



The utility of bathymetric echo sounding data in modelling benthic impacts using NewDEPOMOD driven by an FVCOM model.

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The Scottish Environmental Protection Agency (SEPA) are currently implementing new regulations for consenting developments at new and pre-existing fish farms. Currently, a 15-day current record from multiple depths at one location near the site is required to run DEPOMOD, a depositional model used to determine the depositional footprint of waste material from fish farms, developed by Cromey et al. (2002). The present project involves modifying DEPOMOD to accept data from 3D hydrodynamic models to allow for a more accurate representation of the currents around the farms. Bathymetric data are key boundary conditions for accurate modelling of current velocity data. The aim of the project is to create a script that will use the outputs from FVCOM, a 3D hydrodynamic model developed by Chen et al. (2003), and input them into NewDEPOMOD (a new version of DEPOMOD with more accurately parameterised sediment transport processes) to determine the effect of a fish farm on the surrounding environment. This study compares current velocity data under two scenarios; the first, using interpolated bathymetric data, and the second using bathymetric data collected during a bathymetric echo sounding survey of the site. Theoretically, if the hydrodynamic model is of high enough resolution, the two scenarios should yield relatively similar results. However, the expected result is that the survey data will be of much higher resolution and therefore of better quality, producing more realistic velocity results. The improvement of bathymetric data will also improve sediment transport predictions in NewDEPOMOD. This work will determine the sensitivity of model predictions to bathymetric data accuracy at a range of sites with varying bathymetric complexity and thus give information on the potential costs and benefits of echo sounding survey data inputs.

Chen, C., Liu, H. and Beardsley, R.C., 2003. An unstructured grid, finite-volume, three-dimensional, primitive equations ocean model: application to coastal ocean and estuaries. *Journal of atmospheric and oceanic technology*, 20(1), pp.159-186.

Cromey, C.J., Nickell, T.D. and Black, K.D., 2002. DEPOMOD—modelling the deposition and biological effects of waste solids from marine cage farms. *Aquaculture*, 214(1), pp.211-239.