Potential farm management practices for the reduction of aquaculture impact

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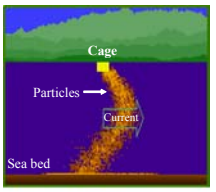
1. The MERAMOD model software predicts solids deposition from Mediterranean fish farms using information on depth, cage layout, current speed and direction, feed input (i.e. ration), species, waste settling velocities, feed digestibility, feed water content and feed wastage (uneaten).

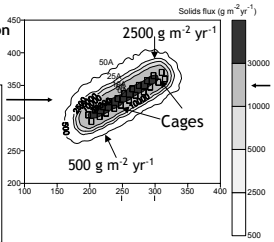
2. In the model, particles settling through the water column are subject to the current speed and direction measured for the site and random walk, a process which approximates turbulence effects.



3. Solids flux is calculated for each grid cell (g solids m^{-2} bed yr^{-1}). High values of flux cause detrimental effects in the sediments resulting in modification or total destruction of the benthic faunal community (high environmental impact). Low values of flux result in less impact and a healthy benthic community, providing good environmental conditions for fish culture.

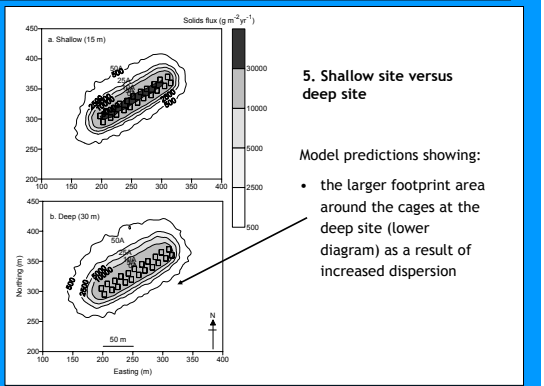
4. Interpretation of diagrams

Plan view of the sea bed showing deposition footprint. Solids flux (and benthic impact) is higher where colours are darker underneath cages



Solids flux - the rate at which waste faecal and feed particles deposit on the sea bed

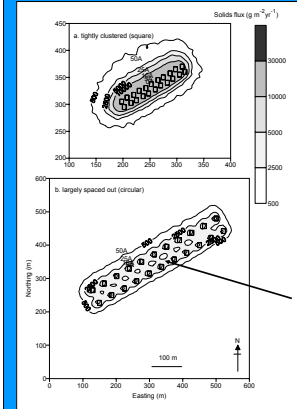
(grams solids per square metre of bed per year)



5. Shallow site versus deep site

Model predictions showing:

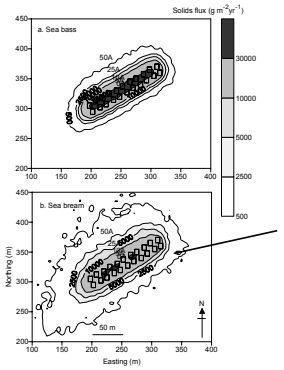
- the larger footprint area around the cages at the deep site (lower diagram) as a result of increased dispersion



6. Large spacing between cages

Model predictions showing:

- large and less severe footprint when clustered square cages are replaced by circular cages spaced by 30 m (lower diagram)
- for the spaced out cages, areas of lower flux are predicted in between lines of cages which will tend to assist sediment processes



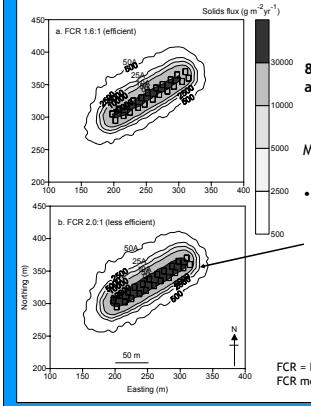
7. Impact of different species

Bream faeces are finer and settle more slowly than bass faeces

Model predictions showing:

- higher flux (impact) predicted below bass cages as wastes from bream are dispersed more widely (lower diagram)

This indicates that bass should be placed in more dispersive, deeper areas of the site.

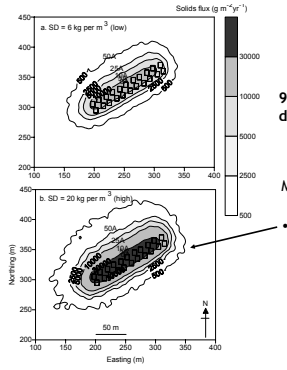


8. Test of efficient FCR against a less efficient FCR

Model predictions showing:

- higher flux (impact) underneath the cages with the less efficient FCR

FCR = Food Conversion Ratio - efficient FCR means less food is required for growth



9. Low and high stocking density

Model predictions showing:

- the higher stocking density causing more of an impact underneath the cages

This information is available in a MERAMED newsletter (www.meramed.com)

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