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depressoffice@dep.nyc.gov, (845) 334-7868

DEP Announces Results from Scientific Study that Examined Sediment Deposition in Catskills Reservoirs

The New York City Department of Environmental Protection (DEP) today announced the results of a scientific study that examined changes in reservoir storage capacity as a result of sediment deposition in the City’s six reservoirs in the Catskill Mountains. A three-year study by the U.S. Geological Survey (USGS) found that natural erosion of watershed mountains and streams has reduced total storage capacity in the reservoirs by approximately 2.4 percent. Importantly, this sediment has collected in the reservoirs where it does not affect the City’s drinking water intakes, nor does it reduce DEP’s ability to deliver drinking water during the worst drought on record. The new storage numbers are the first comprehensive data collected by scientists and engineers since the reservoirs were constructed from 1913-1964.

“The data gathered by USGS serve as an important baseline for DEP to track the rate of sediment deposition in our reservoirs in the decades and centuries ahead,” **DEP Commissioner Vincent Sapienza** said. “The amount of sediment in the reservoirs thus far does not affect the quantity or quality of drinking water that DEP provides to the City, nor does it affect our downstream releases.”

The natural forces that deliver sediment into the reservoirs affect every lake and reservoir in the world, both natural and man-made. These forces have also affected the Catskill Mountains since they were formed millions of years ago by continental drift and melting glaciers. Rain and melting snow are slowly eroding the mountains. Fine sediments, pebbles and relatively large stones – known as “bed load”—were generally picked up by mountainside streams and carried toward the ocean by larger rivers. However, New York City’s reservoirs now act as huge catch basins in these river systems, gathering up much of the eroded material from the mountains that would otherwise be carried farther and farther downstream.

The USGS study, which gathered data from 2013-2015, sought to understand the shape and the depth of each reservoir, and the extent to which sediment deposits reduced reservoir storage over time. Scientists collected data by using sonar to send a signal to the bottom of the reservoirs and measure their depth. Guided by a GPS system, the boat used for the survey traveled almost 700 miles as it traced dozens of shore-to-shore cross sections at each reservoir. Scientists collected millions of data points, including more detailed measurements near intake chambers, dams and other infrastructure that are critical to the water supply’s operation. The data were used to make three-dimensional models of each reservoir, allowing scientists to understand their storage capacities.

Overall, combined storage in the six reservoirs decreased 2.4 percent, from 489.66 billion gallons to 478.06 billion gallons. The decrease in storage capacity by percent at each reservoir varied from 9 percent at Schoharie Reservoir to 0.7 percent at Pepacton Reservoir. These data were also interpreted to measure the rate of sediment deposition by watershed area and by the age of each reservoir.

More Information
NYC Department of
Environmental Protection
Public Affairs
59-17 Junction Boulevard
19th Floor
Flushing, NY 11373
(718) 595-6600

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Those interpretations help DEP understand how each reservoir's age and the size of its drainage basin affect the amount of sediment it collects. USGS is currently performing an identical study of New York City's reservoirs in the Croton System.

Full results from the study can be found below, and a copy of the final USGS report can be found on the [DEP website](#).

	Storage capacity, billion gallons				
Reservoir	As built	New USGS	Change	% Reduction	* Years in Service
Ashokan East Basin	80.68	78.53	-2.15	2.6	99
Ashokan West Basin	49.42	46.82	-2.60	5.3	99
Ashokan Total	130.10	125.35	-4.75	3.7	99
Cannonsville	98.62	96.00	-2.62	2.7	47
Neversink	37.15	36.65	-0.50	1.3	61
Pepacton	149.80	148.69	-1.11	0.7	60
Rondout	52.44	51.77	-0.67	1.3	63
Schoharie	21.55	19.60	-1.95	9.0	88
Total	489.66	478.06	-11.60	2.4	

*Note: Years in service are based on date of completion of USGS study.

The study found that sediment is primarily collecting in portions of the reservoirs known as “dead storage.” These portions of the reservoirs are deeper than the lowest intakes that send water to New York City, which makes them inaccessible for water supply purposes. That’s why the reduction in storage, at this point, has no negative effect on the quantity or quality of drinking water that passes through the water supply. The new data also did not affect the water supply system’s safe yield—a measurement of the maximum amount of drinking water that the system could provide under the most severe drought. In addition, the findings of the USGS study do not significantly affect cold-water volumes that are available for downstream releases.

Based on the data collected by USGS, DEP has determined that no action is needed at this time because the reduction in storage capacity is relatively small and it does not affect water supply operations. The findings do not justify the cost and risk of dredging within the reservoirs, especially because such work would yield no water-supply benefits. However, DEP might look toward building expertise within its science and engineering staff to conduct similar studies more frequently in the future. This would allow the City to collect more data and better understand the rate of sediment deposition over time. Tracking reservoir storage is one of many scientific efforts that DEP has undertaken to gather data for long-term planning, a principle that has guided the New York City water supply since it was established in the 1800s. DEP collects and regularly examines similar data on the effects of climate change, numerous water quality parameters and more.

The new USGS data are also complemented by studies through DEP’s Stream Management Program. Working with its county partners, the Stream Management Program is currently studying the rate of sediment transport and deposition for storm events of different intensities. Data show that recent stream projects—which aim to reduce the transport of sediments by correcting bank failures,

reconnecting streams to their natural floodplains and much more—have reduced the amount of sediment moved by streams in the Catskills Mountains during typical storms.

DEP manages New York City’s water supply, providing more than 1 billion gallons of high-quality water each day to more than 9.5 million New Yorkers. This includes more than 70 upstate communities and institutions in Ulster, Orange, Putnam and Westchester counties who consume an average of 110 million total gallons of drinking water daily from New York City’s water supply system. This water comes from the Catskill, Delaware, and Croton watersheds that extend more than 125 miles from the City, and the system comprises 19 reservoirs, three controlled lakes, and numerous tunnels and aqueducts. DEP has nearly 6,000 employees, including almost 1,000 scientists, engineers, surveyors, watershed maintainers and other professionals in the watershed. In addition to its \$70 million payroll and \$166 million in annual taxes paid in upstate counties, DEP has invested more than \$1.7 billion in watershed protection programs—including partnership organizations such as the Catskill Watershed Corporation and the Watershed Agricultural Council—that support sustainable farming practices, environmentally sensitive economic development, and local economic opportunity. In addition, DEP has a robust capital program that will create up to 3,000 construction-related jobs per year. For more information, visit <http://nyc.gov/dep>, like us on [Facebook](#), or follow us on [Twitter](#).

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