



Water Quality Summary

Testing Date: 7/15/2010

Water Lake Macomb County

Water Quality Test Results

	Units	North End	Mid-North	Mid-South	South End
Temperature	°F	84.6	84.4	84.0	83.7
Transparency	Feet	5.92	6.17	6.33	6.21
pH	Standard Units	8.83	8.84	8.57	8.52
TDS	ppm	193	190	191	192
Conductivity	µS	387	380	383	383
Alkalinity	ppm as CaCO ₃	171.5	174.0	178.5	175.5
Hardness	ppm as CaCO ₃	155.0	160.0	155.0	157.5
Salinity	ppm	190	180	180	180
Dissolved Oxygen	mg/L	6.5	6.3	5.3	5.0
Nitrates	ppb	748.0	660.0	572.0	352.0
Phosphates	ppb	160.0	60.0	70.0	120.0
<i>E. coli</i>	CFU / 100 mL	22	17	15	22

Discussion

These results show that the water at Water Lake is healthy and suitable to support natural wildlife. As there are no signs of pollution recreational use of the lake, such as swimming and fishing, is safe.

The **pH, TDS, Conductivity, Alkalinity, Hardness, and Salinity** concentrations are *normal* for a freshwater lake. These parameters are indicators of many different molecules in the water. Due to the presence of many useful and helpful substances, these will always be present to some degree. However, when any of these rise above their target range, it indicates an influx of molecules that should be carefully examined for any threats. Therefore, it is very important to monitor these parameters regularly, especially when the run-off into the lake is higher than normal.

The **Dissolved Oxygen** is at *slightly low* levels. As water warms, it is able to hold less oxygen than at cooler temperatures. The South End is at a level that may be stressful to fish. Most fish are able to withstand low levels of oxygen if it is through gradual decreases. It is important to keep the fountains running and ensure the water is well oxygenated during these warmest summer months. While the oxygen level remains low, LakePro will carefully plan its treatments in the south end to limit the possibility of post-treatment oxygen depletion, which could stress the fish even further.

The concentrations of **Nitrates** are at *healthy* levels. The **Phosphates** are *slightly high* at both ends of the lake. These are the main nutrients the allow algae and plants to thrive. High concentrations of these nutrients, especially phosphate, may result in algal blooms in the summer, because green algae (*Chlorophyta spp.*) thrive in water with



high phosphate levels. To prevent any further influx of phosphates, fertilizers with high phosphorous content should be reconsidered. The nutrient concentrations should be monitored in the future to watch for any further increases. The results show the largest amount of nitrates in the North end and they consistently decrease moving toward the south end of the lake. At this point, there is not enough information to discern between an influx and an accumulation at the north end. With future testing, a trend will develop to determine if more nitrates are entering the lake at the north end or if they are simply accumulating at the north end.

The results also show the most phosphates at both ends of the lake. The most likely explanation is the decreased water volume at the ends of the lake compared to the middle. In this case, the total amount of phosphates is the same in all areas, but the lower amount of water (due to depth along the north and south shores) increases the concentration readings in these areas. Also, there are more homes per area at the ends of the lake, which will amplify the influx these areas.

E. coli were present in the water samples collected. Michigan Public Health Code, Part 25, sets the Total Body Contact Standard at 300 Colony-Forming Units per 100 milliliters of water (CFU/100 mL) as the geometric mean of all samples from a single sampling event. While the geometric mean is less than this standard (19 CFU/100 mL), the water is safe from fecal contamination.

The **Trophic State Index**, which is based on transparency, shows that the lake is eutrophic (productive). Algae produces chlorophyll-a and clouds the water (i.e. decreases transparency). Also, the blue dye that LakePro adds to the water decreases transparency, skewing this number.

