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Watershed health hits every town

Development threatens water quality on Seacoast

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PORTSMOUTH — The Great Bay watershed is the heart of the Seacoast.

Tides and surrounding rivers feed the bay much like a series of watery arteries. But how healthy is this vital ecological organ?

If you asked a cardiologist, the doctor would probably reassure the patient he was going to live, but stress the need to improve his diet and exercise some common sense.

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STAFF PHOTO BY RICH BEAUCHESNE
Large multi-perimeter water quality measuring instruments like this one are networked throughout the estuary so Director Rich Langen can constantly monitor water quality.

SEACOAST

Great Bay watershed touches all towns

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In various levels, the water pulsing through the Seacoast is infected with bacteria such as fecal coliform, toxins such as ammonium, and excessive nutrients such as nitrogen and phosphorus.

"How is the water quality?" asked Rich Langan of the University of New Hampshire. "It depends on what you compare it to."

According to Langan, all the major rivers feeding into the bay and the Great Bay itself are much healthier than they were in the 1960s and 1970s, but they are not pristine. Improved awareness and environmental consciousness deserve much of the credit, said Langan, who is director of the Jackson Estuarine Laboratory in Durham.

One of the major improvements during the past 20 years was finding and eliminating sewage lines that released raw sewage into rivers and the bay. Most of the lines were outdated infrastructure from old homes, Langan said.

"A number of them were found in Dover and Portsmouth. You'd just about find them anywhere," he said.

The New Hampshire Department of Environmental Services inspects waste water lines each year for improper sewage disposal lines. Tests are complete in Exeter, Newfields, Newmarket, Durham and Dover. Portsmouth is scheduled for tests beginning next spring, said Eric Williams, coordinator of the DES non-point pollution source program.

"We've found those types of cross connections where sewers are incorrectly connected to storm water pipes," Williams said. "A lot of the time it happens by mistake."

Langan is co-director of the Cooperative Institute for Coastal and Estuarine Technology. CICEET (pronounced sigh-seat) was established in 1997 as a partnership between UNH and the National Oceanic and Atmospheric Administration. Its goal is to develop and foster innovative environmental technologies for monitoring, management and prevention of contamination in estuarine and coastal waters.

CICEET uses remote automated measuring instruments to test water quality every 30 minutes. Instruments in the bay and on the Squamscott and Lamprey rivers provide computerized data to Jackson Estuarine Laboratory for analysis. Information also includes categories such as water temperature, salinity, ammonium, nitrogen and percent of oxygen saturation in the water.

Langan said CICEET expects to add two more instruments on the Oyster and Bellamy rivers by year's end, and two others on the Salmon Falls and Cocheco rivers next year.

Fifty New Hampshire and Maine towns are located in the Great Bay watershed, which provided the lifeline for Colonial and Federal-era settlement. The rivers were once home to tanneries, mills and factories, and the banks of the bay provided fertile farm lands for generations of families. Today, the land is dedicated mostly for residential use with some pockets of industrialism and agriculture. Other areas are preserved for conservation, such as the Great Bay Wildlife Refuge in Newington.

The past is still present in river bed sediments, however, especially the Cocheco and Salmon Falls rivers.

"I would say if you have problem rivers, those are it,"



Staff photo by Rich Beauchesne

Richard Langan, director of the Jackson Estuarine Laboratory in Durham, takes a water sample from the Little Bay at Adams Point, where the water is consistently monitored.

Langan said. "You've got some bad history on the Cocheco."

Long ago, mills and tanneries lined the Cocheco River that flows through downtown Dover. Traces of strong chemicals can still be found in the river bed including chromium, which was used in the process of leather tanning. Most of those chemical remains are dormant in the set-

tled soil, but Langan stresses there is always the chance they can "become bio-available again" and affect life forms in the river and estuary. Dover and state officials have discussed dredging the river the past few years.

"I don't want to let Portsmouth off the hook," Langan said of other trouble spots in the estuary. "but it's at the mouth of the river and has more water changes because of the tides."

