

## ABSTRACT

Author: Harrison Stoffel  
Title: The Effects Of Combined Sewer Overflows On Water Quality In New Haven, Connecticut  
Thesis Advisor: James Kearns  
Department: Department of Chemistry and Honors College  
Year: 2021

Phosphorus acts as the limiting nutrient in most aquatic ecosystems. Increased phosphate concentrations in bodies of water increases the likelihood of algal blooms, which imbalance ecosystems by consuming oxygen, suffocating other marine life. Phosphates are found in fertilizers and cleaning products, which when used are flushed into sewer systems during rainfall events. During extreme rainfall, the sewer system in New Haven is designed to overflow at specific locations to prevent sewage backflow. To quantify the effects of rainfall on phosphorus content in these locations, the Hach PO-23 Phosphate Test Kit methodology was adapted to a Perkin-Elmer Lambda 25 spectrophotometer for increased precision and accuracy. A standard curve was developed for prepared standards from 0-500 ppb at a  $\lambda_{\text{max}}$  at 860nm. During dry weather measurements, it was determined that 6 of the 7 test locations were mesotrophic measuring between 10-30 ppb phosphorus, with the other location measuring at 41.09 ppb (eutrophic). During light rain, all but one location significantly increased in phosphate content. These samples ranged from 36.52 ppb (slightly eutrophic) to 153.92 ppb (severely eutrophic). During heavy rainfall, two samples were mesotrophic (22.50 ppb and 19.24 ppb), two were eutrophic (32.28 ppb and 44.02 ppb), and two were highly eutrophic (155.77 ppb and 94.24 ppb). The one effluent which was able to be measured recorded a very low concentration of phosphate (13.70 ppb).