

Abstract

Throughout the United States, aging water infrastructure creates continuous challenges for safety and water quality. Maintaining infrastructure takes considerable organization and coordination. Hydrants are critical for maintaining high water quality and for safety-precautions such as firefighting and dust control in construction. This thesis project aims to determine what factors contribute to hydrant damages in Buffalo, NY through the use of spatial analysis with geographic information science (GIScience) and asset management. It is hypothesized that, due to weather patterns specific to north and south Buffalo, there will be significantly more hydrant damages reported for south Buffalo. Additionally, more hydrants will be damaged during severe winter weather in the locations where snow accumulation is greatest. This study utilized data on hydrants and corresponding hydrant maintenance and weather data at multiple scales to test these hypotheses. Hydrants and corresponding damages were analyzed based on spatial location and temporal (seasonal) scale. Hot spot analysis was used to determine areas where significant clusters of hydrants are located and where maintenance as a result of vehicle damage may be statistically significant. Hydrant failure and repair data were analyzed based on the frequency of occurrences each day, and in relation to weather patterns. In an additional analysis, weather data were analyzed on days when severe storms occurred, to determine if more hydrant repairs result from severe weather. As predicted, south Buffalo reported a greater rate of damaged hydrants than north Buffalo; however, contrary to the second hypothesis, hydrant damages were not consistently confined to areas of Buffalo with the greatest snow accumulation. Understanding how location and seasonal weather factors cause hydrant damage or increase maintenance will help Buffalo to identify highly susceptible areas. Buffalo can use the results from the analysis to strategically implement preventative maintenance and save city funds.