



# Water Quality Summary

Testing Date: 9/22/2009

## Orange Lake

Oakland County

### Water Quality Test Results:

#### Deep Area - North

Temperature:	72.1 °F
Transparency:	7'0"
pH:	8.6
TDS:	520 ppm
Conductivity:	730 µS
Dissolved Oxygen:	8.5 mg/L
Alkalinity:	165.0 ppm
Hardness:	185.0 ppm
Salinity:	356.0 ppm
Phosphate:	690.0 ppb
Nitrate:	352.0 ppb

#### Deep Area - South

Temperature:	72.3 °F
Transparency:	7'0"
pH:	8.6
TDS:	515 ppm
Conductivity:	716 µS
Dissolved Oxygen:	8.1 mg/L
Alkalinity:	162.5 ppm
Hardness:	180.0 ppm
Salinity:	355.0 ppm
Phosphate:	480.0 ppb
Nitrate:	264.0 ppb

#### Shallow Area - North

Temperature:	73.2 °F
Transparency:	4'3" (to bottom)
pH:	8.6
TDS:	518 ppm
Conductivity:	730 µS
Dissolved Oxygen:	6.8 mg/L
Alkalinity:	162.5 ppm
Hardness:	180.0 ppm
Salinity:	352.0 ppm
Phosphate:	540.0 ppb
Nitrate:	176.0 ppb

#### Shallow Area - South

Temperature:	72.3 °F
Transparency:	3'1" (to bottom)
pH:	8.3
TDS:	525 ppm
Conductivity:	742 µS
Dissolved Oxygen:	7.2 mg/L
Alkalinity:	162.5 ppm
Hardness:	180.0 ppm
Salinity:	361.0 ppm
Phosphate:	490.0 ppb
Nitrate:	176.0 ppb

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

The **Dissolved Oxygen** is at very adequate levels throughout most of the lake. Currently, there is enough oxygen for fish and other wildlife to use the lake without harm. Rainfall, increased wind, and increased plant production may have contributed to the increased dissolved oxygen.

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 **Phosphates** are higher than average for a natural system. Since July, the phosphates have increased in the shallow portion, suggesting there is less plant production, leaving more phosphates available in the water. The in the deep portion of the lake, phosphates have decreased, suggesting increased plant production, which will use up the phosphates in the water column. Monitoring the phosphates in the future will allow us to identify temporary fluxes and significant changes in the phosphate concentration.



Since July, the amount of **Nitrates** has drastically decreased in the deeper portion of the lake. The addition of your Biological Augmentation Program has helped consume nitrates in the water column so these nutrients are not available to plants and algae. We recommend to continue the Biological Augmentation into 2010 and to continue monitoring the water for changes.

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

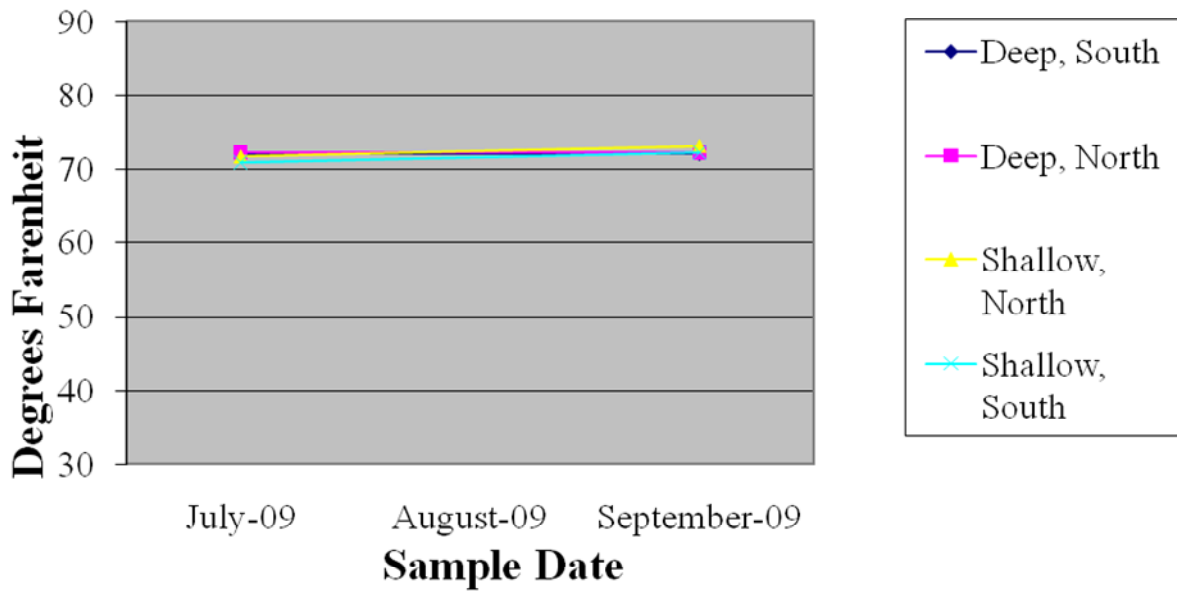
Water samples were taken on 9/22/2009 at 2:30 PM. Water tests were completed on 9/23/2009 at 8:00 AM. This report describes conditions at the time the samples were taken. The quality of the water was tested only to the parameters listed above.

