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## **MORE EYES WATCHING THE WATERS**

### **Sensing device monitors condition of the Hudson**

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BEACON -- If Henry Hudson were to return 400 years after he sailed the river that now bears his name, he would be mystified by many things. Certainly, one would be a silver-and-yellow mechanical sort of "flying fish" retracing his route, undulating as it is towed beneath the water.

But August's maiden voyage of a submarine sensing device from the Beacon Institute of Rivers and Estuaries showed the face of river exploration in the 21st century, as environmental groups join with the state, academia and private business in a bid to make the Hudson the most-monitored river on the planet.

James Bonner spent an afternoon aboard a Beacon Institute research boat on Aug. 26 as it towed the sensing unit -- shorthanded as "the fish" -- from Newburgh to West Point. Equipped with a yellow metal "wing" that allows the \$250,000 machine to dive and rise, it carries sensors that take measurements such as the amount of oxygen dissolved in the water -- a measure of whether or not life can thrive -- as well as temperature, salt content and depth.

It's all part of a program by Beacon, IBM and Clarkson University to set up a \$200 million network of permanent sensors along the entire length of the river that are expected to feed a stream of information on everything from pollution spills to fish movements.

Bonner, research director at Beacon, said that since the first fixed floating sensor platform went into the river near Beacon in July 2008, two other river-bottom sensors have been added, including one off a dock in Albany used by the Dutch Apple cruise ship.

Called "acoustic Doppler current profilers," the devices emit acoustic signals which bounce back off of suspended particles. The reflection can be measured to provide a three-dimensional picture of the water's direction over time, said Bonner.

Signals are fed to a transmitter attached to the Dutch Apple dock, which is connected to servers in Albany and Texas. The data is later posted on Beacon's Web site.

The other acoustic profiler is on the river bottom near West Point. When the entire network is in place -- with sensors designed and built by Clarkson, IBM and Rensselaer Polytechnic Institute -- it is expected to stretch the 315-mile length of the river, and provide an instant at the river's overall condition, said Beacon Executive Director John Cronin. There could be 20 sensors in place within the next two years, he said.

A \$15 million research facility for the network is under construction on the South Troy waterfront. It is expected to open in October 2010 on a city-owned 5-acre campus, which will include a bike path, public docks and picnic grounds.

"We are talking about understanding the river in the three physical dimensions and the fourth dimension, time," Cronin said. "Things like where the fish are in relation to a power plant cooling water intake, where pollutants are relative to a spill, or for dredging, like what is happening with PCBs now up the river at Fort Edward."

Sensors could even help answer an everyday question that swimmers, fishermen or kayakers often ask: Is the

water safe to go into today?

Being able to get timely answers means the technology could be exported around the world, including places where clean water is often a matter of life or death, Cronin said.

Over the last three summers on the Hudson, the question of whether the water is safe to get into has been answered, somewhat belatedly, by the crew of a former fishing boat crewed by members of Riverkeeper, a not-for-profit environmental group.

Each month, the boat makes a run from the where the Hudson meets the Mohawk River south to Battery Park in Manhattan. It takes readings at 85 different locations for bacteria associated with human sewage.

Aboard the craft, the R. Ian Fletcher, is "a machine about the size of a home oven used to incubate the bacteria," said Phillip Musegaas, Hudson River program director for Riverkeeper. After four hours of incubation, the samples are placed in trays and tested with a chemical that glows fluorescent blue if bacteria are present.

"Overall, the water quality in Hudson is better but there is lots of variability," Musegaas said.

Riverkeeper's test results take 24 hours to return, and another week or so to be posted to the group's Web site, so the information appears after someone may have decided whether to take a swim.

So the rule of thumb to avoid exposure to bacteria-tainted river water? "If it has just rained, stay out of the river for a day or two," he said.

BOX:

Online

Information on bacterial levels in the Hudson area available on the Riverkeeper Web site at <http://www.riverkeeper.org/special/swimmableriver/>. Reports indicate whether levels exceeded federal safety standards. The scientific data on the river sensors employed by the Beacon Institute can be found online at <http://www.thebeaconinstitute.org/approach/reondata.php>.

TIP:

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