Shallow Groundwater Quality of Shelter Island, Suffolk County, New York

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Shelter Island's shallow aquifer is the sole source of fresh-water for the island's residents (about 2,500) and a summer population that can exceed 8,000. A small area of the island is sewered, but the majority of residents rely on onsite-wastewater disposal systems (OWDS). These OWDS provide minimal treatment before discharging into the shallow groundwater system and ultimately to receiving surface waters. Shelter Island residents are concerned about the effects of wastewater contaminants in their aquifer and transport of these contaminants to sensitive aquatic ecosystems. These data can help the Town of Shelter Island assess the current effects of OWDS, and inform the town's decisions to prioritize updating methods of wastewater disposal and the protection of drinking water sources for the island.

During the fall of 2016 and 2017, shortly after peak summer population (October through December), the U. S. Geological Survey collected samples from a total of 7 monitoring wells. Each sample was analyzed for nutrients (dissolved forms of nitrogen species and orthophosphate) and contaminants of emerging concern (CEC), including over 50 organic compounds and over 100 pharmaceuticals, to determine the degree of influence OWDS have on the shallow aquifer. Among the CECs detected were a topical anesthetic (lidocaine), a psychostimulant (amphetamine), an antiviral (acyclovir), and an antidepressant (bupropion). CEC concentrations in Shelter Island groundwater samples ranged from 0.01 to 42,600 nanograms per liter (ng/L), which is well below their therapeutic dose; however, no water-quality standards exist for these compounds in drinking water. The site that had the greatest number of detections of pharmaceuticals also showed an elevated ammonium concentration of 48.7 milligrams per liter as N. Another site had a nitrate concentration that exceeded the U.S. Environmental Protection Agency safe drinking water standard (10 mg/L as N). These initial findings are 1) consistent with other studies that have found a correlation between high concentrations of nutrients and the frequency of pharmaceutical detections and 2) support the need for additional monitoring to better understand the spatial and temporal distribution of these contaminants.