Completed and Certified by: \_\_\_\_\_ Date: \_\_\_\_\_  
Peter Filpansick, B.S.

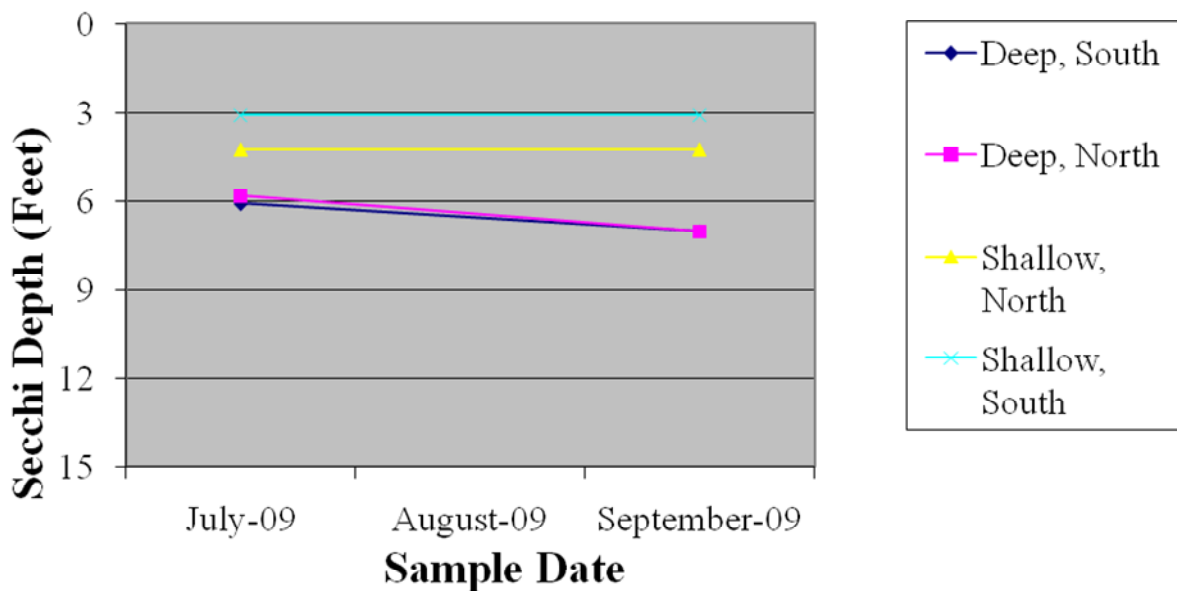
Reviewed and Approved by: \_\_\_\_\_ Date: \_\_\_\_\_  
Paul Dominick, B.A.