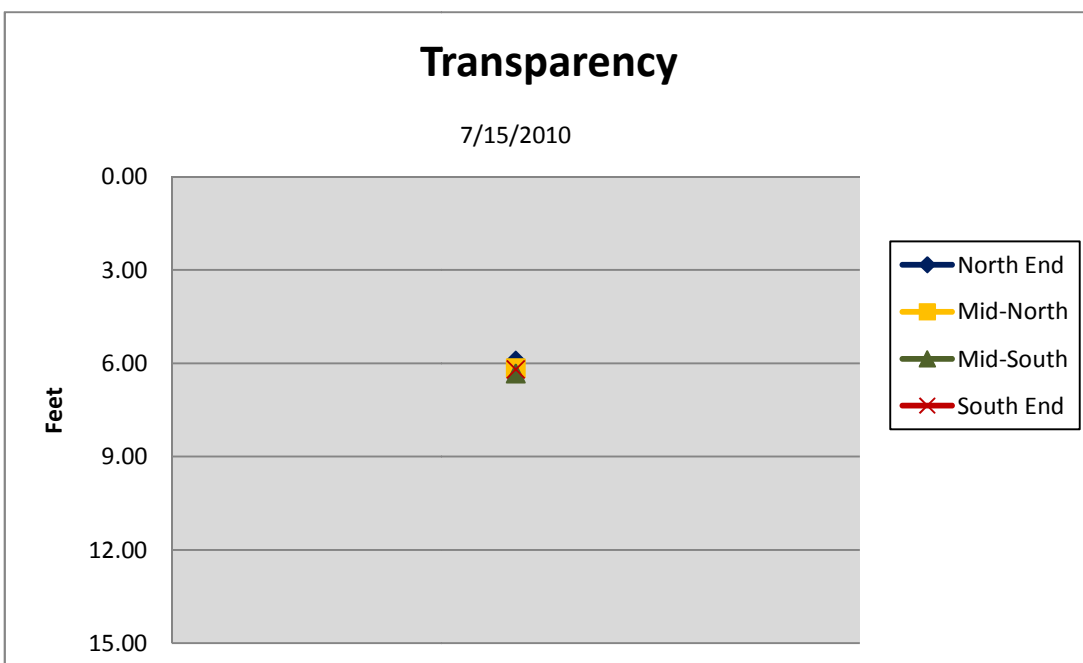
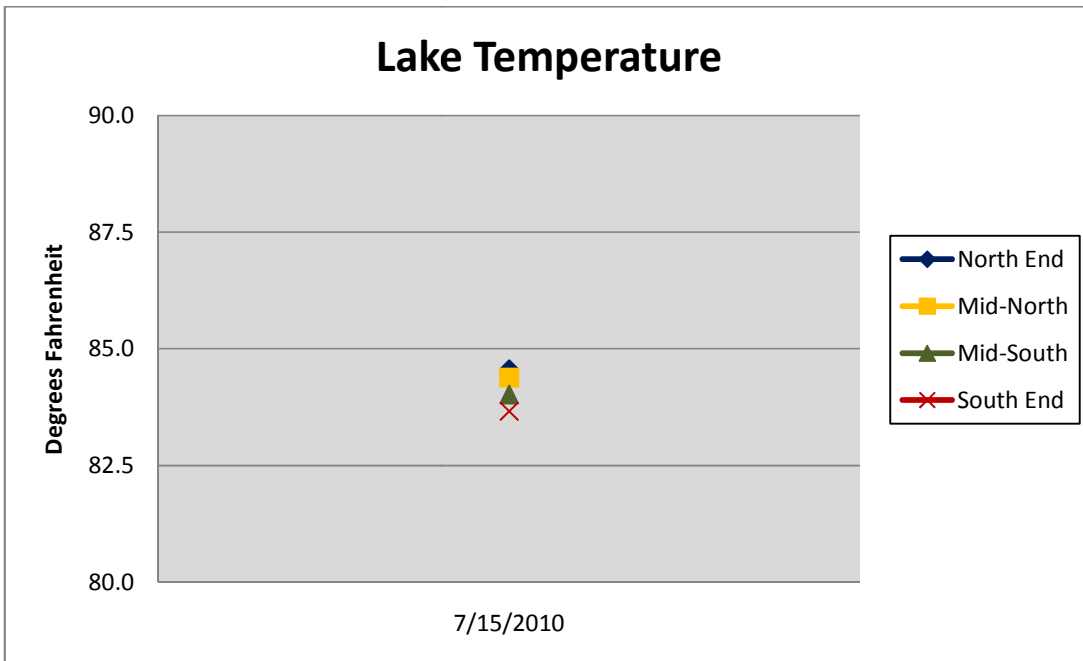
Water samples were taken on 7/15/2010 at 3:00 PM. Water tests were completed on 7/16/2010 at 7:00 AM. This report describes conditions at the time the samples were taken. The quality of the water was tested only to the parameters listed above.

