



Water Quality Summary

Testing Date: 7/1/2009

Orange Lake

Oakland County

Water Quality Test Results:

Deep Area - North

Temperature:	72.3 °F
Transparency:	5'10"
pH:	8.3
TDS:	487 ppm
Conductivity:	689 µS
Dissolved Oxygen:	4.7 mg/L
Alkalinity:	145.5 ppm
Hardness:	166.5 ppm
Salinity:	333.0 ppm
Phosphate:	740.0 ppb
Nitrate:	1,540.0 ppb

Deep Area - South

Temperature:	72.1 °F
Transparency:	6'1"
pH:	8.2
TDS:	488 ppm
Conductivity:	688 µS
Dissolved Oxygen:	5.1 mg/L
Alkalinity:	138.0 ppm
Hardness:	180.0 ppm
Salinity:	333.0 ppm
Phosphate:	1,220.0 ppb
Nitrate:	1,364.0 ppb

Shallow Area - North

Temperature:	71.8 °F
Transparency:	4'3" (to bottom)
pH:	8.1
TDS:	489 ppm
Conductivity:	690 µS
Dissolved Oxygen:	6.5 mg/L
Alkalinity:	150.0 ppm
Hardness:	180.0 ppm
Salinity:	334.0 ppm
Phosphate:	50.0 ppb
Nitrate:	308.0 ppb

Shallow Area - South

Temperature:	70.9 °F
Transparency:	3'1" (to bottom)
pH:	8.1
TDS:	491 ppm
Conductivity:	692 µS
Dissolved Oxygen:	5.4 mg/L
Alkalinity:	163.5 ppm
Hardness:	211.5 ppm
Salinity:	336.0 ppm
Phosphate:	70.0 ppb
Nitrate:	88.0 ppb

These results show that the aquatic environment at Orange Lake is healthy and suitable to support natural wildlife. As there are no signs of pollution, the water is safe for recreational uses, such as fishing and swimming.

The **Dissolved Oxygen** is at low levels throughout most of the lake. Currently, there is enough oxygen for fish and other wildlife to use the lake without harm. The lack of depth in most of the lake prevents waves that would normally help to aerate the water. Furthermore, warmer water holds less oxygen than cold water. The shallow waters warm very quickly and therefore hold less oxygen in the summer than during the spring and fall. There is currently no major concern, however, we should continue to monitor the oxygen levels for any further decreases.

The **pH, Total Dissolved Solids, and Conductivity** levels are very normal for a freshwater lake. The **Alkalinity, Hardness, and Salinity** concentrations are also at normal levels. 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 amount of **Nitrates** and **Phosphates** are higher than average for a natural system. As Orange Lake ages, it accumulates nutrients that cycle between being in the water and in the plants. These elevated nutrient levels will allow plants to flourish, as we have seen with Chara (algae). However, there is no simple solution to reducing the amount of nutrients.

