

## ECASA indicator

<b>Name</b>	<b>Infaunal Trophic Index</b>												
<b>DPSIR classe</b>	Impact												
<b>ECASA subgroups</b>	Benthos (macrofauna)												
<b>ECASA code</b>	ITI												
<b>Proposed by participant</b>	1 - SAMS												
<b>Definition, computation,</b>	<p>ITI (range 0-100) has been tested to some extent for assessing the impact of aquaculture:</p> $ITI = 100 - 33.3 \left( \frac{0 N_1 + 1 N_2 + 2 N_3 + 3 N_4}{N_1 + N_2 + N_3 + N_4} \right)$ <p>where <math>N_i</math> is abundance of organisms in trophic group <math>i</math>. See text below for explanation.</p>												
<b>Data required</b>	<p>Sampling and identification of benthic macrofauna community as described for Annotated sheet on Macrofauna univariate statistics. Categorisation of species identified into trophic groups using a published list (WRc, 1992) and determination of abundance in each trophic group so that formula above can be applied.</p>												
<b>Summary, scientific meaning, implementation</b>	<p>The purpose of the Infaunal Trophic Index (ITI) is to describe the feeding behaviour of soft bottom benthic communities in terms of a single understandable parameter. These animals fall into four groups; they are either suspension or deposit feeders that feed above, on or below the mud surface. The ITI was developed in California, USA and was first published in 1979 (Word, 1979). Since then it has been adapted for use in UK waters (WRc 1992) but the principles remain the same. Invertebrates have been divided into four groups based on what type of food is eaten, where it is obtained and how it is obtained. ITI trophic group 1 are suspension feeders (e.g. <i>Mya arenaria</i>), group 2 are surface detritus feeders, group 3 are surface deposit feeders and group 4 are sub-surface deposit feeders (e.g. <i>Capitella capitata</i>).</p>												
<b>Range of validity</b>	<p>Tested mostly for soft sediment communities and known to have limitations for coarse sediment communities. In addition, ITI needs to be interpreted with care when diversity is low (e.g. number of species <math>\leq 5</math>).</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 15%;">ITI</td> <td style="width: 35%;">Description of community (general definition from sea loch data sets)</td> <td style="width: 50%;"></td> </tr> <tr> <td>&gt; 50</td> <td>little effect</td> <td></td> </tr> <tr> <td>20 – 50</td> <td>enriched</td> <td></td> </tr> <tr> <td>&lt; 20</td> <td>degraded</td> <td></td> </tr> </table>	ITI	Description of community (general definition from sea loch data sets)		> 50	little effect		20 – 50	enriched		< 20	degraded	
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<b>Species concerned (fishes/molluscs)</b>	All												
<b>Related type of aquaculture</b>	All												
<b>Relevant environments for this indicator</b>	Soft sediment communities (further testing in coarse sediments required)												
<b>Geographic scale</b>	local												

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<p><b>Direct relevance to objectives</b></p> <p><b>Clarity in design.</b></p>	<p><b>C</b> – Used in Scottish regulation but not widely accepted</p> <p>– <b>C</b> - The list which assigns species to trophic groups exists for some environments but is a point of debate Species will change feeding mode due to the quality and quantity of food available and therefore species may occupy different trophic groups according to conditions. This effects the value of the index (Levinton 1991; Maurer et al., 1999; Dauer, 1984).</p>
<p><b>Realistic collection or development costs</b></p>	<p>– <b>C</b> - Main limitation is the cost of macrobenthic surveys and subsequent identification to species level similar to annotated sheet on Macrobenthic univariate indices. There is an additional cost/time in categorising species into trophic groups. Where the information does not exist for a particular species, the user will need to make an informed decision as to which group the species occupies.</p>
<p><b>High quality and reliability</b></p>	<p>– <b>C</b> – Quality and reliability variable depending on limitations previously described with trophic groups and environment.</p>
<p><b>Appropriate spatial and temporal scale</b></p> <p><b>Obvious significance</b></p>	<p>– <b>B</b> – Appropriate for assessment of spatial and temporal gradients</p> <p>-- <b>B</b> – Summarises information into a single understandable index. Differences between species in trophic group 1 (suspension feeders) and trophic group 4 (deposit feeders) and the effect of the relative abundances of these groups on the value of the index can be easily explained to stakeholders. In addition, limitations can be easily explained to stakeholders.</p>
<p><b>advantages</b></p> <p><b>disadvantages</b></p> <p><b>references</b></p>	<p>Dauer, D.M. 1984. The use of polychaete feeding guilds as biological variables. <i>Marine Pollution Bulletin</i> 15: 301-305.</p> <p>Levinton, J.S. 1991. Variable feeding behaviour in three species of <i>Macoma</i> (Bivalvia: Tellinascea) as a response to water flow and sediment transport. <i>Marine Biology</i> 110: 375-383.</p> <p>Maurer, D., H. Nguyen, G. Robertson and T. Gerlinger, 1999. The infaunal trophic index (ITI): its suitability for marine environmental monitoring. <i>Ecological Application</i> 9: 699-713.</p> <p>Mearns, A.J. and J.Q. Word. 1982. Forecasting effects of sewage solids on marine benthic communities. In: <i>Ecological Stress and the new york Bight: Science and Management.</i> (ed mayer) GF. Columbia S. Carolina Estuarine Research Federation. pp. 495-512.</p>

## ECASA indicator

### References

Word, J.Q. 1979. The Infaunal Trophic Index. In, Annual Report 1978. Coastal Water Research Project, El Segundo, California, USA, pp. 19–39.

Word, J.Q. 1980. Classification of benthic invertebrates into Infaunal Trophic Index feeding groups. In, Coastal Water Research Project Biennial Report 1979–1980. SCCWRP, Long Beach, California, USA, pp. 103–121.

WRc plc 1992. Development of a biotic index for the assessment of the pollution status of marine benthic communities. WRc report no. SR2995

### State of validation

Not widely accepted as an indicator of impact but may merit further testing. Used partly in Scottish regulatory monitoring surveys and modelling and tested in North American waters.

### recommendations