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### **Portland-area rivers test positive for a veritable pharmacy, scientists find**

**Waterways are laden with a variety of drugs, causing aquatic life possible ills**

Monday, May 07, 2007

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The Oregonian

If there was any doubt Portland is a highly caffeinated city, just look at the bottoms of local rivers and streams.

Scientists from the U.S. Geological Survey did, and they found caffeine all over: the Willamette and Tualatin rivers, Fanno Creek and the inlets of many smaller creeks such as Tryon, Johnson and Kellogg.

That wasn't all. Their testing of creek-bottom mud detected a hidden mix of drugs, pesticides and other compounds ranging from fluoxetine (also known as Prozac) to cimetidine (or Tagamet), a heartburn drug.

The drugs are thought to pass through people who swallow them, through sewage treatment plants never designed to capture them, and into rivers.

Some people also may flush pills they don't need anymore down the toilet, a practice once -- but no longer -- recommended as a way to dispose of them. Local agencies are working on a program to collect surplus pills to keep them out of the water.

The Tualatin River, Fanno Creek and the Columbia Slough generally had the highest combined levels of drugs and similar compounds. Medications in Tualatin sediments, for example, read like the contents of a medicine cabinet: venlafaxine, fluoxetine, citalopram, diphenhydramine, diltiazem.

Some of the compounds have been detected in local waters before, but the new research by Elena Nilsen of the Geological Survey's Portland office looked at sediments because they may collect much of what passes by in the water.

Scientists were surprised by what they found. They have only recently begun looking for the compounds in the environment and still aren't sure how troubled to be about them.

Researchers will present the new findings at a conference this week in Vancouver that centers on pollution and contaminants in the lower Columbia River.

The drugs, along with ingredients of perfumes and cosmetics, are probably the most newly recognized contaminants -- and the least understood.

So little is known about what they do to fish and aquatic life that no one is sure what's safe in the environment over the long term. Some of the compounds are apparently long lasting and build up steadily.

Scientists working on related studies found signs that something in the water is turning the bodies of local salmon haywire. Young male and female salmon from the Willamette River around Portland held traces of an egg yolk protein usually found only in adult female fish beginning to develop eggs.

Male and female fish too young to reproduce manufacture the protein only if their bodies are tricked by artificial chemicals, known as "endocrine disrupters" because they interfere with the endocrine systems that

manage hormones in the body.

"So they're being exposed to something, we just don't know what it is," said Lyndal Johnson, head of reproductive toxicology at the federal Northwest Fisheries Science Center in Seattle.

"It's quite interesting, and a little disturbing," she said.

The river-bottom studies detected at least one of the endocrine-disrupting compounds -- which also include chemicals other than drugs -- at all but one of the 23 sites Nilsen sampled.

Combined with PCBs, flame retardants and other pollutants already known to be present in local rivers, the drugs and other substances put fish at risk in various ways, such as possibly disrupting their immune systems, stunting their growth or interfering with behavior, such as finding food or evading predators.

"The levels are high enough there's certainly potential for affecting the health of salmon," Johnson said.

At the same time, it could be difficult to tell whether that's happening if levels are low enough not to kill fish outright, but rather compromise their survival in less obvious ways.

Many of the drugs and other compounds are present in sediments at levels of parts per billion -- areas of the Tualatin River bottom had about 50 parts per billion of diphenhydramine (also known as Benadryl), for example. That's generally low, but scientists don't know how the levels might affect animals, especially as drugs might intensify one another when mixed.

"The point is that drugs are designed to work at very low levels," said Sheree Stewart, drinking water protection coordinator at the Oregon Department of Environmental Quality. "When you have six or seven or 16 or 17 even at very low levels, we don't know what that's doing to aquatic life."

Researchers also worry that antibiotics and other substances washing into the environment could help bacteria and other organisms develop resistance to drugs and pesticides. It could also affect insects and other important but little-noticed elements of local ecosystems.

"The consequences may be major, but to some extent they may be subtle," said Joseph Rinella of the U.S. Geological Survey in Portland.

The U.S. Environmental Protection Agency has designated the Columbia River system a national priority for cleanup, along with seven other major water bodies across the country such as the Great Lakes and Florida Everglades. Research is trying to identify what the main pollutants are and where they come from.

The simple answer with drugs and cosmetic compounds is that they come from people.

Trouble is, water treatment plants were designed before any wide recognition that drugs and similar chemicals might be a problem. So many of the substances make it through the plants unaffected.

"People just assumed a lot of that stuff was removed," Stewart said. "Actually a lot of what is in the raw water gets through."

A notable finding from the new research is that concentrations of some drugs and other chemicals are higher in small, urban waterways such as Fanno Creek than in the much larger Columbia, Nilsen said. That may be at least in part because the volume of water in the Columbia dilutes the drugs.

A group of local environmental and water treatment agencies is working on a drug "take back" program, which would set up a way for people to dispose of unneeded drugs without flushing them. The group hopes to have a plan outlined this summer, said Janet Gillaspie of the Oregon Association of Clean Water Agencies.

Strict federal laws surround the handling of drugs, especially controlled drugs -- which must be collected by police, leaving few options for people to get rid of them, she said. The take-back program must comply with the same laws, complicating development of the program.

She said the group hopes Oregon can piggyback on legal allowances for similar programs in Seattle and San Francisco. The city of Newberg has begun a pilot program in which police collect surplus drugs from

local nursing homes, she said.

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