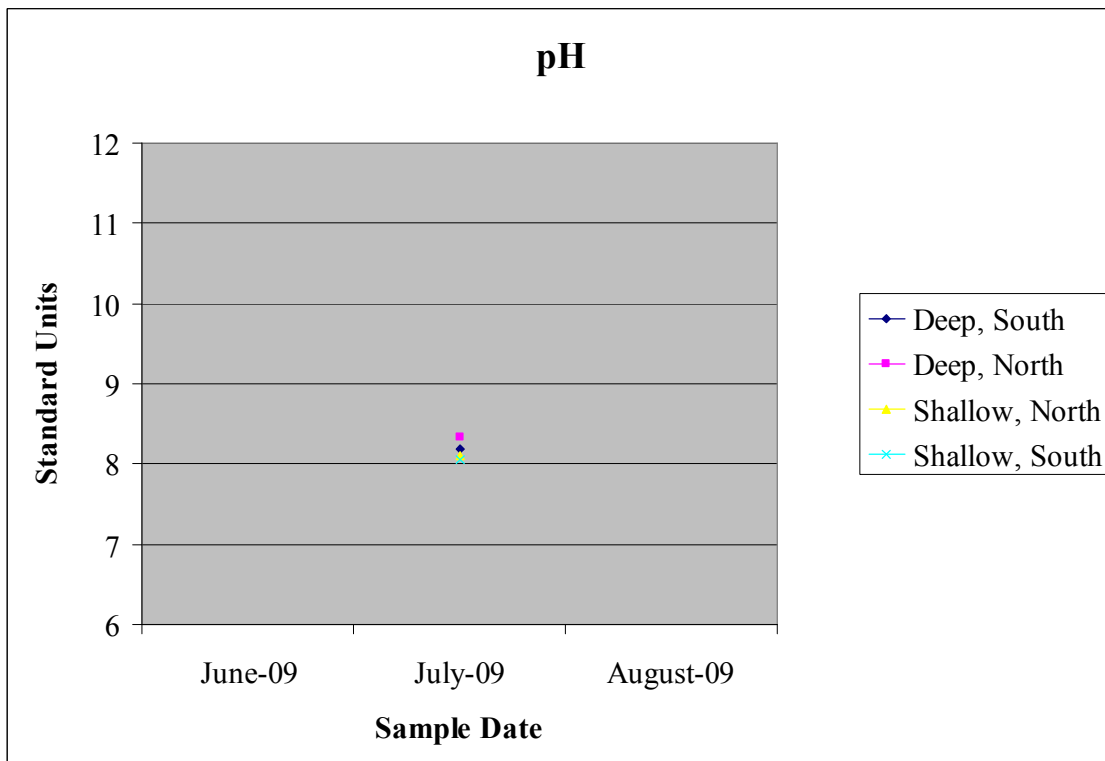
Fecal Coliforms (E. coli) were not found in the water samples.



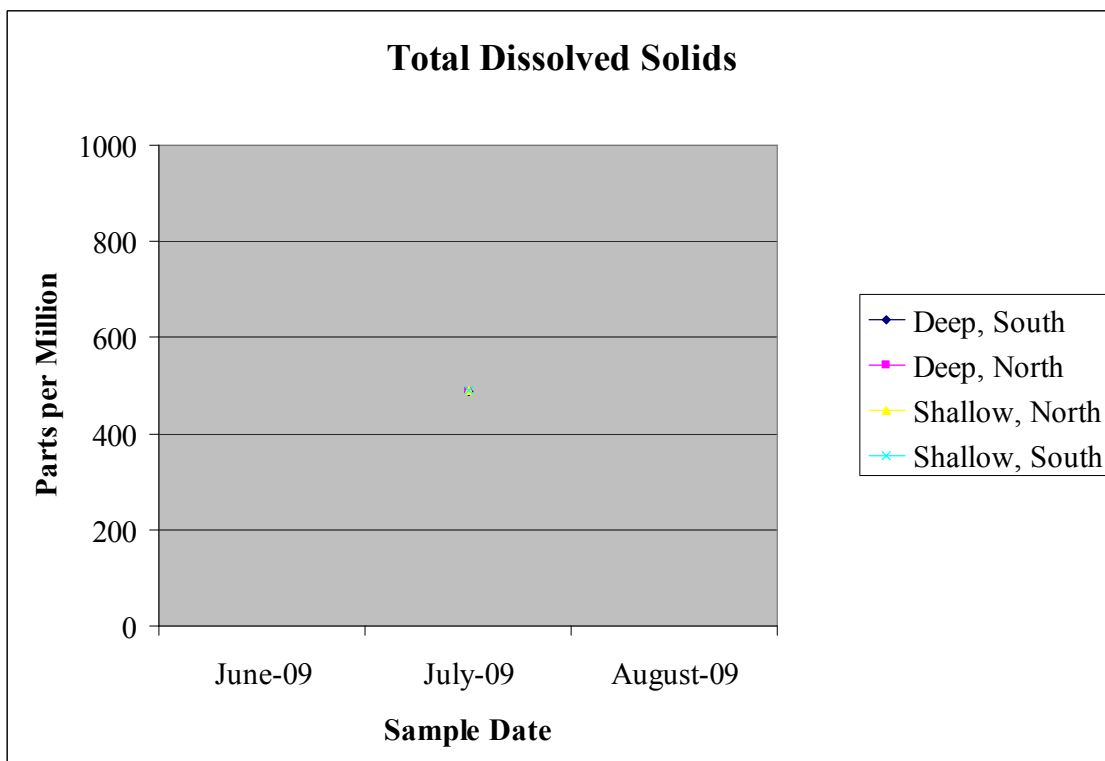
Water samples were taken on 7/1/2009 at 11:30 AM. Water tests were completed on 7/2/2009 at 8:00 AM. This report describes conditions at the time the samples were taken. The quality of the water was tested only to the parameters listed above.