A recent report from the New Hampshire Estuaries Project showed the area around Portsmouth Naval Shipyard had elevated concentrations of toxic contaminants such as chromium, lead, mercury, copper and zinc. Lead found in mussels from around Seavey Island has exceeded published Federal Drug Administration levels.

According to Langan, another factor affecting the water quality of the Salmon Falls River, also considered the upper neck of the Piscataqua River, is the presence of five waste-water treatment plants along it. Plants are located

in Milton, Somersworth, Berwick, South Berwick and Rollinsford. While treatment plants are vital to protecting the environment, they also disturb it.

Treatment plants remove particular matter from storm water and sewage, and disinfect the water before returning it to the river. Water returned to the rivers often has nitrogenous waste that wants to switch to nitrate and in the process depletes oxygen.

An overabundance of nutrients like nitrogen, phosphorus and magnesium, combined with light and warm, slow-moving water, can result in algae bloom, the first step towards hypoxia.

Hypoxia, which means low oxygen, often occurs in estuaries or coastal areas where there is little water mixing by tides or river flows, and the effect can reach throughout the ecosystem. Hypoxia kills non-mobile animals such as shellfish and causes other fish to vacate the area for more suitable habitats. Subsequently, birds and mammals that

feed on fish, such as herons and otters, can't survive in an area that suffers from hypoxia.

"We don't have hypoxia," Langan said, "but if we continue to increase the nitrogen and phosphorous in the water we could be heading in that direction."

Currently, no rivers around Great Bay are adequate habitats for shellfish such as clams and oysters. According to Williams, the beds are often closed because of bacteria contamination more than hypoxia.

Treatment plants are not the sole bogey man when it comes to affecting the water, Langan said. Neither are the large industrial factories and power plants on the Piscataqua River in Newington, though the nitrogen oxides released from the plants transform into nitrates that help start the hypoxia process.

"Pollution doesn't come from one bad industrial guy," Langan said. "It comes from everyone."

Included in the specter of pol-

Estuary a vital resource for area

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lution are farms in the watershed. Williams said the DES is working with area farmers to control runoff from agricultural sources. Excess fertilizer runoff washes into streams, rivers, the bay, the ocean and eventually the atmosphere. Fertilizer from farms and individual residences is one of the sources of bacteria contaminating the shellfish beds, Williams said.

"Basically," Williams said, "we're trying to better manage the animal waste."

Williams said his department works with farmers to employ measures such as removing manure reserves from the path of water flow and developing

concrete pads for areas that have high use by animals.

"Our priority issue in this area is shellfish beds, and the primary concern is bacteria," Williams said. "We had some farms in the past that contributed bacterial runoff, but I wouldn't say it's a pervasive problem."

Instead, the finger of blame seems to be pointed at the general public. Langan describes the pollution problem as "continuous low-level contamination" that increases with the growing population within the watershed.

"How much land we develop and how we develop it will have a great impact in the future," Langan said.

Nearly all of the 50 towns in

the watershed experienced population growth in the past five years. Inland towns such as Raymond, Nottingham, Fremont and Epping are burgeoning.

As development encroaches on brooks, streams, marshes and ponds, the impact upon the watershed will increase. Installation of impervious surfaces such as roads, driveways, parking lots, and even houses and buildings will affect the natural flow of water through the filtering mechanism of the ground, Langan said.

Increased development will also increase the amount of storm water and sewage handled by treatment plants. During periods of heavy rainfall, treatment plants are physically unable to treat the amount of water chan-

neled into them. Typically, more than three inches of rainfall in one storm can cause plants to discharge untreated water into the rivers, Williams said.

According to John Bush, DES administrator of the waste water engineering bureau, there are 85 treatment plants in New Hampshire. All are licensed by the federal Environmental Protection Agency and the DES.

How storm water runoff is channeled and treated is one of the most significant challenges of increased and continued development, Langan said.

"The water quality is getting better, but making that next step is the most difficult because of the number of people out there today."