

Name	Ammonia in pore water																												
DPSIR class	Impact																												
ECASA sub-group	Sediment																												
ECASA code	AMMPW																												
Proposed by participant	14 – Venice University																												
Definition, computation,	A "relative" rank can be obtained by considering the ratio between the value of the measure at the impacted and reference site. The calculation of this ratio, implies the application of a control or multi-control sampling strategy (Danovaro et al., 2004; Chamberlain, 2002; Porrello et al., in press).																												
Data required	Ammonia measurements, expressed on the surficial sediment layer (top 1.5 cm).																												
Summary, scientific meaning, implementation	N-NH ₄ ⁺ concentration in sediments pore water are higher with respect to the upper water column, because this compound is released by the degradation of organic matter. This process includes deamination of proteins and reduction of nitrate with ammonium production. A recent study conducted in the Northern Adriatic Sea (Aleffi et al., submitted), found that ammonia concentrations in pore water were significantly higher beneath a mussel farm than																												
Range of validity	<table border="1"> <thead> <tr> <th></th> <th>Mean pore water concentration (1.5-2 cm)</th> <th>ratio to reference [imp.]/[ref.]</th> <th>References</th> </tr> </thead> <tbody> <tr> <td>NH4 reference Stat. [microM]</td> <td>29,25</td> <td></td> <td>Aleffi et al.,submitted</td> </tr> <tr> <td>NH4 impacted Stat. [microM]</td> <td>63,57</td> <td>2,17</td> <td></td> </tr> <tr> <td>NH3 reference Stat. [microg/ml]</td> <td>67,5</td> <td></td> <td>Chamberlain, 2002</td> </tr> <tr> <td>NH3 impacted Stat. [microg/ml]</td> <td>975</td> <td>14,44</td> <td></td> </tr> <tr> <td>NH4 flux reference Stat. [microM/m2 h]</td> <td>20</td> <td></td> <td>Christensen et al., 2003</td> </tr> <tr> <td>NH4 flux impacted Stat. [microM/m2 h]</td> <td>275</td> <td>13,75</td> <td></td> </tr> </tbody> </table>		Mean pore water concentration (1.5-2 cm)	ratio to reference [imp.]/[ref.]	References	NH4 reference Stat. [microM]	29,25		Aleffi et al.,submitted	NH4 impacted Stat. [microM]	63,57	2,17		NH3 reference Stat. [microg/ml]	67,5		Chamberlain, 2002	NH3 impacted Stat. [microg/ml]	975	14,44		NH4 flux reference Stat. [microM/m2 h]	20		Christensen et al., 2003	NH4 flux impacted Stat. [microM/m2 h]	275	13,75	
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Species concerned (fishes/molluscs)	All																												
Related type of aquaculture	Mussel culture: <ul style="list-style-type: none"> • Longlines (Aleffi et al., submitted; Martincic 1998; Chamberlain, 2002); • Rafts (Chamberlain, 2002). finfish culture:																												
Relevant environments for this indicator	Marine cages (Porrello et al., in press). <ul style="list-style-type: none"> • Sheltered areas (Chamberlain, 2002). Coastal waters not protected by bays (Aleffi et al., submitted; Martincic, 1998).																												
Geographic scale	local																												

Table 1. NH₄⁺ pore water concentrations in sediment surficial layer, measured in recent EI studies.

ECASA indicator

Direct relevance to objectives	B
Clarity in design.	A
Realistic collection or development costs	B
High quality and reliability	
Appropriate spatial and temporal scale	
Obvious significance	B
advantages	
disadvantages	
references	<p>Aleffi, I.F., Bettoso, N., Solis-Weiss, V., Tamberlich, F., Predonzani, S., Fonda-Umani, S., submitted to ICES – Journal of Marine Science. Effects of suspended mussel culture on the macrozoobenthos in the Gulf of Trieste (Northern Adriatic Sea, Italy).</p> <p>Chamberlain, J., 2002. Modelling the environmental Impacts of Suspended Mussel (<i>Mytilus edulis</i> L.) Farming. Ph-D Thesis, Napier Univeristy, Edimburgh.</p> <p>Christensen, P.B., Glud, R.N., Dalsgaard, T., Gillespie, P., 2003. Impacts of longline mussel farming on oxygen and nitrogen dynamics and biological communities of coastal sediments. <i>Aquac.</i> 218: 567-588.</p> <p>Danovaro et al., 2004. Sustainable impact of mussel farming in the Adriatic Sea (Mediterranean Sea): evidence from biochemical, microbial and meiofaunal indicators. <i>Marine Pollution Bulletin</i> 49: 325-333.</p> <p>Martincic, B., 1998. Modello di Carrying capacity applicato alle mitilicoltura in sospensione. Ph-D Thesis in aquaculture, University of Florence, Pisa and Udine.</p> <p>Porrello, S., Tomassetti, P., Manzueto, L., Finoia, M.G., Persia, E., Mercatali, I., Stipa, P., in press. The influence of marine cages on the sediment chemistry in the Western Mediterranean Sea. <i>Aquac.</i></p> <p>Porrello, S., Tomassetti, P., Manzueto, L., Finoia, M.G., Persia, E., Mercatali, I., Stipa, P., in press. The influence of marine cages on the sediment chemistry in the Western Mediterranean Sea. <i>Aquac.</i></p> <p>Regnier, P., O'Kane, J.P., Steefel, C.I., Vanderborght, J.P., 2002. Modeling complex multi-component reactive-transport systems: towards a simulation environment based on the concept of a Knowledge Base. <i>Applied Mathematical Modelling</i> 26: 913-927.</p>
State of validation recommendations	