



# Stream Measures

By Kristina Casagrand

**IT WAS A SUNNY DAY IN OCTOBER,** and Nicki Fuemmeler was passing hard hats to a crowd of more than 30 people. Among them were conservation employees, city council members, AmeriCorps volunteers, and environmental quality specialists. On a slope behind her, heavy machinery shuttled dirt from one end of a new high school campus to another. Ahead of her ran Hinkson Creek, a polluted stream that snakes 26 miles through the heart of Columbia, Missouri.

As part of a multiyear, multijurisdictional cleanup effort, Boone County stormwater managers were spending the day updating stakeholders on the county's new stormwater mitigation ordinance. This site showcased best management practices: a 100-foot buffer zone around the stream, a retention basin and sediment forebay to treat pavement runoff, erosion barriers and vegetation planted on the exposed ground. As the county's stormwater educator, Fuemmeler works with engineers, contractors, and developers to make sure that practices of this sort are being employed.

She also works with a bigger team—the county, city, and state university—to improve overall watershed conditions. The city is spreading the word among its 100,000 residents, including nearly 30,000 students who attend the University of Missouri. For its part, the university serves as a center of research on Midwest water quality and as a contact and reporting entity for the area's MS4—its municipal separate storm sewer system.

## It's urgent

A recent mandate from the U.S. Environmental Protection Agency has given these efforts some urgency. In 2010, the agency established a total maximum daily load, and called for the MS4 to reduce Hinkson Creek's runoff by nearly 40 percent. For the city, reducing the volume of runoff that

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makes its way to the stream would mean diverting roughly 5.5 million cubic feet of stormwater from the stream through retention or wetland treatment. That would mean installing roughly 730,000 rain barrels (55-gallon drums), or 20,000 to 25,000 residential rain gardens.

City officials, however, say they need more information from EPA to remedy the problem—including an indication of what the actual problem is. Last December, the city hired an attorney to challenge the EPA directive.

Timothy Teddy, the city's community development director, explains that the EPA uses runoff as a surrogate for an unknown source of pollution. "They're basing impairment on the fact that warm water aquatic life isn't up to par," and assuming that the rapid rate of urbanization is leaching sediment and other pollutants into the runoff, Teddy says. But, he adds, "there are a lot of failing wastewater treatment sites in Boone County and that could contribute to the problem."

Many things may be harming the stream: the chemicals, motor oil, fertilizers, and sediment that can wash unhindered over



Columbia, Missouri, holds an annual "Clean Sweep" to pick trash out of Hinkson Creek. The event is part of a multiyear cleanup effort. So are show-and-tell sessions when stormwater educators describe the on-the-ground tools of a new mitigation ordinance (opposite).

pavement. Cutting down on those pollutants should bring the city into compliance with the stormwater mandates for Hinkson Creek.

The city, county, and university say that the EPA's mandate fails to comply with the federal Clean Water Act because it cites no specific pollutants. Officials want the state Department of Natural Resources and the U.S. EPA to enforce compliance, and are concerned about the cost associated with curbing runoff.

Meanwhile, the stakeholders press on in addressing runoff. The most recent endeavor is updating the second phase of the Hinkson Watershed Restoration Project, a federally funded project operated through the Missouri Department of Natural Re-

sources. It involves drafting a management plan to restore the creek's watershed to a healthier, more natural biological state. The plan, which is in its final stages of completion, includes working with property owners to share the cost of retrofitting stormwater treatments and monitoring and employing best management practices for treating a wide variety of contaminants.

"The strength of our partnerships is the



Photos by Kristina Casagrand

most significant thing" in the watershed restoration project, says Bill Florea, a senior planner for Boone County who manages the project with state transportation, conservation, and natural resource departments; the farm bureau; local nonprofit organizations; and others.

### Spreading the message

Other efforts to clean up the watershed are ongoing. A local church installed inverted islands, rain gardens, and pervious pavement. Middle schools use rain gardens as teaching tools. AmeriCorps volunteers help residents plant wet and dry rain gardens, and the city offers a free rain barrel program.

