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Computer checks lake PCB levels

MADISON — Contamination of Lake Michigan waters by toxic industrial chemicals such as PCBs will persist long after use of the chemicals is prohibited. Just how long is now under study by University of Wisconsin-Madison water chemists David Weininger and David Armstrong.

PCBs, chemical cousins of PBBS, PCPs and DDT, have been identified as environmental contaminants that — among other things — cause acne and hair loss in humans and reproductive failure in several animal species.

As a result, legislation is being enacted to eliminate the use of PCBs.

PCBs enter lakes as a result of some industrial processes such as paper recycling and manufacturing of electrical equipment. PCBs in lakes concentrate in fish at the top of the food chain; and eating contaminated fish is the main source of PCBs for humans.

Weininger is developing a computer model to predict PCB concentration in fish from the known concentration of PCBs in lake water and food organisms.

"Fish get PCBs from two sources — either from food or from water and small particles passing the gills," explains Weininger.

To predict PCB concentrations in fish, therefore, Weininger and coworkers first determined food consumption and respiration rates in Lake Michigan fish using what is called the bioenergetic equation.

"The equation is based on the fact that a fish will use some food for energy and lose some through elimination. What is not used or lost will be gained as weight," explains Weininger.

"Measuring weight gain gives biologists a way to predict consumption and respiration and therefore PCB concentration in fish."

Weininger's study showed that, in Lake Michigan perch, more PCBs are accululated from food than from water passing through the gills. This contradicted earlier conclusions based on laboratory findings which showed that fish receiving equal concentrations of PCBs in water and food will accumulate PCBs more quickly from water than from food.

"In a lake, however, PCB concentrations in water are much lower than in food — the major source of PCBs for fish in Lake Michigan," says Weininger.