

1.4. Parameters used to assess the quality element

The method uses the indicative parameter "upstream furoid site" to assess the condition of the quality element. The parameter is calculated using information on three furoid species: *Fucus ceranoides*, *Fucus spiralis* and *Fucus vesiculosus*. The calculation also depends on information on the presence or absence of any other macroalgal species.

2. SAMPLING AND ANALYSIS

2.1. Sampling method

Within this method, a "survey" means the sampling of the transitional water; "sampling" means the on-site identification and recording of all or any of the three indicator species if they are present, otherwise the recording of their absence and the recording of the presence or absence of any other species or genus of macroalgae.

2.1.1. Sampling sites

A survey should be made so as to determine the site (hereafter termed the upstream furoid site) that is closest to the freshwater limit of the transitional water and at which at least one of the

indicator fucoid species occurs. If no such site can be found, the survey should determine the presence or absence of other macroalgae within the transitional water.

2.1.2. Method

The algal survey should be visual. The salinity at the site should be measured or water should be sampled for determination of the average annual salinity overlying the algae.

2.1.3. Sample timing

A survey may take place at any time of year.

2.2. Analytical method

2.2.1. Macroalgae

Appropriate and contemporary taxonomic keys should be used to identify the presence or absence of the three indicator fucoid species or, if those species are absent from the survey, the presence or absence of any other macroalgal species in the survey.

2.2.2. Salinity

The salinity of water should be measured by a contemporary quality-controlled reproducible method traceable to the salinity of IAPSO standard seawater.

3. PROCEDURE FOR DERIVING THE ECOLOGICAL QUALITY RATIO FOR THE PARAMETER

3.1. Calculation of the observed value for the parameter

The observed value for the parameter should be given as:

- (i) the mean annual salinity at the upstream fucoid site; or
- (ii) if no upstream fucoid site can be found, the presence or absence in the survey of any other macroalgal species.

3.2. Calculation of the reference value for the parameter

Reference conditions were derived using a combination of expert opinion and best available sites. In the reference conditions applicable to transitional waters, one of the fucoid species is expected to be present in upstream parts of transitional waters with salinities in the range zero to < 5 (and the fucoid zone is unbroken in lower parts of the transitional water where appropriate habitat exists): in such conditions the reference value of this parameter is unity.

3.3. Calculation of the ecological quality ratio estimate (EQRE) for the parameter

The EQRE for the parameter in the transitional water should be given as the value in column 3 of

Table 1 that corresponds with the conditions defined in column 1 and 2 applicable to the transitional water.

| Table 1: Calculation of the ecological quality ratio estimate for the parameter | | |
|---|----------------------|----------|
| Column 1 | Column 2 | Column 3 |
| Observed value of parameter | | |
| Presence or absence of one or more furoid species in the transitional water | Mean annual salinity | EQRE |
| Present | 0 to < 5 | 0.90 |
| Present | 5 to < 10 | 0.70 |
| Present (or furoid zone interrupted) | ≥ 10 | 0.50 |
| Absent or restricted to seaward end but other macroalgal species present | >0 | 0.30 |
| Absent and no other macroalgal species present | >0 | 0.10 |

3.4. Calculation of the ecological quality ratio (EQR) for the parameter

The EQR should be calculated as the ratio of the EQRE to the reference value.

4. DEFINITION OF TERMS

Furoid – a brown seaweed of the genus *Fucus*.

Annex 1: Parameters

The parameters are:

presence or absence of any of three members of the genus *Fucus*:

Fucus ceranoides;

Fucus spiralis;

Fucus vesiculosus;

presence or absence of other macroalgal species.

Annual Average Salinity

Annex II: Worked example

Two transitional waters were surveyed at sites (Transitional water 1: A, B, C) and (Transitional water 2: AA, BB, CC), moving towards the freshwater limit.

Table 1: Example surveys

| Transitional water 1 | | | Transitional water 2 | | |
|----------------------|--|----------------------|----------------------|--|----------------------|
| Site | Species present | Mean annual salinity | Site | Species present | Mean annual salinity |
| A | <i>Fucus ceranoides</i> ; <i>Fucus spiralis</i> ; <i>Fucus vesiculosus</i> . | 23 | AA | No <i>Fucus</i> present Other macroalgae present | 25 |
| B | <i>Fucus ceranoides</i> | 8 | BB | No <i>Fucus</i> present No other macroalgae present | 17 |
| C | None | 3 | CC | No <i>Fucus</i> present No other macroalgae present | 7 |
| Upstream fucoid site | B | | Upstream fucoid site | Not found | |
| EQRE | 0.7 | | EQRE | 0.3 | |

The EQRE of transitional water 1, in which an upstream fucoid site was found, was 0.7. The EQRE of body 2, in which no upstream fucoid site could be found but other macroalgae were present, was 0.3.

The ratios of these estimates to the reference value (unity) was: water body 1, 0.7; water body 2, 0.3.

Annex III: Further reading

- Hiscock, S. 1979. A Field Key to the British Brown Seaweeds (Phaeophyta). Field Studies, vol. 5, pp 1-44.
- Wilkinson, M and P. Wood (2005): Macroalgae in estuaries (version 1). UKTAG Water Framework Directive Marine Plants Task Team Tools Paper. 43pp.
- Wilkinson, M. Wood, P. Wells, E & Scanlan, C. 2007. Using attached macroalgae to assess ecological status of British estuaries for the European Water Framework Directive. Marine Pollution Bulletin. 55, 136-150.