



# A COMPARATIVE ANALYSIS OF NORTH AND SOUTH TEXAS SURFACE WATER WITH AN OBSERVATION OF TWO ESSENTIAL NUTRIENTS



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## ABSTRACT

Water supports life in all ecosystems. Only 1% of the world's freshwater is available for use. The importance of nutrient testing is to better understand consequences of human interaction on nature and preserve fresh water sources. Tests were done to determine concentration levels of nitrogen and phosphorus. Organic nitrogen compounds and phosphates are favored for plant nutrition. An excess of nutrients causes eutrophic conditions where growth of organic matter increases and oxygen concentration decreases. Results from locations in North and Southeast Texas were recorded for comparison with water quality standards set by the U.S Environmental Protection Agency. There were notable observations suggesting a longitudinal study would be best for overall results.

## INTRODUCTION

Water is the basis of life. It supports and sustains the human body, its environment, and various ecosystems. 97% of the Earth's water is in the oceans, the remaining 3% exists as freshwater sources in the form of glaciers, ground waters, and surface waters. Of that 3%, only .03% is in the form of rivers and lakes, the source of water for most people and inland aquatic environments (1). The purpose of this project was to analyze surface water from North and South Texas with a focus on two essential elements. The primary objective was to determine nutrient concentration at sample locations. The second objective was to compare results between North Texas (NTX) and Big Thicket National Preserve (BTNP) surface water with water quality standards set by the U.S. Environmental Protection Agency (EPA) (2). All observations, trends, and interpretation of results were recorded.

## METHODS

Water and soil samples were gathered at the BTNP from various areas within several units; Canyon Lands, Big Sandy Creek, Turkey Creek, and Lance Rosier. Sample locations outside the BTNP included the Trinity River and the Neches River. Sample locations from NTX included the west and east fork of the Trinity River and their convergence point. Using the LaMotte Smart Water Lab Model SCL-04, a colorimeter tested for low concentrations of  $\text{NO}_2$ ,  $\text{NO}_3$ , and  $\text{PO}_4$ . Titration, adding reagents to a solution until a desired color is attained, was used to determine Chloride ( $\text{Cl}_2$ ) concentration; data was recorded in mg/L. The comparative analysis was based on charts, graphs, and tables generated from experiment data.

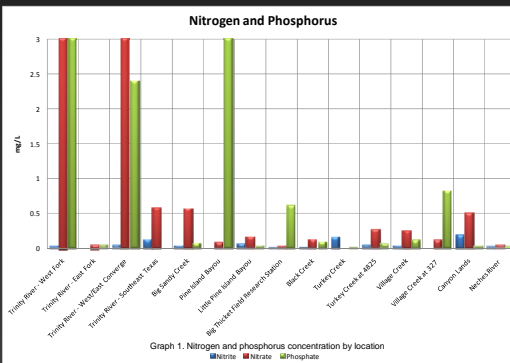
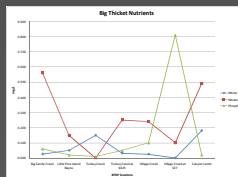
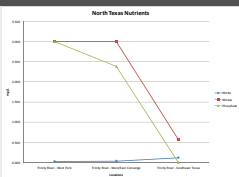


Image 1 Trinity River -West Fork @ US HWY 85d



## RESULTS

The testing range for low levels of nutrients was 1 – 3 mg/L. Over range results were assigned the maximum value of 3 mg/L. Across all water locations, total nitrogen concentration from  $\text{NO}_2$  and  $\text{NO}_3$  was .624 mg/L. Average  $\text{NO}_2$  concentration was 0.044 mg/L and  $\text{NO}_3$  concentration averaged .58 mg/L. The highest concentration of  $\text{NO}_3$  was at two areas of the Trinity River. Phosphorus in the form of  $\text{PO}_4$  was an average concentration of 0.68 mg/L from all locations. Highest concentration levels of  $\text{PO}_4$  were found at two Trinity River locations and at the Pine Island Bayou. Turkey Creek at the BTNP had the lowest concentrations of  $\text{PO}_4$  of .01 mg/L (see Graph 1 for Nitrogen and Phosphorus levels by location). NTX locations have a similar trend when comparing  $\text{NO}_3$  and  $\text{PO}_4$ . There was an increase in  $\text{NO}_2$  from north to south.  $\text{NO}_3$  was more abundant than  $\text{NO}_2$ . BTNP results for  $\text{NO}_3$  concentration displayed higher concentrations at the western and eastern borders and lower in the central area.  $\text{PO}_4$  concentration levels were under 0.1 mg/L for all locations except Village Creek at the 327 bridge.

## DISCUSSION

NTX results, seen in Graph 2, display a consistent decrease in concentration levels of contaminants with the exception of  $\text{NO}_2$ . Image 1 shows the west fork of the Trinity River had the highest concentration of nitrate and phosphate. Another factor unaccounted for was the distance between locations of the Trinity River. There was a greater distance between the 2<sup>nd</sup> and 3<sup>rd</sup> locations than in between the 1<sup>st</sup> and 2<sup>nd</sup> locations. Ideally, samples should be collected in equal distances with noted observations of the different environments between locations. As seen in Graph 3, BTNP concentrations of  $\text{NO}_2$ ,  $\text{NO}_3$ , and  $\text{PO}_4$  were lower in concentration at central areas and higher in concentration at the western and eastern borders. One possible explanation for western and eastern locations having more concentrations for  $\text{NO}_3$ , was that the areas tested were generally rural and had less opportunity for human contamination. An alternate explanation would be the central locations were more populated with plants and trees. The denser population resulted in a smaller area for nutrients and more competition for resources. NTX and BTNP locations did not exceed EPA maximum safe standards for quality water. BTNP results averaged lower for nitrates and phosphates and higher for nitrites when compared to results from the Trinity River.

## LITERATURE CITED

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