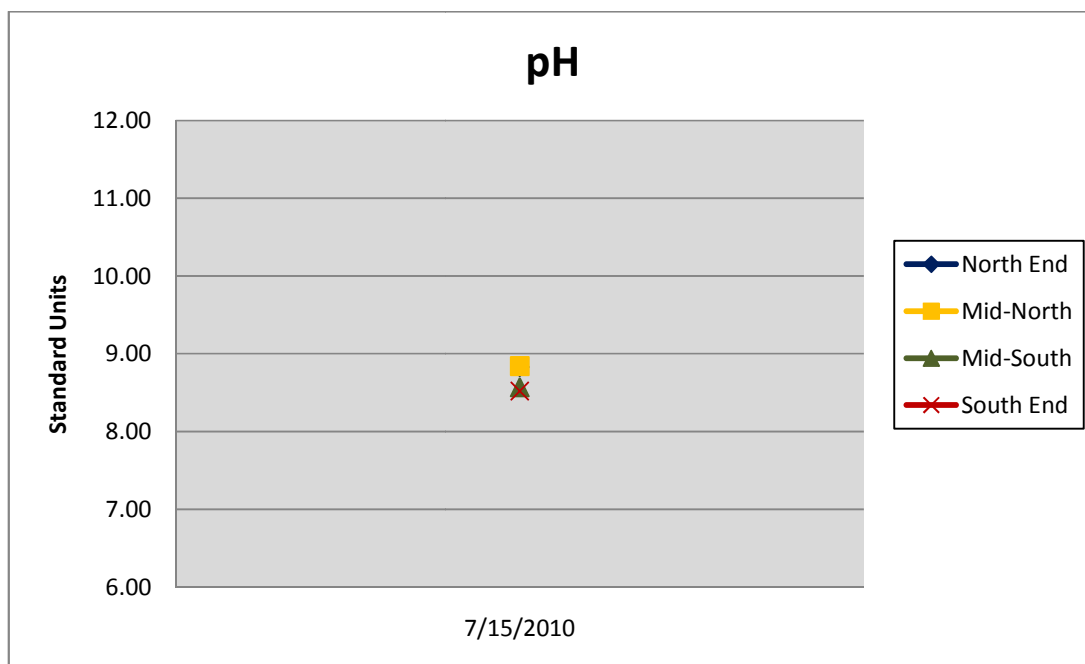
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Date: 7/23/2010

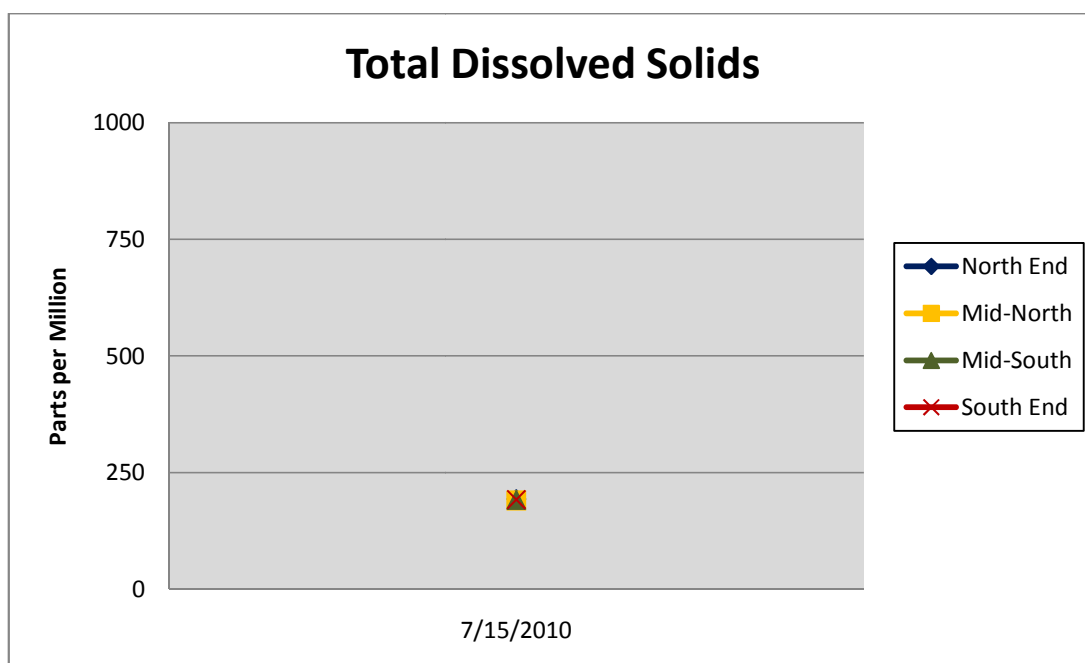
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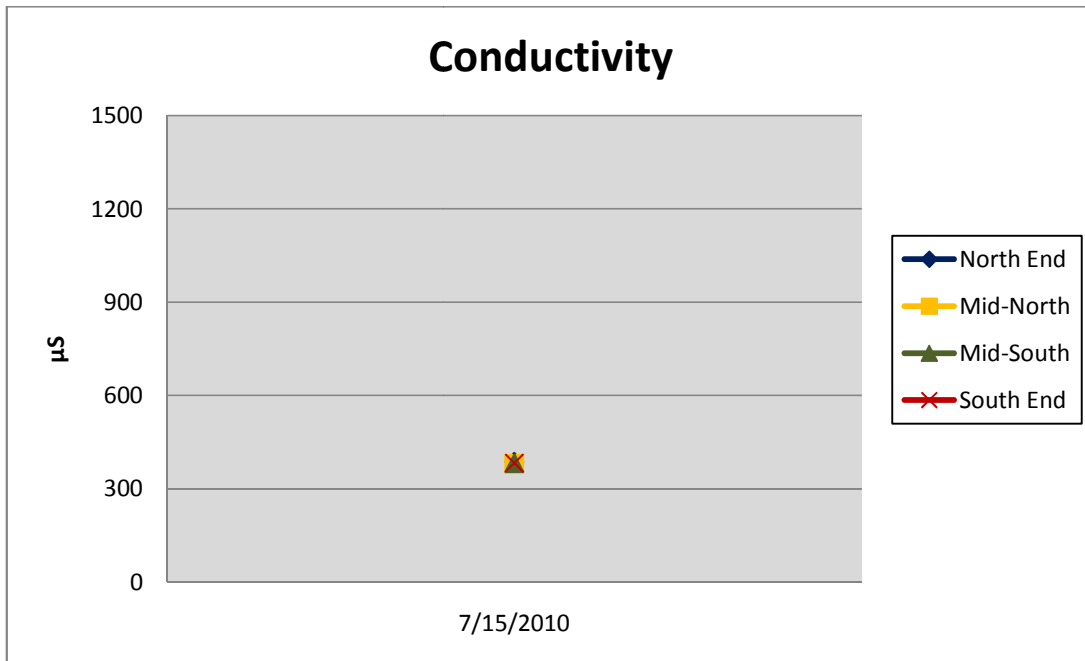




