

Measures of Water Quality from the Headwaters to the South Branch of the Susquehanna River

Background Information

Streams and rivers can be classified by where they occur in a drainage network – that is, by stream order. Some ecologists have studied a pattern in which the water quality of a stream or river becomes worse throughout its progression, or as the stream order becomes larger. This is so because as two streams join, any impurities or pollution from each individual stream are now flowing as one. As a majority of the Susquehanna River is of a higher stream order, it is host to many species that rely on adequate water quality for survival in their aquatic habitat.¹

Objective/Claim

This study was conducted in order to determine if the water quality of the Susquehanna River becomes worse as the stream order increases further down the river's progression. When measuring different variables that affect water quality, the claim is that the quality of water will become worse further down the Susquehanna River.

Methods/Materials

- Using empty water bottles, two water samples were collected from each of six locations – Cooperstown, NY; Wilkes-Barre, PA; Northumberland, PA; Millersburg, PA; and Harrisburg, PA.
- The dissolved oxygen content was then measured on site using a D.O. measuring kit (Figure 1).
- Once in a secure setting, the pH of each water sample was measured using standard litmus paper. In addition, the nitrate content was measured with a nitrate testing kit.
- Finally, the clarity of each water sample was measured simply by close observation in a transparent container.

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Figure 1. Dissolved Oxygen testing on site at Northumberland, PA.

