



Testing the water quality in Texas

Nicholas C. Charassri, Stephen McDonough, Melissa Griffin, Ishan Desai[‡], Dr. Bryan Boulanger[‡]
 Eastfield College, DCCCD, Mesquite, TX [‡]Texas A&M University, College Station, TX

Abstract

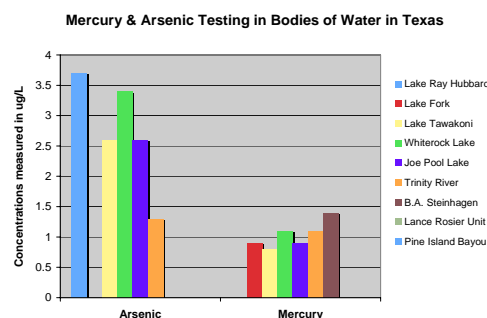
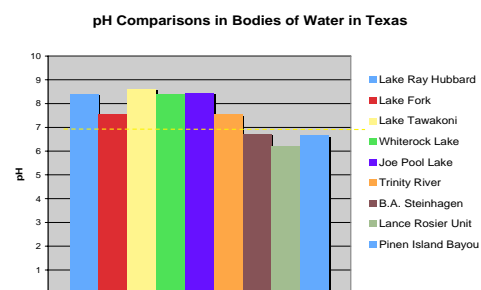
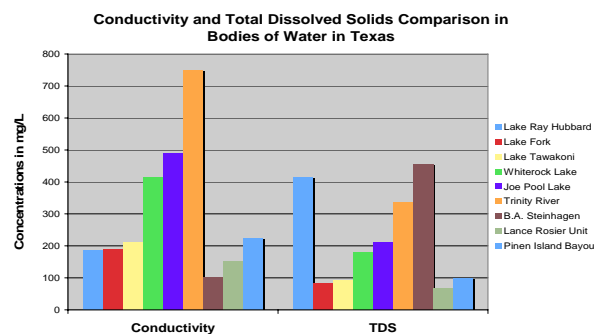
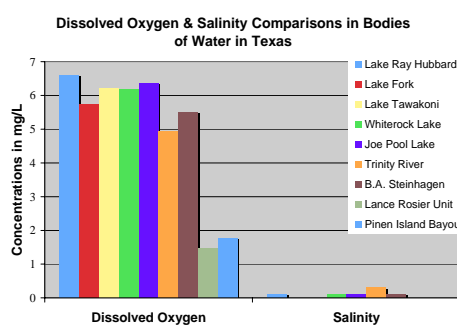
In many areas of the world water is polluted with heavy metals like arsenic and mercury which are highly toxic. These heavy metals build up over time from their use in agricultural and industrial processes. (2) Testing the quality on bodies of water is important research since consuming water contaminated with heavy metals is a threat to health. Monitoring and recording data for the future is key to our survival as well as the protection of the ecosystem and other organisms.

The purpose of the research is to compare the water quality in Northeast Texas and Dallas with water in the Big Thicket. Tests were run on site for the dissolved oxygen, salinity, total dissolved solids, conductivity, and pH. Tests for heavy metals were conducted at the Texas A&M laboratory.

The salinity level was the highest in samples from the Trinity River South of Dallas, pH was more acidic in water in Southeast Texas. Dissolved solids had higher concentrations in water samples taken from B. A. Steinhagen reservoir. Dissolved oxygen was highest in samples taken from Lake Ray Hubbard. The highest levels of arsenic were from samples from Lake Ray Hubbard. North Texas had higher arsenic levels in the water while Southeast Texas had higher concentrations of mercury.

Introduction

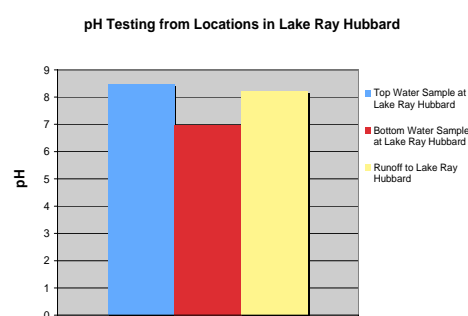
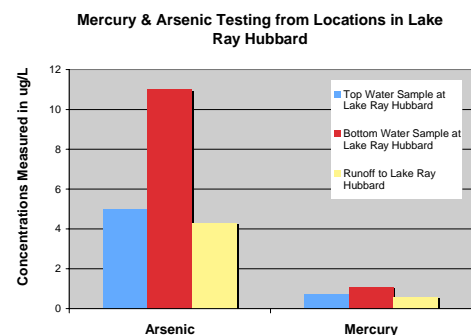
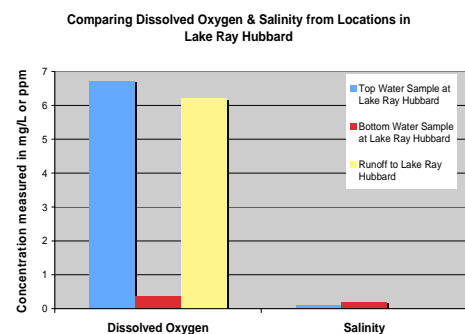
The purpose of the research is to compare the water quality in East Texas and Dallas with water in the Big Thicket. The Northeast Texas samples were from Lake Ray Hubbard, Lake Tawakoni, Lake Fork, Joe Pool Lake, White Rock Lake, and Waxahachie Lake. Samples were also collected from the Trinity River South of Dallas. The Big Thicket samples were taken from B. A. Steinhagen Reservoir, Pine Island Bayou, and the Lance Rosier Unit. The onsite water tests conducted were pH, dissolved oxygen, salinity, total dissolved solids, and conductivity. Heavy metal tests for Arsenic and Mercury were conducted.