Completed and Certified by: _____ Date: _____
Peter Filpansick

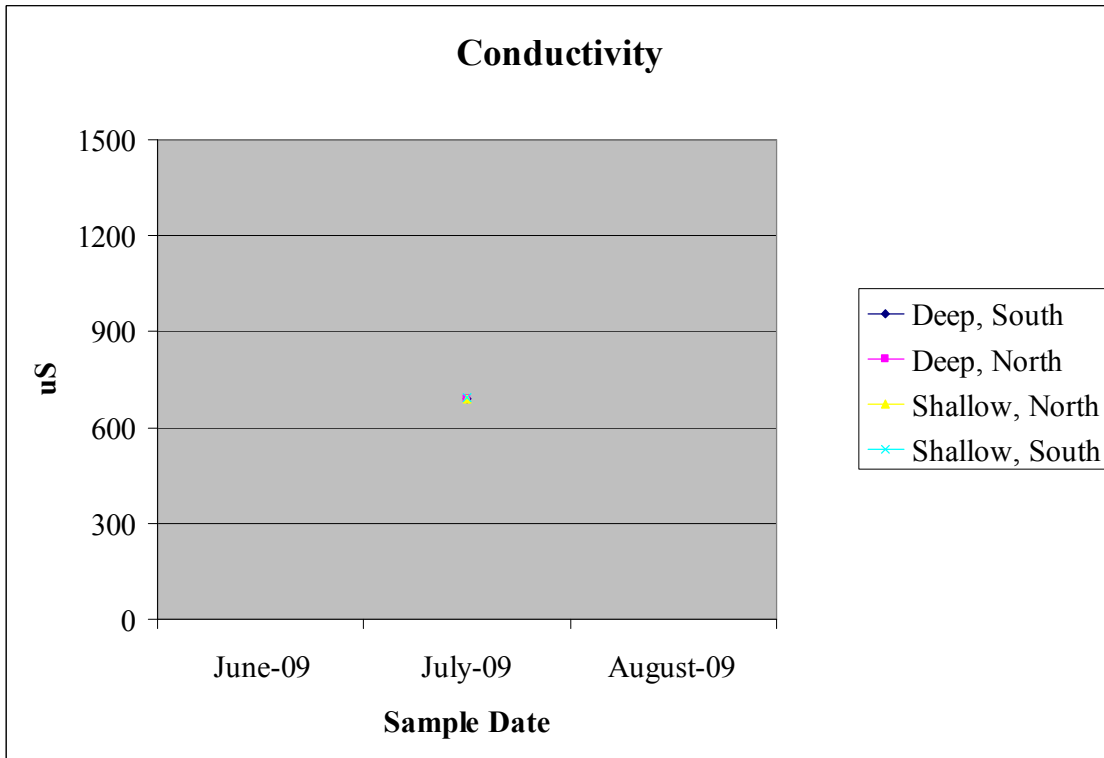
Reviewed and Approved by: _____ Date: _____
Paul Dominick



