



XVIIth World Congress of the International Commission of Agricultural and Biosystems Engineering (CIGR)

Hosted by the Canadian Society for Bioengineering (CSBE/SCGAB)
Québec City, Canada June 13-17, 2010



MONITORING AND MODELING PHOSPHORUS CONTRIBUTIONS IN A FRESHWATER LAKE WITH CAGE-AQUACULTURE

J.E. MILNE¹, R.D. MOCCIA¹

¹ J.E. MILNE, R.D. MOCCIA, Aquaculture Centre, Department of Animal and Poultry Science, University of Guelph, 50 Stone Road East, Building #70 Guelph, Ontario, Canada N1G 2W1, Jacqui.Milne@ec.gc.ca.

CSBE101657 –Presented at Section II-B: Aquaculture Engineering Conference

ABSTRACT This project will address current challenges in water quality risk assessment and risk management of cage-aquaculture in Ontario. A mass-balance modeling approach has been applied to gain an improved understanding of the relative contributions of phosphorus loading from various sources into a freshwater lake with cage-aquaculture in Ontario. Lake Wolsey is located on Manitoulin Island in Lake Huron, Ontario. The lake is connected to the North Channel by a small canal where water exchanges periodically. The farm was established 1986 and has annual production of approximately 400 metric tonnes of rainbow trout. We have estimated total phosphorus loadings from 8 sources of inputs and 3 sources of outputs from the lake. We then applied a sensitivity analysis to establish parameters that require empirical measurement and field validation. Preliminary results show tributaries to be the most sensitive parameter in terms of phosphorus loading followed by the exchange via the canal and then followed by contributions by the farm itself. Information from this project will; 1. provide improved understanding of the relative phosphorus contributions of a fish farm to a freshwater lake in Ontario and, 2. will provide water quality managers with scientific information to aid in the decision-making processes related to determining policy and regulatory approaches to sustainable aquaculture management in Ontario.

Keywords: Caged-aquaculture, Phosphorus mass-balance model, Freshwater, Risk management