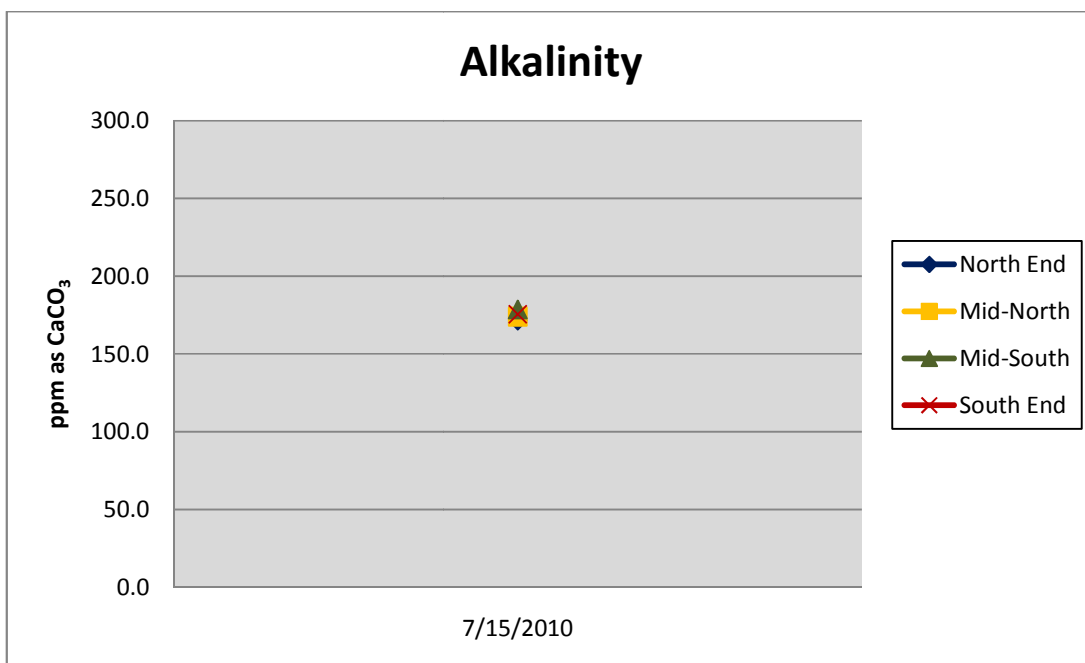
Target Range: 7.0 – 10.0



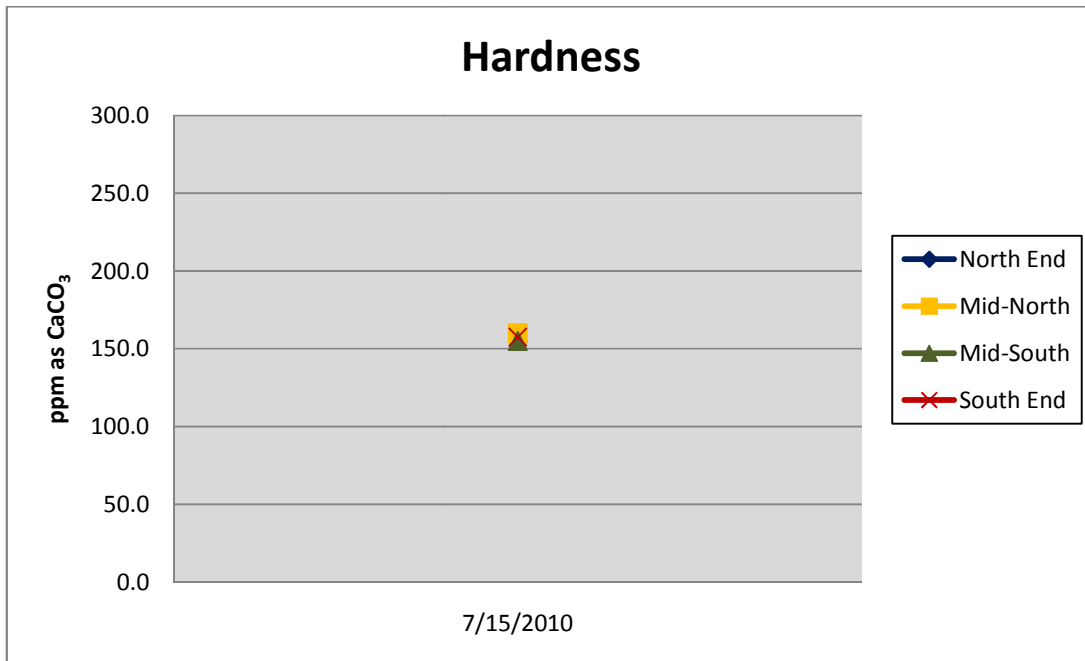
Target Range: 0-1,000 ppm