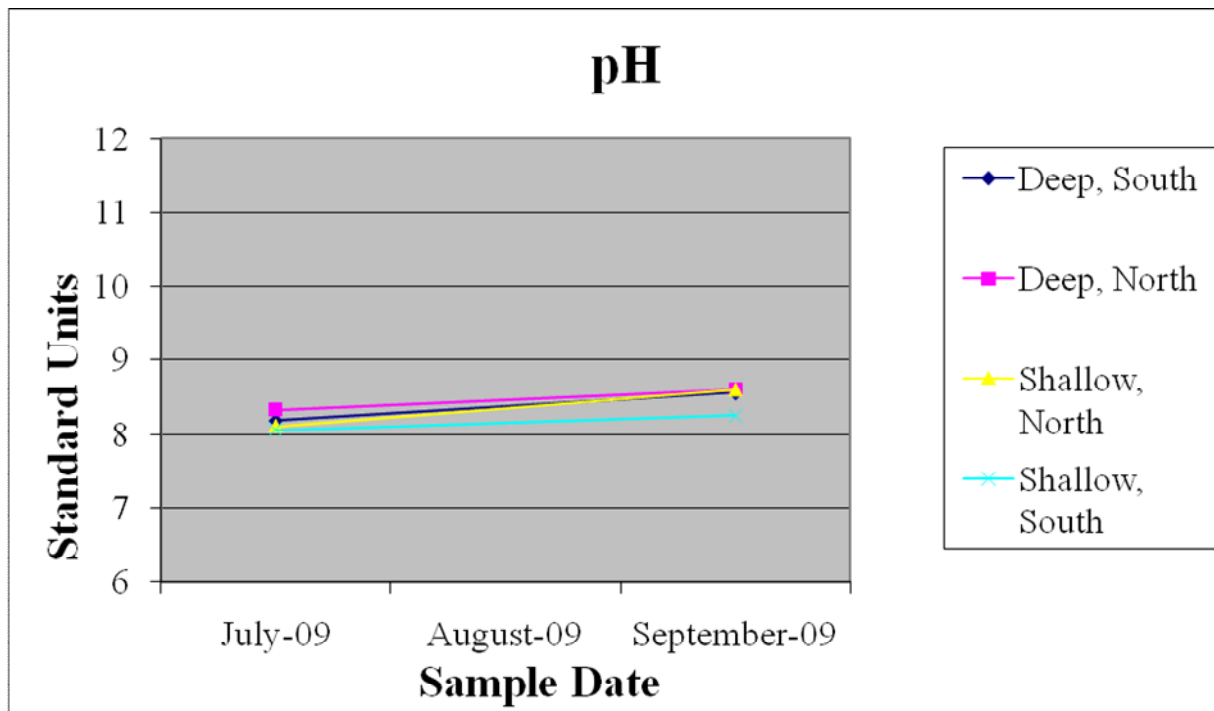


## Lake Temperature

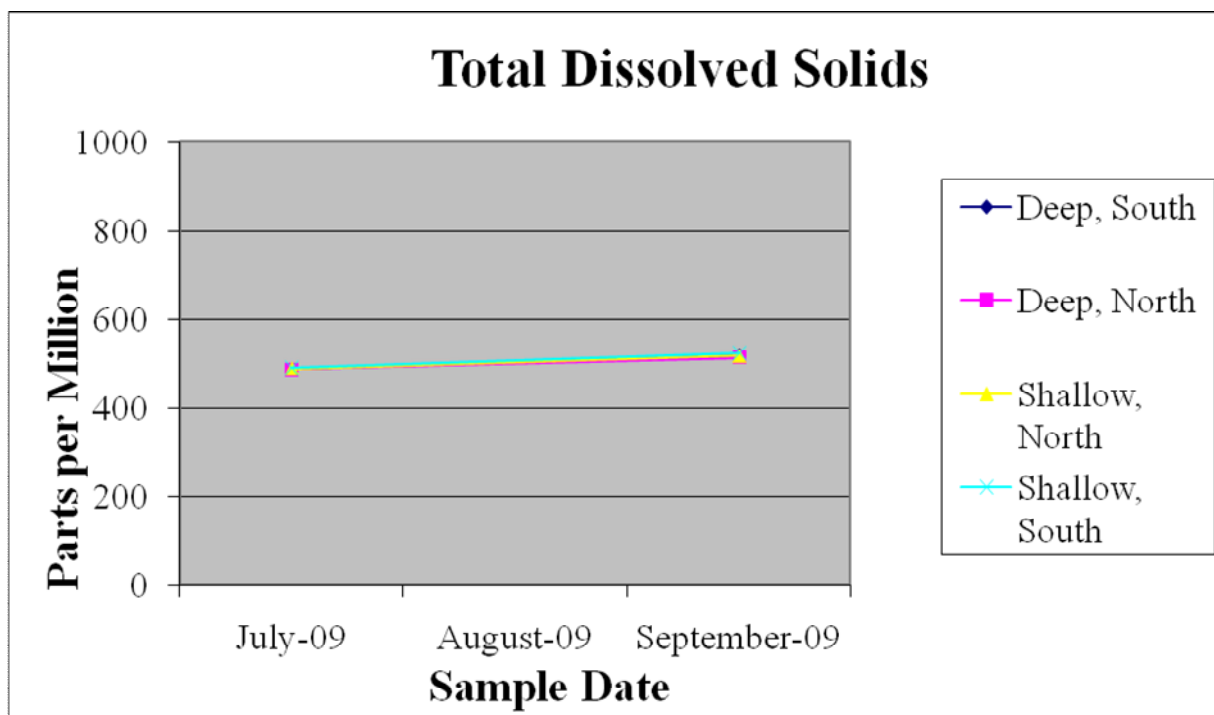


## Transparency

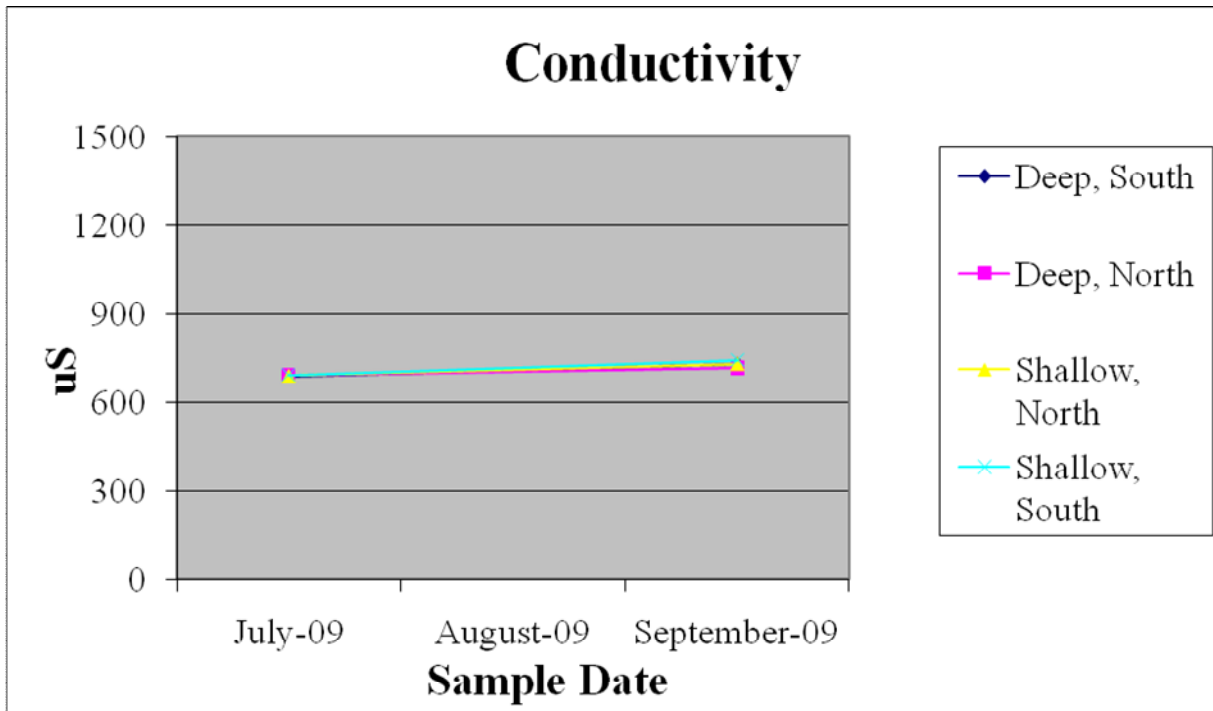




