Pesticide levels in rivers may threaten fish, insects

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Pesticides, mostly from agricultural runoff and yard use, remain a concern for fish and insects in many of the country’s streams and rivers, warns a national study based in part on research done in Michigan.

Although levels of pesticides usually didn’t exceed benchmarks for human health, their potential to harm aquatic life is likely underestimated, according to a recent [study](http://pubs.usgs.gov/sir/2014/5154) by the [U.S. Geological Survey](http://www.usgs.gov/), part of the U.S. Interior Department.

That’s because the agency can afford to monitor “less than half of the more than 400 pesticides currently used in agriculture, and monitoring focused only on pesticides dissolved in water.”

U.S. farms use more than half a billion pounds of pesticides each year to boost crop production and reduce insect-borne disease. “Some of these pesticides are occurring at concentrations that pose a concern for aquatic life,” the Geological Survey said.

An environmental scientist at Michigan State University’s [Kellogg Biological Station](http://www.kbs.msu.edu/) said the study shows a need for more research about “potential interactive effects of pesticides and other organic contaminants in aquatic ecosystems.

“The report is important as the best systematic evaluation we have,” said Stephen Hamilton, a professor of ecosystem ecology and biogeochemistry at the research station near Kalamazoo. “But it is conservative because of its limited coverage of the ever-changing pesticides in use, its focus on dissolved pesticides when some can be more associated with sediment or biomass and because sampling was not designed to capture all times of the year and flow conditions, such as high storm runoff events.”

According to the study, pesticides — herbicides, insecticides and fungicides — are used most intensively in agricultural and urban areas, with “substantial use for home, lawn and garden pest control in residential areas.”

The Geological Survey said, “One or more pesticide compounds were almost always present at detectable levels in stream water.”

The findings are based on tests from 1992 to 2011. Testing occurred at 125 streams and rivers in agricultural, urban and mixed-use areas across the United States during 2002-2011 and 182 during 1992-2001. None of the testing took place at drinking-water intakes.

The tests included sites in Washtenaw, Macomb and St. Clair counties.

Testing occurred between 2002 and 2011 on the Clinton River in Sterling Heights, which is considered urban, and on the River Raisin near Manchester, which is considered a mixed-use area.

The River Raisin flows through Lenawee, Monroe, Washtenaw, Jackson and Hillsdale counties in Michigan and Fulton County, Ohio, before emptying into Lake Erie. The Clinton River flows from Oakland County to Lake St. Clair.

Earlier testing occurred between 1992 and 2001 in an agricultural area near Jeddo on the Black River, which runs through Sanilac and St. Clair counties. It empties into the St. Clair River, which flows into Lake Huron.

The number of testing sites has dropped over the years because of funding limitations, although the latest study included a larger number of pesticides. The agency is now testing slightly more than 100 sites each year.

Wesley Stone, a Geological Survey hydrologist based in Indianapolis, said the results of such studies are useful to agencies that regulate pesticides.

One thing the research shows is how changes over time are largely driven by agency regulatory actions, as well as changes in the products available and the sampling techniques used by scientists, according to Stone and the study.

“We need to continually reprioritize what pesticides we’re sampling for. We’re continuing to reassess which ones we’re looking at,” said Stone, an author of the report.

In its study, the Geological Survey said, “The potential for human-health concerns can only be approximated because this assessment represents untreated stream and river water from sites that are not located at drinking water intakes.”

The agency said the study looked only at levels of pesticides dissolved in water and didn’t examine river and stream sediment for contaminants.

“There were detectable concentrations in water more than 90 percent of the time across all streams sampled that had significant agricultural or urban land use in their watersheds,” it said.

The study and a related [article](http://pubs.acs.org/doi/abs/10.1021/es5025367) by Geological Survey scientists in the journal “Environmental Science & Technology” found “widespread trends in pesticide concentrations, some downward and some upward,” largely because of changes in regulations and the use of new pesticides.

“The potential for adverse effects is likely greater than these results indicate because a wide range of potentially important pesticide compounds were not included in the assessment.”

The Kellogg Biological Station’s Hamilton said there are other relevant concerns, including “the effects of herbicides applied directly to lakes to control aquatic plants” and past research results from studies of how pesticides affect amphibians.

As for limitations on existing test methods, Hamilton also said, “Some research has suggested that a much more complex toxic syndrome exists than has been implied by standard toxicity testing.”