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How much is a clean Blackstone worth?

PART 1

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Water flowing from the wastewater treatment plant, at left, converges with the Blackstone River, at right. (T&G Staff/CHRISTINE PETERSON)

You can see it clearly, standing on a footbridge along the Blackstone River Bikeway in Millbury: A channel comes in from the left, as you look north toward Worcester, its path carpeted with weedy green plants and algae. On the right, the water from the Blackstone River runs nearly plant-free.

It's the carpet of green that troubles water quality advocates and the U.S. Environmental Protection Agency — evidence, they say, of excessive plant growth fed by phosphorus and nitrogen from the Upper Blackstone Water Pollution Abatement District's wastewater

treatment plant a few thousand feet up the channel.

Overabundant aquatic growth is choking the river, the EPA says, here near its headwaters and downstream as it flows into Rhode Island's Seekonk River, Providence River and ultimately Narragansett Bay.

A four-year legal battle between the water pollution abatement district and the EPA about who is responsible for the water troubles and who should shoulder the expensive burden of cleaning it up has sparked national attention.

The EPA ordered the district to reduce its output of phosphorus, nitrogen and aluminum, another pollutant, in its 2008 discharge permit.

On Aug. 3, the U.S. First Circuit Court of Appeals rejected an appeal by the district and ordered the new limits to go into effect. On Oct. 10, the court refused to rehear the appeal.

The district plans to file the case with the U.S. Supreme Court.

Regionally, the health of the river and potentially millions of dollars to ratepayers — some say more than \$200 million for plant upgrades (or more than \$200 per household) — are at stake.

Much of the debate comes down to determining how clean is clean: What standards must be met and how should they be measured? The answers aren't just technical; they affect how resources will be spent and what trade-offs will be made.

“The Blackstone River is nationally significant,” said Donna M. Williams of Grafton, watershed advocate for the Blackstone River Coalition and chairwoman of the Blackstone River Valley National Heritage Corridor Inc., a nonprofit organization working to preserve the region's history, culture and natural resources.

“It's an American Heritage River, one of only 14 in the country, and this is what it looks like. I have trouble with that,” Ms. Williams said.

Upper Blackstone plant officials say that the scientific model used as the basis for the discharge permit, which sets a limit on the amount of pollutants the plant can discharge into the river, is faulty, however.

Robert L. Moylan Jr., Worcester commissioner of public works and parks and chairman of the Upper Blackstone district, said, “First and foremost, we need to have some ability to establish good science. Secondly, it's the public's money. It should be spent wisely.”

When the Clean Water Act was enacted 40 years ago, prohibiting any entity from discharging into a waterway without a National Pollutant Discharge Elimination System permit from the EPA or its delegated state authority, the focus was on toxic pollutants

such as chemicals and metals.

More recently, the threat is seen coming from nutrients such as phosphorus and nitrogen, which come from human and animal waste, fertilizer, and until recently, detergent. The elements enter the river through sewage plants, septic and storm water runoff.

This nutrient-caused problem, accelerated by human activity, is called cultural eutrophication. It leads to algae blooms and “dead zones,” lifeless bodies of water.

Eutrophication works in freshwater when phosphorus feeds aquatic plants and algae. As the plants grow, die and decompose, bacteria consume oxygen in the water, endangering fish and other aquatic wildlife that need the oxygen.

The same process occurs downstream in Rhode Island's saltwater Narragansett Bay from excessive nitrogen. A decade ago, the bay had fish kills, red tides and shellfish poisoning linked to high levels of nitrogen and low dissolved oxygen.

Cultural eutrophication is the second human assault in the Blackstone River's history, and restoring the river isn't easy.

For much of the 19th and 20th centuries, industrial dumping from mills along the Blackstone led the EPA to call it America's most polluted river in 1990.

At the peak of the Industrial Revolution, 45 dams lined its 48-mile path from Worcester to Providence, accumulating toxic sediments of heavy metals and other industrial waste. Eighteen major dams remain and create pools of stagnant water where algae can flourish. Removing the dams to flush out pollutants would risk releasing the accumulated toxic sediment.

With industrial dumping stopped, Massachusetts and Rhode Island are working toward making the river system a resource for recreation, tourism and commercial fishing. Bills have been filed in Congress to establish a Blackstone River Valley National Historical Park.

But while the river no longer runs different colors depending on the day's color of textile dye, wastewater discharge threatens the Blackstone's potential to once again become fishable and swimmable.

The Upper Blackstone treatment plant is the largest discharger on the Blackstone, accounting for 70 percent of the river's municipal wastewater flow, according to court documents.

Serving Worcester and portions of Auburn, West Boylston, Holden, Rutland, Leicester, Oxford, Millbury, Paxton, Shrewsbury and Sutton, the plant discharges an average of 30 million to 40 million gallons of effluent a day. It is designed to process 56 million gallons

a day.

In heavy rains, when stormwater mixes with wastewater, it can release up to 160 million gallons a day with partial treatment of the water.

Twelve wastewater facilities line the Blackstone, Seekonk and Providence watersheds, but most discharge a small fraction of the Upper Blackstone amount.