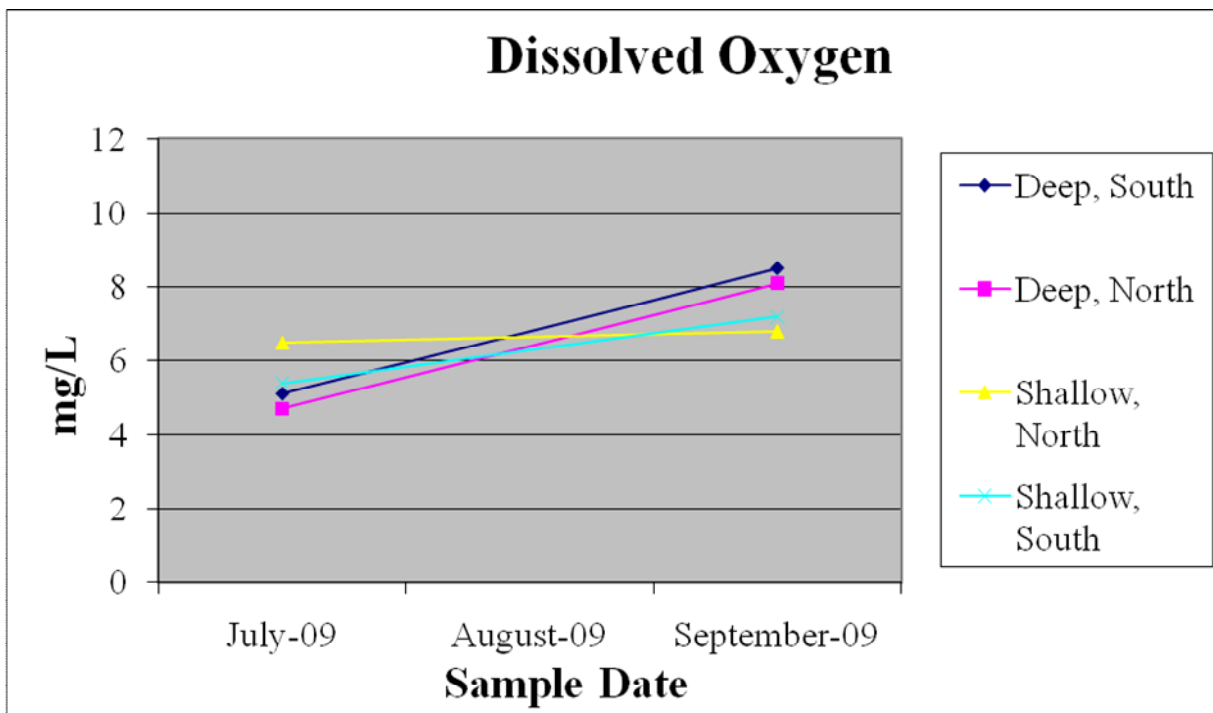
**Target Range: 7.0 – 9.0**



**Target Range: 0-1,000 ppm**



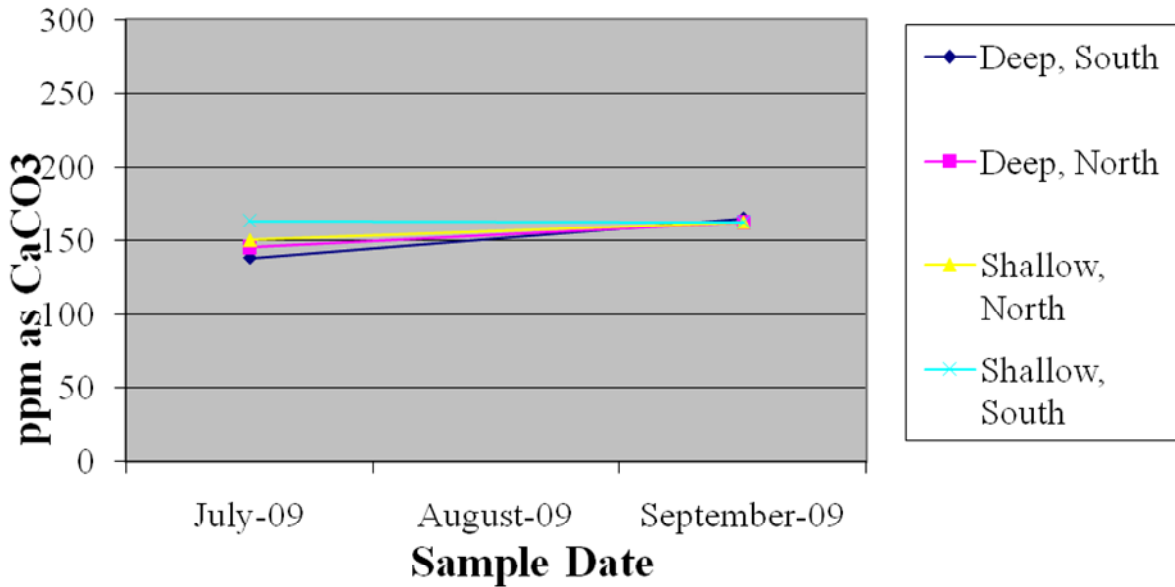
Target Range: 0 – 1500  $\mu$ S



