

## ECASA - Model description template

<b>NAME of model:</b> <i>MOM (dispersion model)</i>	<b>Reporter/institute (a):</b> <i>Carina P. Erlandsson, Address: University of Gothenburg, Box 450, 405 30 Gothenburg, Sweden Phone no: +46317862854 Email: caer@gvc.gu.se (b)Ander Stigebrandt Address: University of Gothenburg, Box 450, 405 30 Gothenburg, Sweden Phone no: +46317862851 Email: anst@gvc.gu.se</i>
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### Short DESCRIPTION of model (b)

general description: *The dispersion model calculates the spreading of feed and faeces from the farm and the resulting maximum carbon flux to the sediment  $F_{c_{max}}$  ( $\text{gC m}^{-2} \text{day}^{-1}$ ). The dispersion increases with the sinking time and the variability of the current field, and is calculated for each cage resulting in local maxima. The variance of the current speed is used to calculate the dispersion of particles. The mean current is assumed to displace but not spread the particles. Sedimentation is assumed to be zero if the variance of the current speed is above the threshold value of resuspension. The dispersion model is one of four sub-models in the MOM model.*

main state variables (c): *maximum carbon flux to the sediment  $F_{c_{max}}$  ( $\text{gC m}^{-2} \text{day}^{-1}$ )*

scale to which applicable (d): *Local (A)*

forcing data needed (e): *The output of particulate organic matter (feed and faeces) from the farm (given by the fish model and input of the factual feed conversion ratio), current velocities (observed during minimum 2 weeks), sinking velocities of feed and faeces, water depth at the farm site, and cage depth.*

### possibly relevant INDICATORS (f)

driver:  
pressure:

state: *sedimentation rate of organic matter at the bottom, oxygen concentrations in the bottom water (calculated by the benthic model), biodiversity*

impact:  
response:

### STATUS of model (g)

origin(ator), present development state (has been tested, under development, etc)  
present use, claimed robustness and scientific basis of this:

*The dispersion model was originally developed for Salmon (Stigebrandt and Aure, 1995, Stigebrandt et al. 2004). This sub-model of MOM will not be further developed during the*

*ECASA project, since it is not fish specie dependent, but depend on input of known sinking velocities of feed and faeces.*

#### **IMPLEMENTATION OF MODEL**

state of implementation (h):

state of documentation: *The dispersion model was described in Stigebrandt et al. (2004) and in detail in Stigebrandt and Aure (1995).*

intellectual property concerns (i): *none*

#### **TESTING**

summary of conditions and measurements needed - including critical forcing data (j)  
criteria for model rejection

#### **OTHER models**

Used with this model (k): *The MOM model: fish model, water quality model, dispersion model, and benthic model.*

Similar models (l): *DEPOMOD, MERAMOD*

#### **REFERENCES cited**

*Stigebrandt, A., Aure J., 1995. A model for critical loads beneath fish farms. Fisken och Havet No. 26, Institute of Marin Research, Norway, 1-27+appendix 1, 27 pp, by A. Stigebrandt (In Norwegian).*

*Stigebrandt, A., Aure, J., Ervik, A, Kupta Hansen, P., 2004. Regulating the environment impact of intensive marine fish farming III. A model for estimation of the holding capacity in the Modelling-Ongrowing-fish farm-Monitoring system. Aquaculture 234: 239-261.*