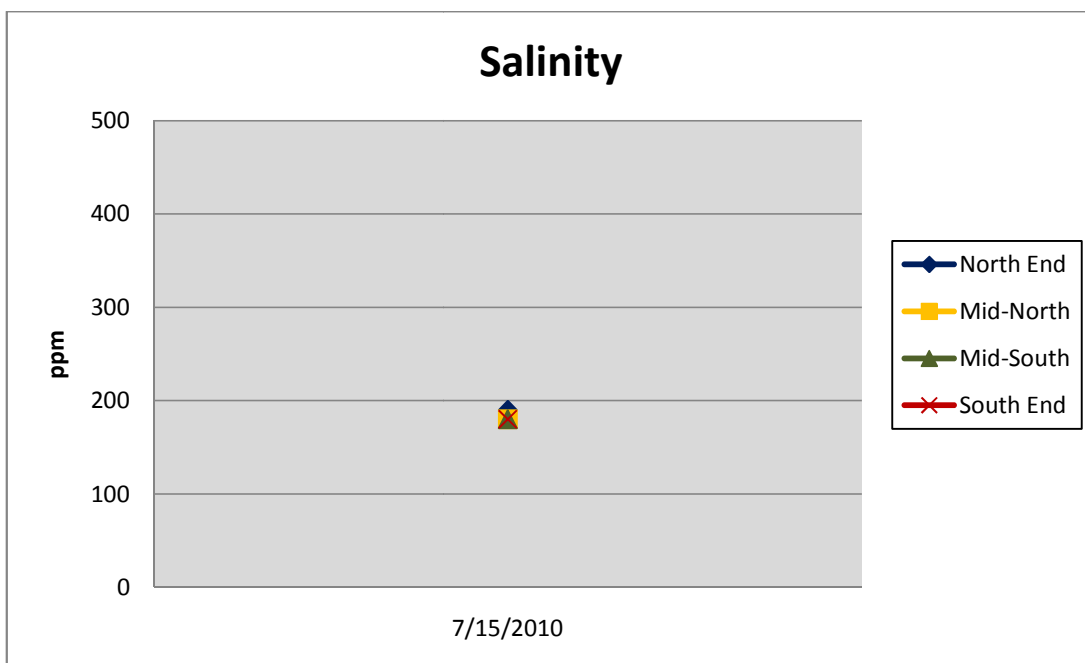
Target Range: 0 – 1,500 µS



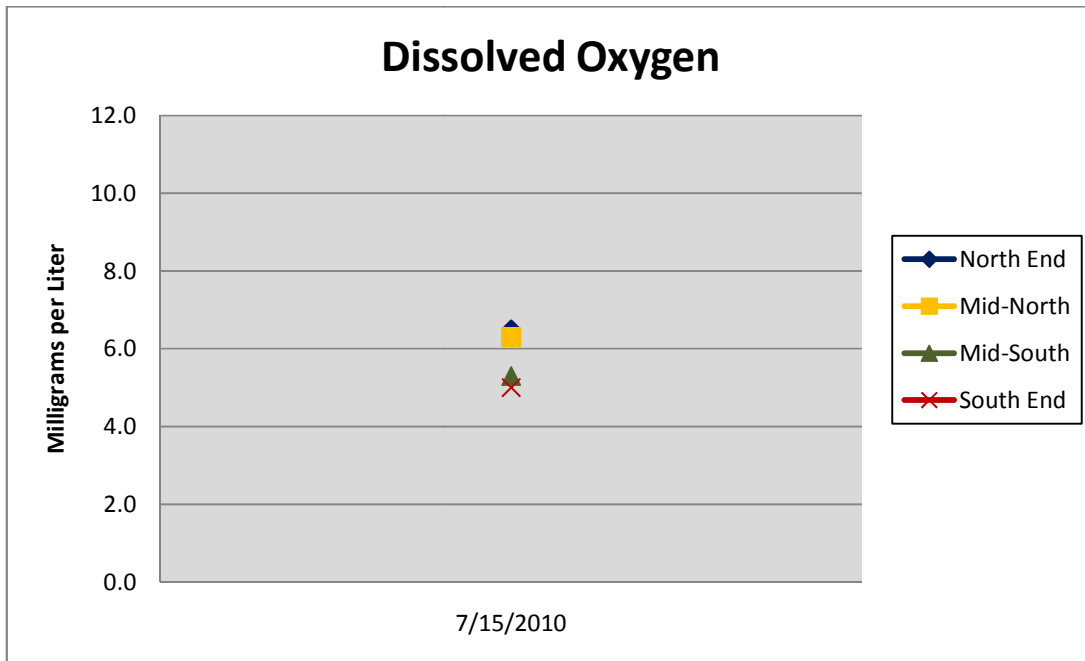