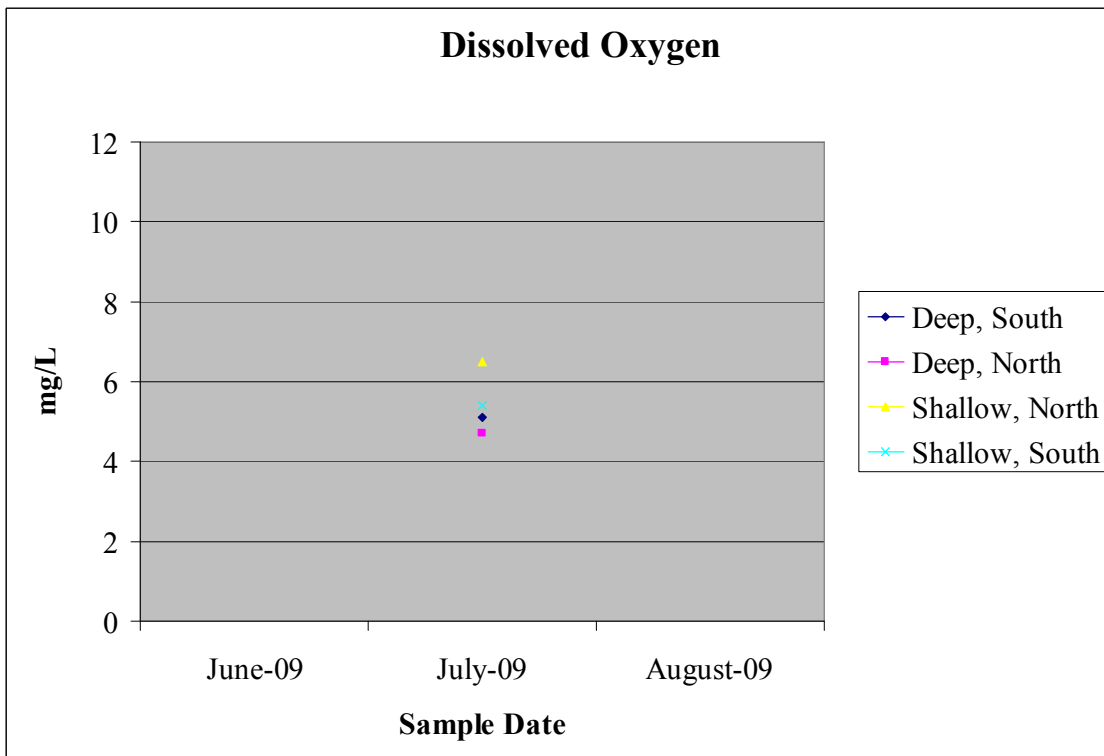
Target Range: 7.0 – 9.0



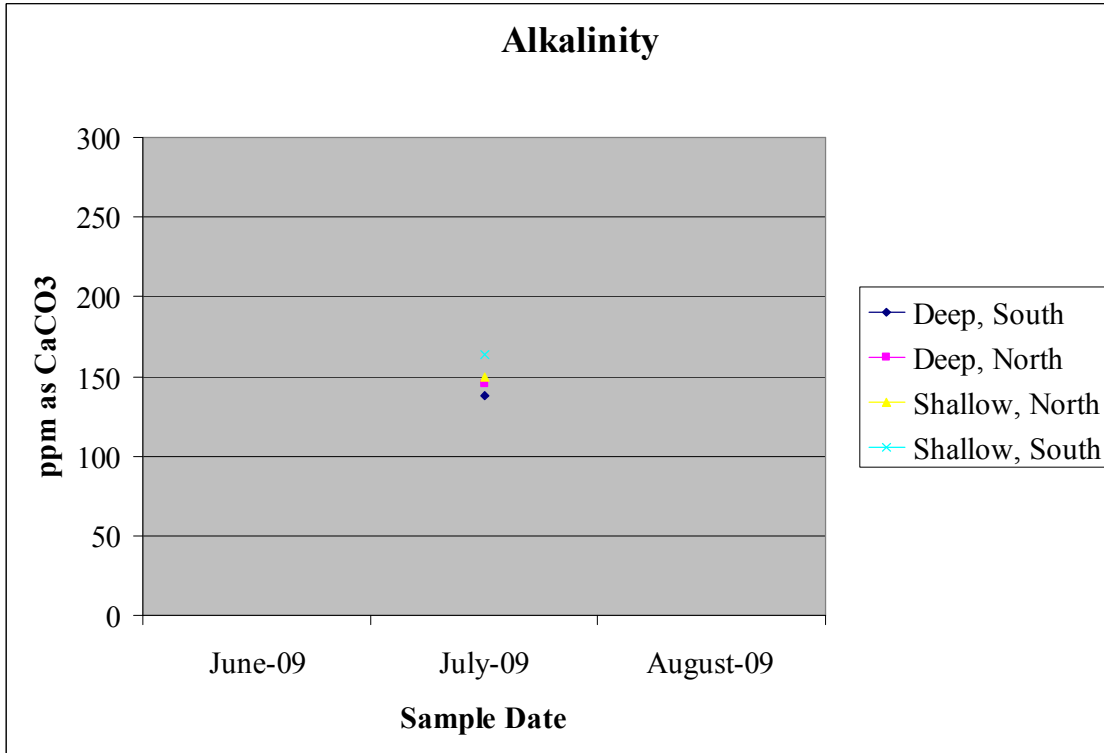
Target Range: 0-1,000 ppm



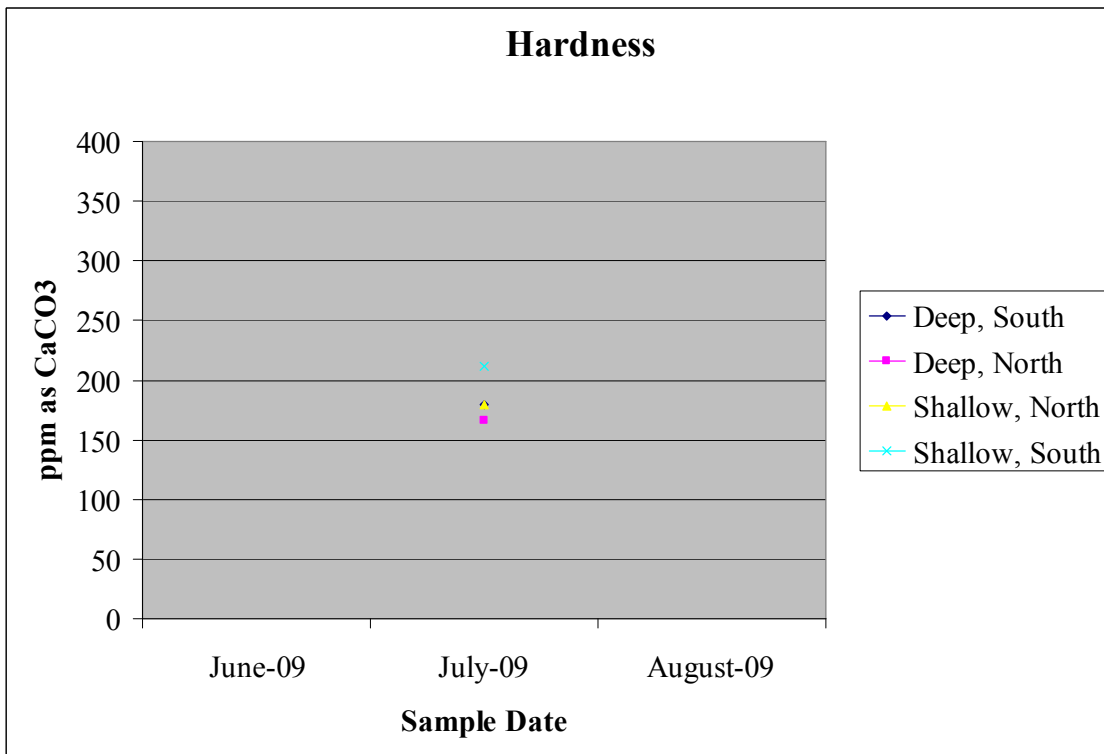
Target Range: 0 – 1500 μS