Methods

The samples were collected on site and placed in plastic containers and put on ice approximately three minutes after the water samples were collected. The samples were taken to the laboratory and stored in the refrigerator for approximately two weeks until the samples were taken to the Texas A&M laboratory to test for heavy metals. The solutions used to test for the arsenic were 6 m Hydrochloric Acid (HCl) + 0.3% w/v Sodium Borohydride (NaBH₄) + 0.1 % w/v sodium hydroxide (NaOH). The solution used to test for mercury was 1.2 M HCl + 1.0% w/v NaBH₄ + 0.1% w/v NaOH. The equipment used on site was a Hach sension 156 with electrodes that tested, pH, dissolved oxygen, salinity, total dissolved solids, and conductivity.

Additional samples were collected and preserved for heavy metal analysis at College Station using an atomic absorption spectrometer, (AAS). The tests conducted were for arsenic and mercury.



Results

The results indicated water in Southeast Texas was more hypoxic than water in North Texas. (Graph 1) The highest DO concentrations were in the reservoirs. The highest DO level was from Lake Ray Hubbard with a reading of 6.6 mg/L. The highest concentration of DO collected in South Texas was from B. A. Steinhagen Reservoir with a reading of 5.5 mg/L. The lowest reading in North Texas came from the Trinity River, South of Dallas with a DO reading of 4.9 mg/L. While the lowest reading was collected in Southeast Texas was at the Lance Rosier Unit located in the Big Thicket National Preserve, the sample had a DO level of 1.47 mg/L (Graph 1) Depth affected the dissolved oxygen levels. (Graph 6), the lower the depth the less dissolved oxygen. The water in South Texas was more acidic while the North Texas samples were more alkaline. Graph 2) Depth also affected the pH. (Graph 7) The dissolved solids was highest in B. A. Steinhagen Reservoir with a reading of 455.6 mg/L Conductivity was higher in the Trinity River Samples taken south of Dallas with a reading of 750 mg/L. Lake Ray Hubbard was sampled at depths of fourteen meters, and the (TDS) reading was 204.0 mg/L, while the surface sample reading was 190.5 mg/L. (Graph 3) The pH at 14 meters was 6.98 while the surface water sample had a pH of 8.47.

The data showed North Texas water contained more arsenic than the Southeast Texas samples. The highest concentration of arsenic were found in Lake Ray Hubbard. The concentration was 5.0 ug/L, while the second highest concentration of arsenic was 4.3 ug/L, the second sample was taken at a soil conservation mini lake which drains to Lake Ray Hubbard. Lake Fork had the lowest concentration of arsenic of the samples taken with a "below detection limit" or "BDL". (Graph 4) The concentrations of arsenic in Lake Fork were lower than 0.6 ug/L. The water at the bottom of Lake Ray Hubbard at fourteen meters had double the amount of arsenic found at the surface with a reading of 11.0 ug/L, so depth may affect the heavy metal concentration in a body of water. (Graph 5) The highest mercury concentration in Southeast Texas was found in water from B. A. Steinhagen Reservoir with 1.4ug/L. The highest concentration of mercury recorded in North Texas was in water from Joe Pool Lake and White Rock Lake with a reading of 1.1ug/L. (Graph 4)

Discussion

The data indicated that water from South East Texas was more hypoxic than the water from North Texas. (Graph 1) Water South East Texas was also more acidic than water from North Texas. The deeper samples of water contained a higher percentage of total dissolved solids and the water was more acidic. Depth the water samples were taken from affect the TDS and the pH to the data. Conductivity and salinity did not seem to make much a difference at depth according to the results. The Trinity River that was tested South of downtown Dallas had a high concentrations of conductivity and a higher percentage of sodium with a salinity level of 0.3 mg/L.

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