Target Range: 0 – 250 ppm



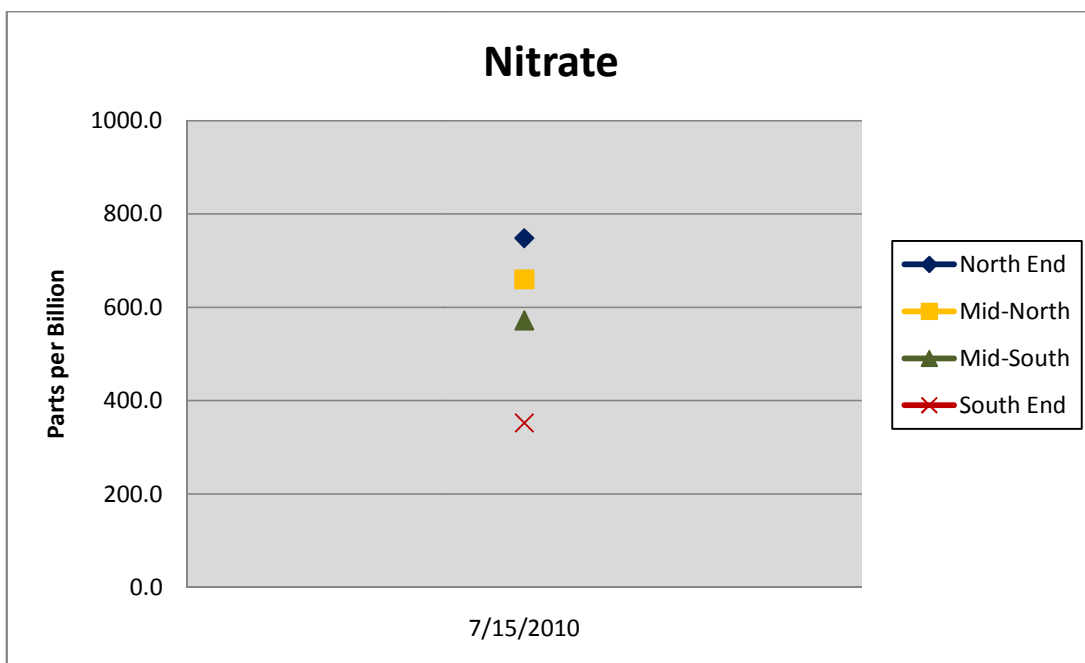
Target Range: 100–300 ppm



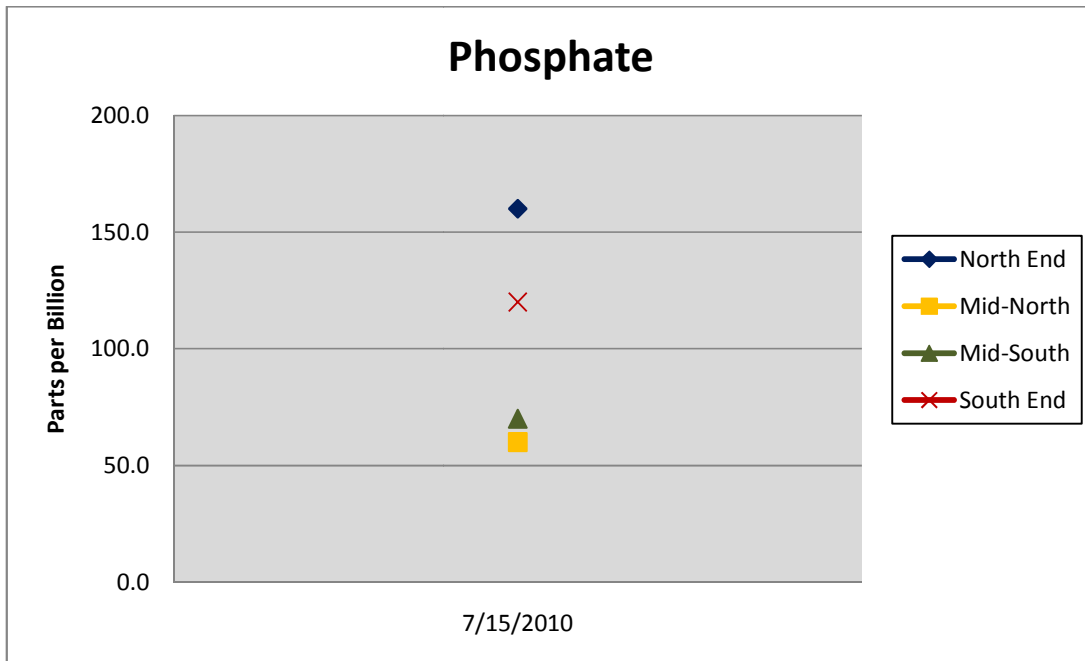
