

Investigating dissolved oxygen and nitrate levels among urban sites along the Chena River in Fairbanks, Alaska

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Introduction

Dissolved oxygen (DO) and nitrogen levels interact to influence the health of river ecosystems. A proper balance between these factors supports healthy aquatic life. DO plays an important role in oxygen availability to living aquatic organisms, while nitrate, a form of nitrogen, is a necessity for the growth and production of aquatic plants (Kermorvant et al., 2023 & Suter et al., 2025). In the Chena River, which flows through the urban areas of Fairbanks, runoff and seasonal changes may alter these parameters during the fall (Cai et al., 2008).

This research project investigates how dissolved oxygen, nitrate, and pH levels vary among urban sites along the Chena River in Fairbanks, Alaska, during the fall season. Understanding these relationships can provide insights into the effects of urbanization and environmental change on local water quality and the overall health of the river ecosystem.

Materials and Research Methods

To test how Nitrate and Dissolved Oxygen vary among urban sites along the Chena River, we collected data in 6 different locations on the Chena River around Fairbanks.

We conducted all tests on October 16th, 2025. All our data was collected along the bank of the river where there were a variety of shrub land coverage, in some locations there were no shrubs while in other locations there were loosely spaced short shrubs or closely spaced tall shrubs.

We conducted our research by using the Nitrate, Dissolved Oxygen, and pH GLOBE protocols. To gather our samples we used a bucket attached to a rope to collect water from the different locations. Our Nitrate and Dissolved oxygen samples were tested using LaMotte testing kits. We also tested pH using pH paper.

Results

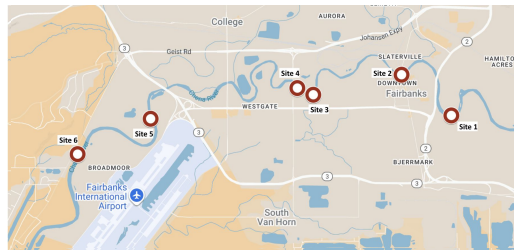


Fig 1. Site Map

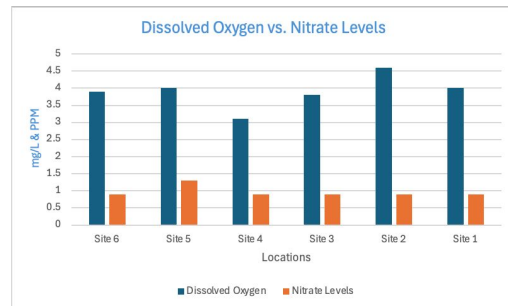


Fig 2. DO and Nitrate Results

Site 1: Snedden Memorial Park
Site 2: Downtown Fairbanks Bridge
Site 3: Chena River Walk
Site 4: Canoe Alaska
Site 5: Kiwanis Park
Site 6: Faith Baptist Church

Overall, the fall water quality results from the Chena River show that nitrate levels remained consistently low across all six sampling sites, ranging narrowly from 0.9–1.3 ppm with a mean of 0.97 ppm. Dissolved oxygen (DO) levels showed moderate variation, ranging from 3.1–4.6 ppm with a mean of 3.9 ppm. The slightly lower DO at Site 3 and higher DO at Site 5 suggest localized environmental differences, such as changes in flow, temperature, or organic matter. Despite these variations, both DO and nitrate concentrations stayed within ranges typical for urban river systems during fall. A main limitation of this study was not having direct access to the middle of the river, requiring samples to be collected using a bucket from the riverbank, which may not fully represent mid-channel conditions. Even so, these findings provide a baseline for understanding seasonal changes in the Chena River and can help guide future monitoring, especially in areas where DO levels approach thresholds that may stress aquatic life.

Conclusions

Our sampling of six urban sites along the Chena River shows that dissolved oxygen, nitrate, and pH levels vary across locations, reflecting the influence of differing vegetation cover, runoff patterns, and other urban environmental factors. Cooler water temperatures (4 °C) supported relatively stable DO levels, while nitrate concentrations and pH values shifted more noticeably among sites, suggesting localized impacts from land use and seasonal conditions. These variations highlight how even small differences in bank vegetation and surrounding urban activity can shape water quality. Overall, our findings reinforce the importance of ongoing monitoring to understand how urbanization and environmental change influence the health of the Chena River ecosystem and to support informed watershed stewardship in Interior Alaska.



Fig 3. Nathanael collecting water samples at Site 5

Literature cited

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Further Information:

At the six locations we gathered a mean pH of 5.9 and a mean temperature of 4 degrees Celsius.