NOTICE OF PUBLICATION

Title: Modelling Temperature Variation and Thermal Stratification in Shallow Aquaculture Ponds

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Abstract: A mathematical model to stimulate thermal stratification in shallow aquaculture ponds is described. The dynamic, mechanistic model was developed to simulate the water column of ponds in discrete, completely mixed, horizontal volume elements. Energy exchanges between the pond's surface and atmosphere were calculated with theoretical and empirical relationships commonly applied to heat balance calculations in lakes, reservoirs and waste treatment ponds. Energy transfer between the volume elements caused by turbulent mixing were simulated as functions of the temperature gradient in the water column and a diffusion coefficient. The value of the diffusion coefficient was calculated in each time step as a function of wind speed, depth, and the water column density gradient. The model was implemented using a dynamics simulation language (STELLA™) using an Apple Macintosh™ microcomputer. Also described are the model calibration and verification procedure and results.

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