Target Range: 0 – 500 ppm



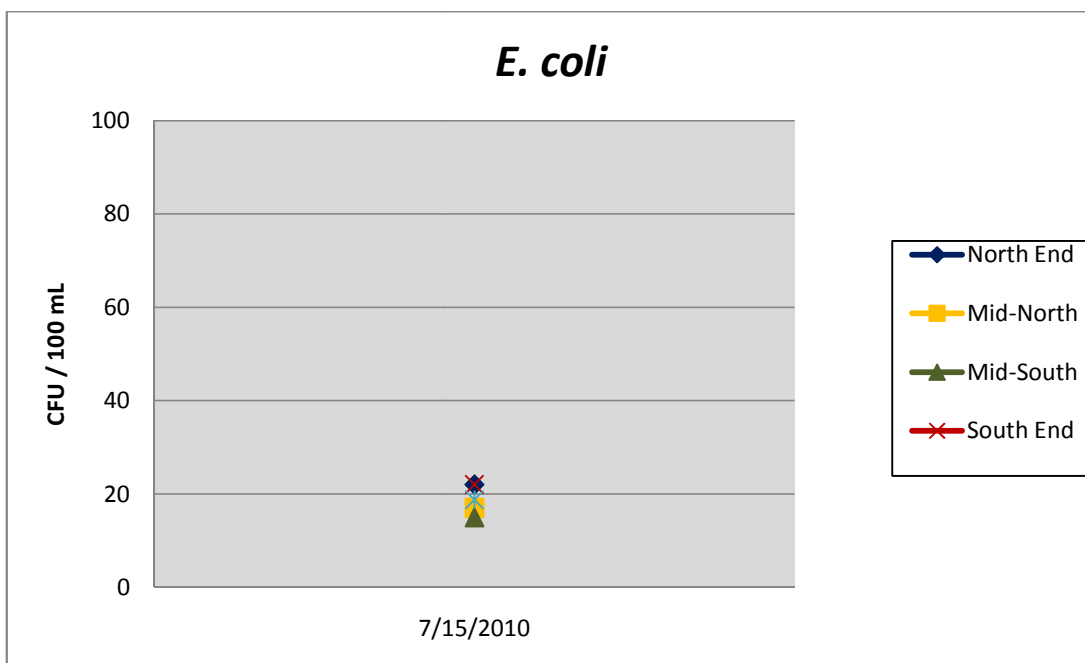
Target Range: 4 – 8 mg/L (Warm water)



