WATER QUALITY — RUNNING CLEANER?

Water quality in the Hudson Valley will never be as unblemished as it was when the region was a wilderness. Human influence is pervasive. Even brooks far from settlement feel the impacts of climate change, acid precipitation, and mercury falling from the sky. But we don't have to turn the clock back to have a drinkable, swimmable, and fishable Hudson; to protect and restore streams that replenish the estuary and nourish its web of life; or to sustain water resources critical to the health and wellbeing of the region's residents.

Threats to the health of the Hudson and streams in its basin include sewage discharges, urban/stormwater runoff, sediment, and contamination from past industrial activity.

SAFE TO SWIM?
In 2005, TV reports showed boaters and water skiers happily jumping into the Hudson at Albany. Unfortunately, public perception of river health exceeded reality. DEC monitoring showed that water quality failed to meet swimming standards all summer.

Swimming in the Hudson was not foreseen when the Capital Region's sewage plants were constructed decades ago. Thus, they were not required to disinfect their discharges, raising the risk of disease for swimmers. That is changing; the Rensselaer sewer district began disinfection in 2013, and disinfection came on line at two large Albany plants in 2014.

Elsewhere on the Hudson, water quality at official swimming beaches is monitored and generally good, but swimmers leap into the river at many locations that lack lifeguards and water testing. In a Riverkeeper study of bacteria levels at 74 river sites, results overall failed to meet U.S. Environmental Protection Agency (EPA) standards for safe swimming 21% of the time from 2006 to 2010.

Sewage can have impacts beyond limiting swimming, even when treated. In the watershed, sprawl has spurred construction of more wastewater treatment facilities. Though many are small, cumulatively they have major effects. Surveys of Woodbury Creek in Orange County, for example, documented declining water quality from 1987 to 2004. Increased nutrient enrichment fostered an over-abundance of algae, especially downstream of treatment facilities serving new residential developments.

SEWER OVERFLOWS
In older sewage systems, storm drains often connect to sanitary sewer collection pipes. During rainstorms, their combined flow may exceed the capacity of the receiving treatment plant, causing untreated sewage to be diverted directly into the Hudson. Combined sewer overflows (CSOs) are a major pollution problem. Annual CSOs into the Albany Pool total 1.2 billion gallons and into New York City waters, 27 billion gallons.

Communities with CSOs are required to develop long-term control plans, and almost all along the estuary have done so. The Albany Pool plan, announced early in 2014, is expected take 15 years and cost $136 million. In 2012, DEC and New York City signed an agreement to develop ten waterbody-specific long-term control plans plus a citywide plan. This agreement should reduce CSO discharges by approximately 8.4 billion gallons a year.

Modern sewer systems separate sewage and stormwater pipes, eliminating CSOs, but spills still occur. In systems old and new, sanitary sewer overflows (SSOs) may be caused by pipe blockages, human error, aging infrastructure, or extreme wet weather events.

THE SEWAGE POLLUTION RIGHT TO KNOW ACT
In May 2013, the first phase of the Sewage Pollution Right to Know Act went into effect. It requires system operators to notify DEC and the Department of Health within two hours of the discovery of untreated or partially treated SSOs. The public must be informed within four hours.

BASELINE: In the first year of the Sewage Right to Know Act, sewage districts reported 153 spills to the Hudson and streams flowing into the estuary.

Steve Stanne/DEC

Among Sewage Right to Know discharge reports submitted since May 2013, the most common cause of SSOs is heavy rain. Resulting flows strain infrastructure in new and old systems. Pipes break, overflows surge out of manholes, and pumps fail to keep up. As climate change causes precipitation to occur in more intense events, stormwater will be an even greater challenge.

STORMWATER
Stormwater runs off impervious surfaces that prevent water from soaking into the ground — rooftops, streets, and sidewalks — as well as from bare soil and lawns. It plays a big role in CSO discharges; impervious surfaces cover about 72% of New York City's 305 square miles of land, sending substantial volumes of stormwater into sewers.