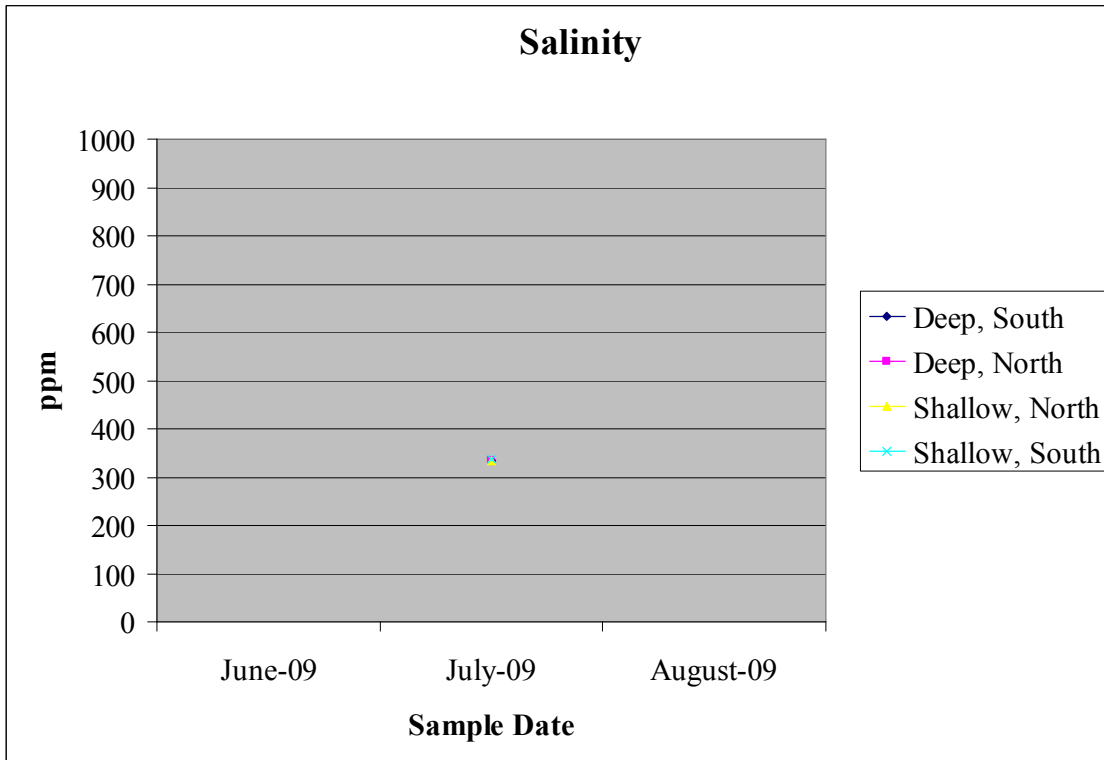
Target Range: 6 – 12 mg/L



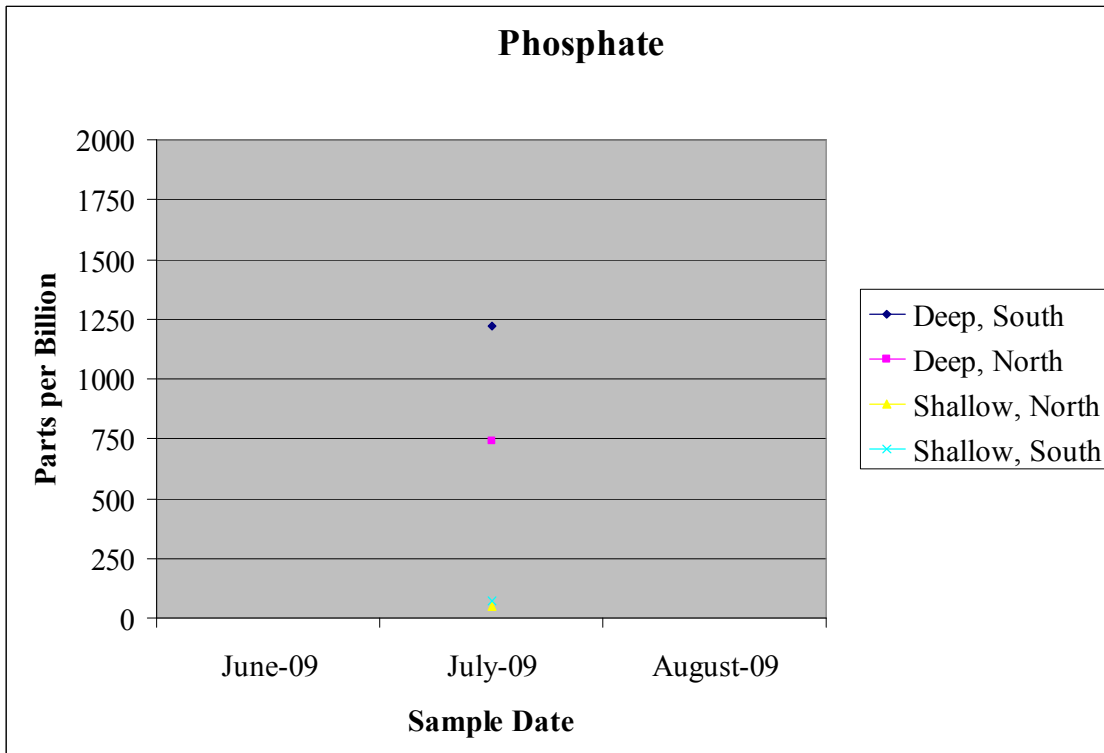
Target Range: 0 – 250 ppm



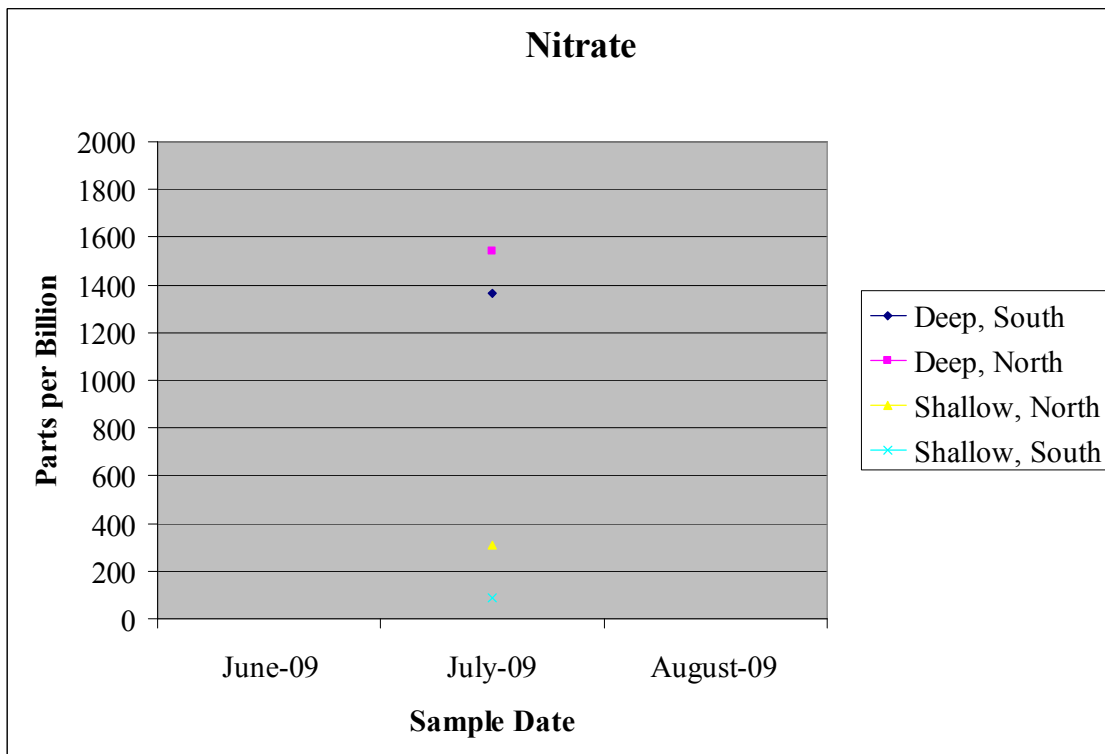
Target Range: 100–300 ppm



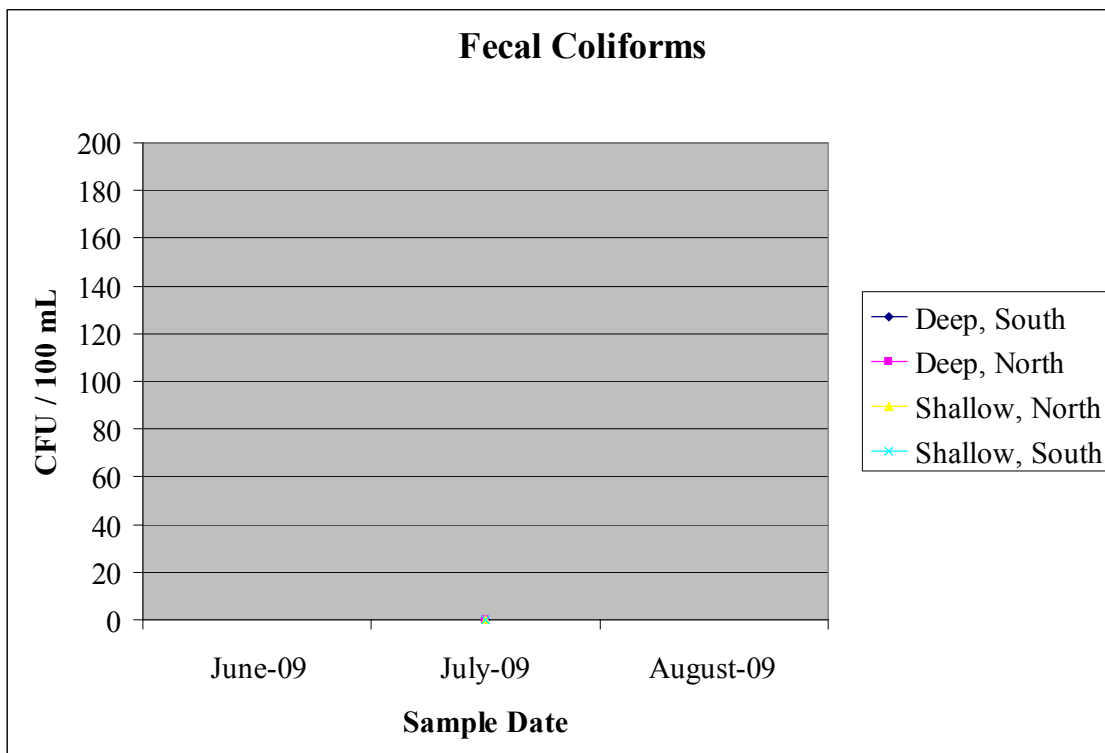
Target Range: 0 – 500 ppm



Target Range: 0 – 100 ppb



Target Range: 0 – 1,000 ppb



Target Range: 0 – 100 CFU/100mL



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.
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.
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.
Phosphates:	Phosphorus is an essential nutrient for plant growth. However, concentrations exceeding 100 ppb can impair the water and results in nuisance vegetation growth. Phosphate is the form of phosphorous that is most readily available to plants and algae.
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.
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.