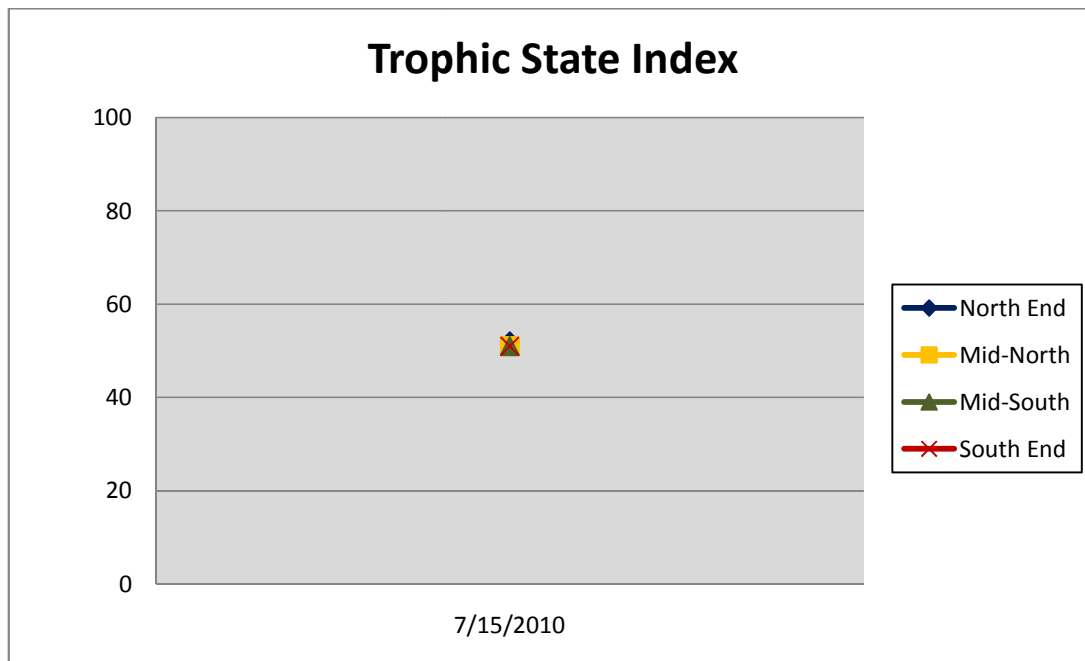
Target Range: 0 – 1,000 ppb



Target Range: 0 – 100 ppb



Target Range: 0 – 300 CFU / 100 mL



Target Range: 0 – 300 CFU / 100 mL



Analysis Information

■ DANGEROUS ■ CRITICAL ■ HIGH ■ HEALTHY

Temperature:	The water temperature directly affects the amount of oxygen that is able to dissolve into the water. The temperature of surface waters is not indicative of the entire water column.
Transparency:	The ability of light to penetrate the water column is determined by the amount of dissolved and suspended particles in the water. Although aesthetically desirable, transparent water allows increased light to reach the lake bed and may result in vegetation growth.
pH:	pH is a measure of acidity or alkalinity. pH is a general measure of lake health and can roughly indicate the range of other measurements such as alkalinity and hardness.
TDS:	Total Dissolved Solids is the amount of all organic and inorganic substances in the water in a molecular or ionized state. Higher values generally indicate richer and more productive water. Lower values usually indicate cleaner and less productive water.
Conductivity:	Conductivity is a measure of the ability of water to conduct electricity. Dissolved ions in the water increase conductivity, thus TDS and Conductivity are closely related.
Alkalinity:	Alkalinity refers to the ability of the water to neutralize acids, mainly through the hydrogenation of carbonate ions. This is why the alkalinity is expressed as “ppm as CaCO ₃ ”. However, other basic molecules in the water can also contribute to alkalinity.
Hardness:	Hardness is very closely related to alkalinity. It is a measure of the dissolved salts and metals in the water, including but not limited to CaCO ₃ .
Salinity:	Salinity is the measure of the dissolved salt content of water. Salinity influences the types of organisms that are able to survive in the water. Salinity also affects the chemistry of the water, and including conductivity and potability.
Dissolved Oxygen:	D.O. is a measure of the amount of oxygen dissolved in the water. This oxygen is available to fish and other animals for respiration. Vegetation generally increases DO, particularly during the day and early evening. Animals and other respiring organisms consume the oxygen, mostly during the day. Oxygen is also added to the lake through wave action, rain, fountains and aerators.
Nitrate:	Nitrogen is also essential for plant growth. Nitrate is the predominant form of nitrogen in water. Excessive nitrate concentrations may also result in pollution and increased vegetation.
Phosphates:	Phosphate is the form of phosphorous that is most readily available to plants and algae.
Total Phosphorus:	Phosphorus is an essential nutrient for plant growth. However, concentrations exceeding 100 ppb can impair the water and results in nuisance vegetation growth.
Fecal Coliforms:	Non-fecal coliforms are naturally found as soil organisms. Fecal Coliforms, such as <i>E. coli</i> , are coliforms found in the intestines of warm-blooded animals and humans. The presence of fecal coliforms indicates contamination from either animals or humans.



Trophic States

- Oligotrophic: Water is very clear. Nutrient levels are generally low. Plant and algae productivity is also low. Sufficient dissolved oxygen in the bottom, cooler waters allows cold-water fish to survive, such as salmon and trout.
- Mesotrophic: Water is moderately clear. Nutrient levels are slightly elevated. Plant and algae productivity is present, but generally not a nuisance. Oxygen and temperature in the lower portion of the lake allow walleye and perch to survive.
- Eutrophic: Water is not clear due to high nutrients levels, increased turbidity, and excessive algal growth. There is no oxygen in the bottom, cooler waters, restricting the lake to warm water species, such as bass and bluegill.
- Hypereutrophic: Nutrient levels are extremely high, promoting very high algae productivity. Blue-green algae blooms are likely. High turbidity and algae growth make the water opaque. Little plant growth is restricted to invasive plants. The only fish that can survive this environment are rough fish, such as carp, catfish, and mudminnows.