Angelo S. Liberti, chief of surface water protection for the Rhode Island Department of Environmental Management's Office of Water Resources, said the Blackstone River Initiative computer model, which tracks how nutrients move down the river, found that more than 90 percent of the Upper Blackstone plant's nitrogen load reaches the mouth of the river.

"Nobody's saying they're the only source of nitrogen to the bay, but they're definitely one of the top contributors," he said.

The Upper Blackstone plant began operation in 1976, constructed with 75 percent federal funding through the Clean Water Act, 15 percent state funding and 10 percent local funding, according to Karla H. Sangrey, engineer director/treasurer. It cost Worcester less than \$3 million.

In 2002, following a consent agreement with the EPA to meet its 2001 permit, the district invested \$180 million to upgrade the plant. The project was completed in 2009.

The district argued in its recent appeal that the EPA erroneously issued its 2008 permit before the new system was fully online.

The upgraded plant relies largely on mechanical processes and nutrient-consuming "bugs," or bacteria and plankton (microorganisms termed "activated sludge"), to clean the wastewater and remove nitrogen, phosphorus, dissolved metals and other pollutants.

"Most of what we rely on here is biological processes, with a few chemicals for disinfection," Ms. Sangrey said in a tour of the plant.

But the plant isn't meeting the 2008 permit limit of 0.1 milligrams per liter for phosphorus and barely misses the new nitrogen limit of 5.0 milligrams per liter. In July, effluent samples averaged 0.22 milligrams per liter phosphorus and 5.2 milligrams per liter nitrogen.

"Let's maximize the performance of this plant and see where we are with water quality. That's the frustration," Ms. Sangrey said. "It performs great and approaches the limits that they (EPA) want; it exceeds performance on the existing (2001) permit."

Ms. Sangrey said the district also objected to the 2008 permit's requirement to fully treat

the maximum peak flow amount of 160 million gallons per day, which would occur only in major storms.

“Ninety percent of the time you'd have all this plant we wouldn't use,” she said.

Meeting the new standard would require a major construction project and would also likely mean that more chemicals would have to be used in the treatment process, according to Ms. Sangrey.

Besides the timing of the 2008 permit, the district's battle has focused on the models used by the EPA to set its phosphorus and nitrogen limits, which they argue don't accurately reflect the Blackstone River and Narragansett Bay.

The First Circuit Court of Appeals ruled that the EPA exercised rational judgment by including, among its data sources, a model developed in the 1980s by the Marine Ecosystems Research Laboratory at the University of Rhode Island. The weight of evidence suggested the EPA's conclusions were within a “zone of reasonableness.”

The court used the same argument rejecting a challenge from the Conservation Law Foundation that the 2008 permit's standard for nitrogen wasn't strict enough. The CLF argued that a nitrogen limit of 3 milligrams per liter, instead of 5 as set in the permit, was needed to meet downstream Rhode Island water-quality standards.

The MERL model, developed through a series of tank experiments to reflect a range of sewage scenarios, was designed to simulate conditions of Narragansett Bay. The EPA has used the model for national nitrogen-limit standards and the Rhode Island Department of Environmental Management has factored it into limits for its sewage plants.

Similarly, the Upper Blackstone district objected to the EPA's setting phosphorus limits based on national standards and other regional studies.

The district argued that the EPA should have waited for results from a Hydrological Simulation Program — FORTRAN computer model it was developing with the University of Massachusetts and its consultants, CDM Smith.

“That study essentially says that it doesn't make a difference what the water quality is of the discharge at the Upper Blackstone, in terms of meeting water-quality standards,” said Mr. Moylan. He said even if the district were to invest in the upgrades, “We are not going to meet water-quality standards. They will not be met until we deal with impoundments (dams).”

The EPA recently rejected the district's HSPF model in the draft permit for a smaller wastewater treatment plant in Grafton, questioning its value for simulating future scenarios based on obsolete data on phosphorus discharge from downstream plants.

“Why is their (the district's) science any more trustworthy than EPA's?” Ms. Williams asked. “It's dueling models and dueling science. It's in every environmental argument. Then you never get to an endpoint, if that's your argument.”

Others seek more certainty before making decisions with large financial implications.

Timothy J. Downs, chairman and associate professor of environmental science and policy graduate program at Clark University, said, “Unless you have an idea of the relative importance of the sources (of pollutants), it's hard to know whether stricter regulation is warranted. The models are not quite there yet.”

He said that land use along the Blackstone has changed since the EPA's MERL model was developed, and more phosphorus and nitrogen could be coming into the river from lawn fertilizer, septic and other runoff.

The Upper Blackstone isn't the only treatment plant scrambling to meet stringent new limits. EPA issued draft permits in September to downstream plants including Grafton, Northbridge and Uxbridge. While the limits aren't quite as tight, with 0.2 milligrams per liter total phosphorus and 8 milligrams per liter nitrogen, the plants only discharge up to 2 million to 2.5 million gallons per day.

“We were hoping the big fish (Upper Blackstone) would lead the battle for us little fish,” said Uxbridge Department of Public Works Director Benn S. Sherman.

Mr. Sherman said the cost to upgrade the 35-year-old Uxbridge facility, which serves about 2,100 connections, or half the town, would be \$30 million.

“Based on testing and the sampling we conduct now, there's no indication that there is a problem,” he said. “How can we say we're contributing to the overall degradation of the Blackstone?”