Target Range: 6 – 12 mg/L

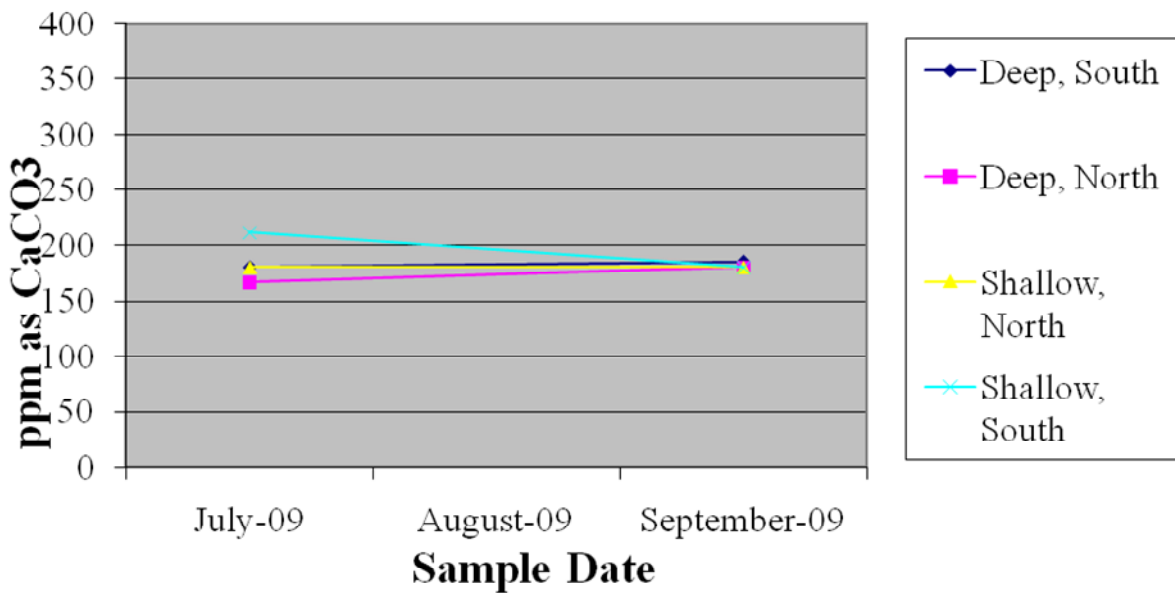


## Alkalinity



Target Range: 0 – 250 ppm

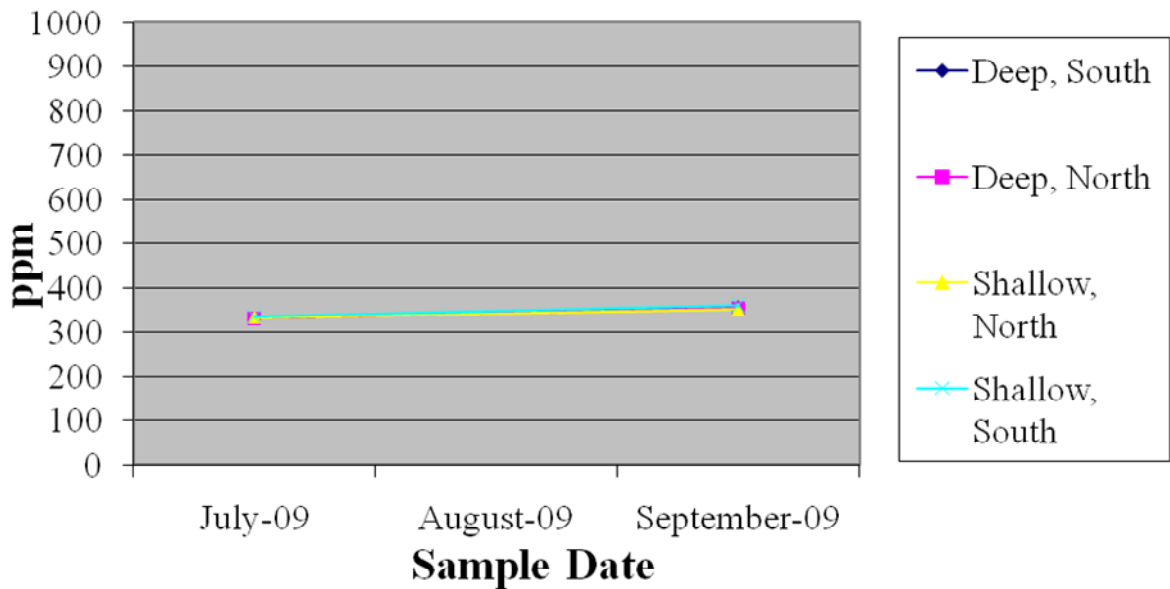