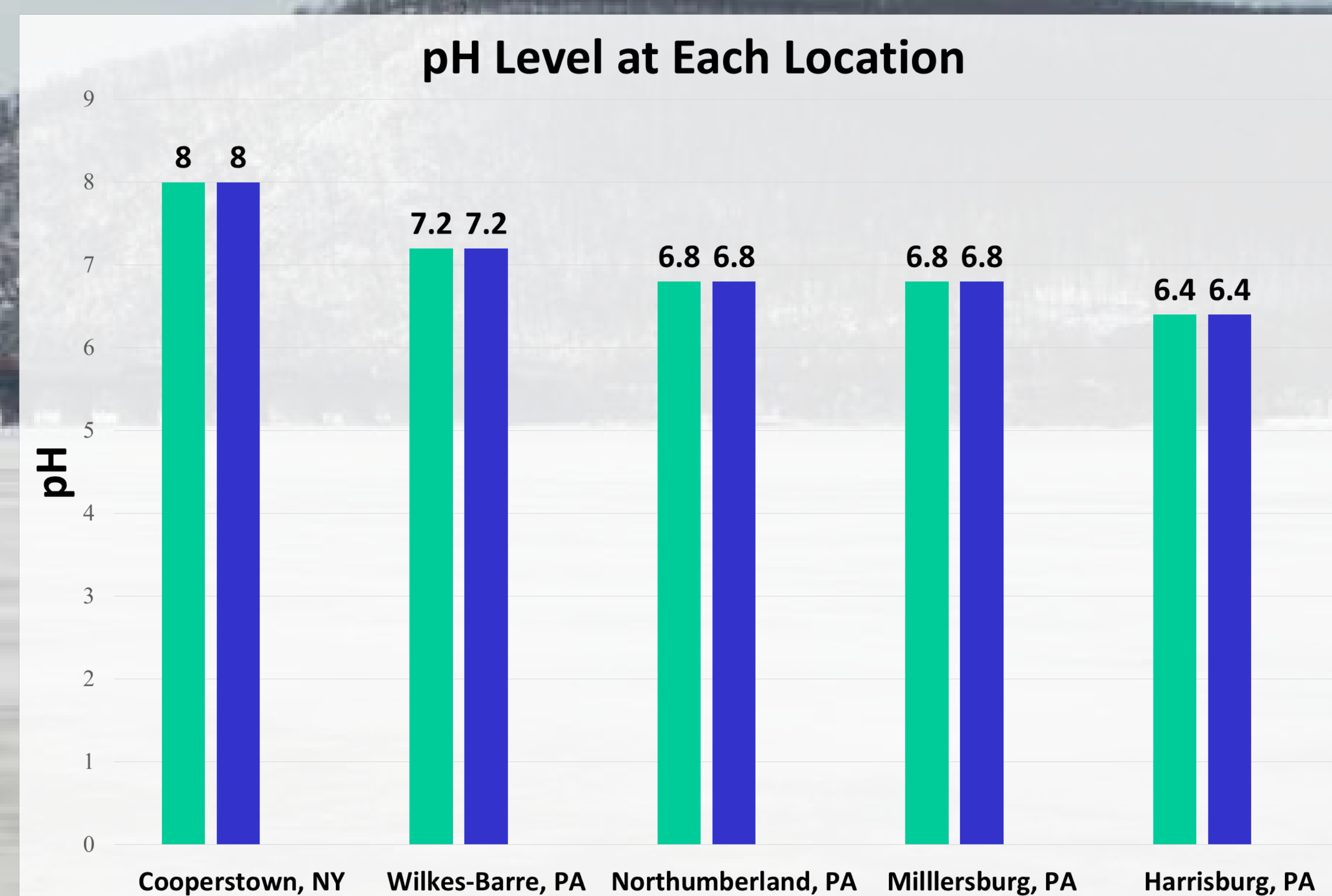


Figure 2. pH Levels at Each Tested Location

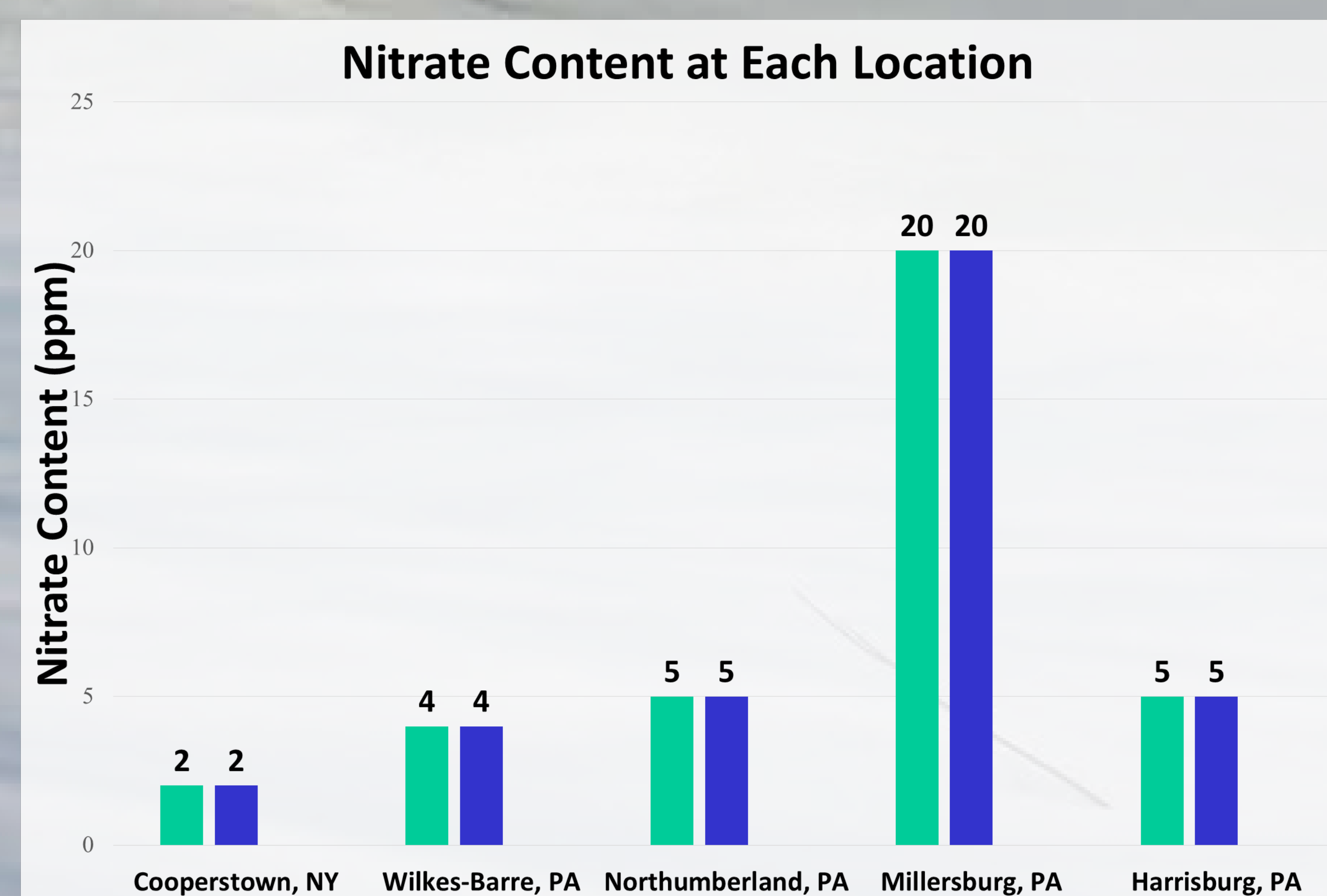


Figure 3. Nitrate Content at Each Tested Location

Results

- Dissolved Oxygen content remained the same for each location, measuring 12 ppm.
- pH levels decreased slightly throughout the progression of the river, as seen in Figure 2.
- A slight increase in the level of nitrates was measured throughout the river, with a sudden escalation at Millersburg, PA as seen in Figure 3.
- Each water sample possessed primarily clear water containing trace amounts of debris. When ranking each location based on decreasing clarity, the results were as follows:

- Cooperstown, NY (best) → Harrisburg, PA → Northumberland, PA → Wilkes-Barre, PA → Millersburg, PA (worst)

Conclusion

The results of this experiment were conclusive to the claim. As a minor decrease in pH level and a minor increase (excluding the escalated outlier) in nitrate content was measured, a slight digression in the water quality of the Susquehanna River can be seen as it progresses southward. This supports the claim that higher order streams possess worse quality water.

In order to improve the quality of the Susquehanna River, the Susquehanna River Basin Commission has developed a large river assessment study that will aim at reducing pollution output and improving quality of water in order to protect species inhabiting the river.²

Acknowledgments

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Direct information from:

¹ Pennsylvania Department of Environment Protection. (2015). In Department of Environmental Protection.

² Susquehanna River Basin Commission