City and county efforts vary from general education to nitty-gritty. Mike Heimos,

the city's stormwater educator, typically spreads the word with fliers, an active Facebook page, tree planting and cleanup events, and signs posted next to storm drains that say, "No dumping—drains to stream." He also leads the city's annual Hinkson Clean Sweep.

During the last one, held in September 2010, some 300 volunteers cleaned up 5,106 pounds of trash from the Hinkson and its tributaries. "It's good promotion for volunteerism," Heimos says. "It alerts people to an issue that's very serious—it's water quality, it's the water we all inevitably drink. The biggest impact is that it gets people thinking."

In leading weekend stream cleanups, Heimos has worked with about 2,394 volunteers. He often begins in Flat Branch Park, next to a daylighted Hinkson tributary that flows through a bustling part of downtown. He talks about the park's native grasses, how their deep roots soak up water, and how soil purifies contaminants. He lets volunteers reflect on these efforts a few moments before shouting, "Let's go!" on the way to pick up trash.

Heimos also partners with the local schools. A job development program he created teaches students about stormwater techniques as part of facility and parks landscaping. "This is pervious pavement," Heimos told students at one of Columbia's LEED-certified fire stations in July 2010. "Think of it like a Rice Krispie Treat, minus the marshmallow."

He explained the way impervious pavement forces rain to run off into drains, curbs, and, eventually, streams, and how pervious pavement allows water to percolate through to the soil. The students also built a berm to stop runoff from the fire station's lawn, laid mulch in a bioretention pond, and worked in a nearby compost pile.

These techniques "are going to be prominent on construction sites across the country and the city," Heimos says, adding that he hopes the city's youth will apply them in the future.

### What's the culprit?

All these efforts stem from the U.S. EPA's 2003 listing of Hinkson Creek as an "impaired stream." Usually that label includes a diagnosis of the impairment, and a city or county will get to work targeting specific toxins. Not in this case. Hinkson Creek's contaminant is unknown. The EPA's recent action implies that the culprit may be runoff,

but others are testing that notion.

Columbia has seen its population increase from 73,000 to more than 100,000 in 10 years. That kind of growth brings more impervious surfaces, more chemical lawn treatments in the summer, more salted roads in the winter, and higher water temperatures from heated lots. Scientists have observed a significant drop in Hinkson Creek's biodiversity, lower base flows, and higher peak flows since 1998.

What, exactly, are the pollution sources? To find the answers, University of Missouri forestry professor Jason Hubbart in 2008 procured a state Department of Natural Resources grant for an ambitious watershed project—the first in the Midwest to continually monitor water flow, microclimate, and water quality. Although many Western states conduct pollutant studies, data can't necessarily be transferred. In Missouri, the soil has a lot of clay and the climate is unpredictable.

"The fundamental question is, 'Is the Hinkson polluted at all, and if so, with what?'" Hubbart says. The answers may come from his extensive monitoring system. Every hour of every day at five different sites along the creek, a series of sensors take note of wind speed and direction, snow depth, precipitation, sediment, and temperature of the air, soil, and water. It's too early for specific results, but Hubbart may have some soon.

Hubbart also hopes that his research will lay the groundwork for improved urban floodplain management in the central U.S.

Inspired in part by these efforts, the university's Environmental Science Club in October 2010 constructed a similar station on a small stream that catches the campus runoff, including the football stadium where more than 70,000 fans gather at each game. From the stadium, pollution rushes just 3,000 feet to Hinkson Creek.

"Since the campus is so close to the Hinkson, we figured it would be beneficial to monitor the total maximum daily load," says Carrie Tanner, the club's president. With baseline data in place, the club members can monitor the effects of any new stormwater management that the university may implement.

That is one more step—among the many needed—to take the Hinkson from impaired to repaired.

■ Tina Casagrand lives in Columbia, Missouri. She has reported for the *Columbia Missourian*.