## Hardness



Target Range: 100–300 ppm

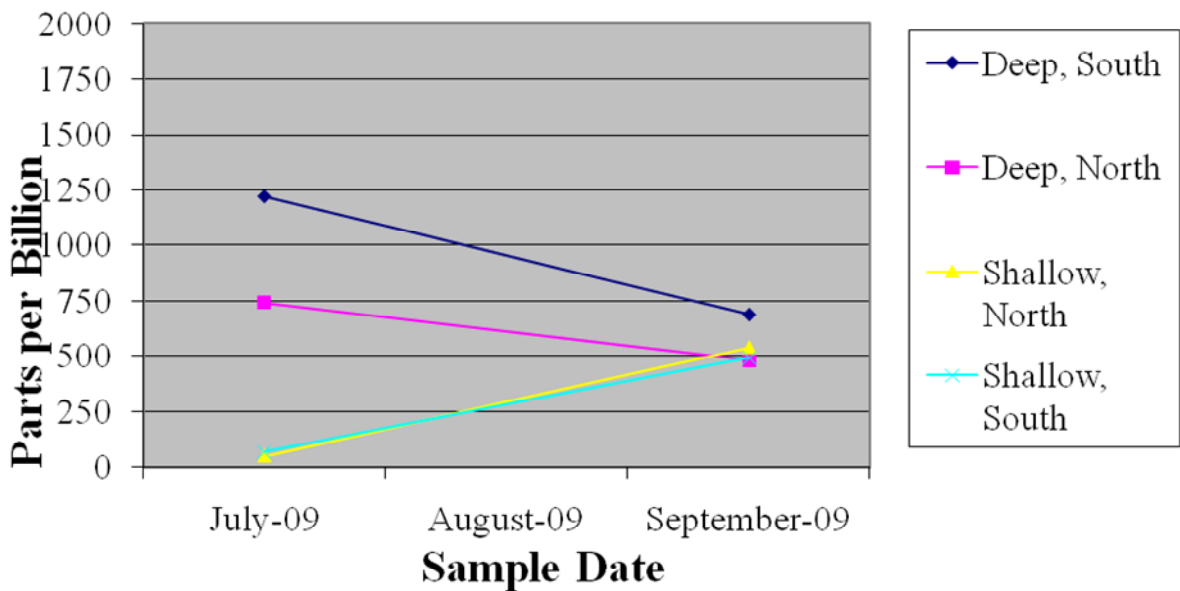


## Salinity



Target Range: 0 – 500 ppm

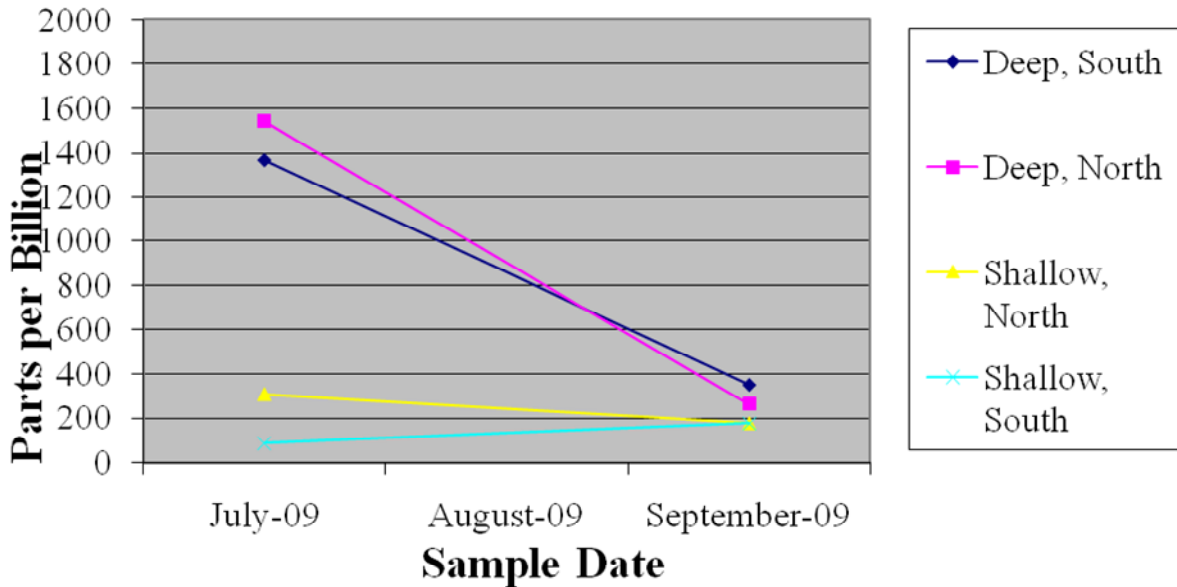