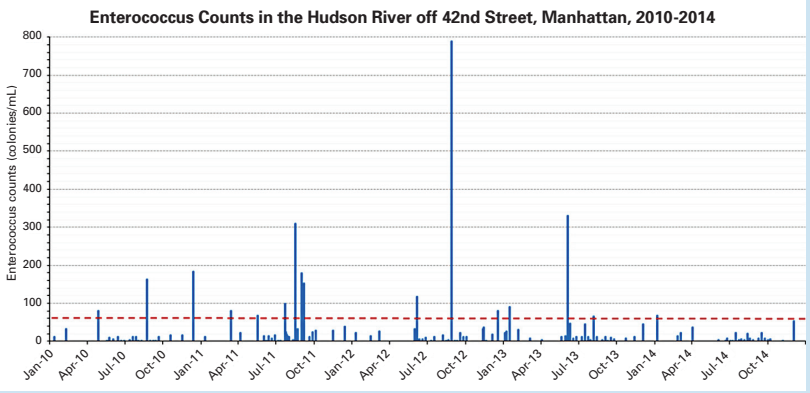
Development expands impervious surfaces. The resulting stormwater flows increase loadings of sediment, nutrients and salt to tributaries, and lead to unstable stream channels, erosion, and degraded habitat. Pollution from a single roof, parking lot, or roadway may seem trivial, but according to the EPA, stormwater runoff is implicated in 50% of water quality impairments nationally.

Cleaning up the stew of contaminants in stormwater where it discharges to a river or sewage plant is expensive and difficult. Control at the source works better; contaminants can be reduced or contained by employing best management practices for storing chemicals and controlling erosion, for example.

Natural communities and infrastructure modeled on them can reduce stormwater flows. On a large scale, solutions include preserving and restoring forests, floodplains, and wetlands, and slowing and reversing the spread of impervious surfaces. On a local scale, green roofs, rain gardens, rain barrels, and other source controls reduce stormwater volume or slow runoff. Green infrastructure can lessen the need for expensive, engineered "gray" infrastructure at the end of the pipes, with secondary benefits including aesthetic improvements, cleaner air, and lower energy costs.

Paul Bastin/Riverkeeper

TREND: On average, bacteria levels in the Hudson meet water quality standards, but sewage overflows cause bacteria counts to spike to problematic levels.



Data from the New York City Department of Environmental Protection.

Angus McIntyre/Riverkeeper

EPA suggests that an enterococcus bacteria count of 60 be used for beach closure notifications. Counts off Manhattan are usually under 60, but spikes occur, especially after rain. DEC has proposed modifying the uses associated with the Hudson's water quality classification here to encompass primary contact recreation including swimming, though other factors may limit such activity. Adopting this change would require effective control of sewage overflows.

HERITAGE CONTAMINANTS – THE PCB CLEANUP

Between 1947 and 1977, General Electric released about 1.3 million pounds of toxic polychlorinated biphenyls (PCBs) into the river from plants in Fort Edward and Hudson Falls. After 1977, PCBs continued to enter the Hudson from subsurface contamination beneath the Hudson Falls plant, adding to the burden of earlier discharges in the river bottom.

PCBs became concentrated in fish through the food chain, threatening the wellbeing of people and wildlife that eat contaminated fish. In response, New York State recommended limited consumption of fish caught south of Troy. From Troy to Hudson Falls, nearer the source of the contamination, DEC required anglers to release any fish they captured.

The Hudson's PCBs first made news in 1975: "State Says Some Striped Bass and Salmon Pose a Toxic Peril" was the front-page headline in *The New York Times*. However, it wasn't until 2002 that the EPA settled on a cleanup plan. Years of sampling, feasibility studies, and design work followed before removal began in 2009.

The cleanup will dredge approximately 2.65 million cubic yards of PCB-contaminated sediments from a 40-mile stretch of river between Fort Edward and Troy. At 2014's end, some 2.4 million cubic yards had been removed. Several more years of data collection will be needed to draw conclusions about how the cleanup has affected PCB levels in the estuary's fish.

TREND: Cleanup of PCBs is proceeding on schedule, with 2.4 million yards of contaminated sediments having been removed from the upper Hudson by the end of 2014.

D.Tromp/DEC

SEDIMENT

Even when uncontaminated, excess sediment can create problems, muddying the water and blocking sunlight needed by aquatic plants. It smothers shellfish beds as well as gravelly and rocky bottom habitats needed by many aquatic creatures.

The Hudson estuary is typically cloudy with sediment eroded from the watershed and lifted off the bottom by tidal currents. This turbidity can be exacerbated by dredging, boat traffic, and runoff from bare cropland and construction sites. High turbidity may lower concentrations of dissolved oxygen, as less sunlight is available for photosynthesis by aquatic plants.

Sediment deposition has both negative and positive impacts. Accumulating sediment reduces water depth in shipping channels and berths, and must be dredged to enable navigation and docking. In the estuary's shallows, sediment can create a foundation for development of wetland habitats.

Steve Stanne/DEC