## Phosphate



Target Range: 0 – 100 ppb

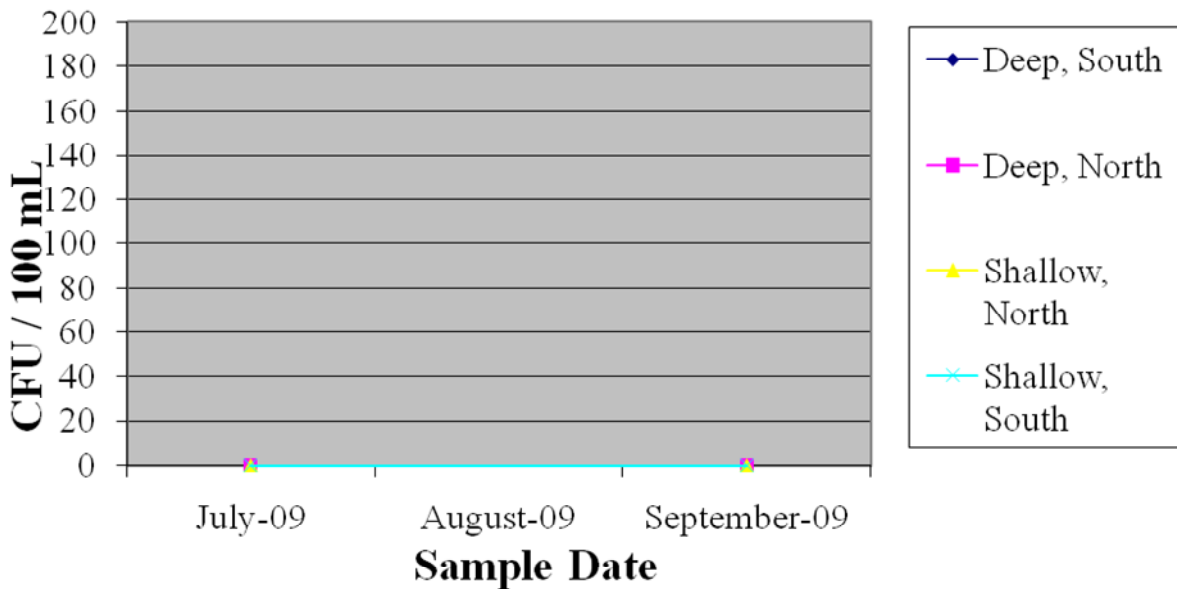


## Nitrate



Target Range: 0 – 1,000 ppb

## Fecal Coliforms



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 <sub>3</sub> ". 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 <sub>3</sub> .
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.