9353 Hill Road • Swartz Creek, MI 48473
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LakePro Pond

Michigan County

Test Date: July 16th, 2013

Water Quality Test Results

Parameter	North Shore	Outlet	Target Range
Temperature	86.4 ˚F	85.9 ˚F	Less Than 80 ˚F
Transparency	7.7 feet	6.2 feet	More than 6.5 Feet
pH	7.62	7.53	7.0 – 10.0 S.U.
Total Dissolved Solids	346 ppm	351 ppm	0 – 1,000 ppm
Conductivity	684 µS	702 µS	0 – 1,500 µS
Alkalinity	133 ppm as $CaCO_3$	126 ppm as $CaCO_3$	0 – 250 ppm
Hardness	162 ppm as $CaCO_3$	158 ppm as $CaCO_3$	100 – 300 ppm
Salinity	290 ppm	290 ppm	0 – 500 ppm
Dissolved Oxygen – Concentration	7.1 mg/L	7.3 mg/L	4.0 – 12.0 mg/L
Phosphate	30 ppb	30 ppb	0 – 100 ppb
Nitrate	1,804 ppb	1,848 ppb	0 – 1,000 ppb
E. coli	20 CFU	0 CFU	0 – 300 CFU / 100 mL
Trophic State Index – Transparency	48	51	Oligotrophic: 0 - 40 Mesotrophic: 40 – 50 Eutrophic: 50 – 70 Hypereutrophic: 70+

Discussion

These results show that LakePro Pond is suitable to support natural wildlife. Recreational use, such as swimming, should be carefully considered due to nitrate impairment.

The **pH, TDS, Conductivity, Alkalinity, and Hardness** concentrations are normal for a freshwater pond. These parameters have all decreased since 2012. With plenty of rain so far this summer, the pond has been flushed with relatively cleaner water. The positive trends for these parameters indicate the rain is doing more good than harm, flushing out excess molecules rather than delivering them with runoff.

The **Salinity** concentrations are at a safe level. The amount of salt in the pond has decreased since last year, again most likely due to the heavy rains so far this year.

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The **Temperature** is higher than preferable, due to the extreme heat that recently came through. In spite of the higher temperature, the **Dissolved Oxygen** is at adequate levels and is suitable for a healthy fish population to survive.

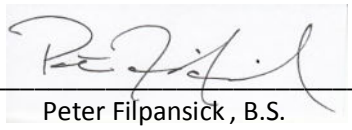
The concentrations of **Phosphate** are at healthy levels and have continued to decrease since 2011. This is most likely due to the state's ban on phosphorus fertilizer and heavy rains that are helping to flush excess molecules from the pond.

The amount **Nitrate** remains very high in the pond, but has decreased significantly from 2012. Efforts by the homeowners to reduce nitrate influents appear to be working. As we get more rain and snow, the pond will slowly flush the excess of nitrates in the water. It is important that homeowners continue their efforts to prevent fertilizer, yard waste, and pet waste from reaching the water. The biological augmentation provided by LakePro, both in the water and in the sediment, are also helping to reduce the amount of nitrates in the water.

E. coli were found in the water samples at low concentrations. At these densities, there are no safety concerns due to bacteria in the water.

The **Trophic State Index**, which is based on transparency, shows that the pond is moderately productive. Algae produces chlorophyll-a and clouds the water (i.e. decreases transparency). However, the blue dye that LakePro puts in the water also creates artificial turbidity to block sunlight.

Water samples were taken on 7/16/2013 at 12:40 PM. Water tests were completed on 7/17/2013 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.

Completed and Certified by: 
Peter Filpansick , B.S.

Date: July 22nd, 2013

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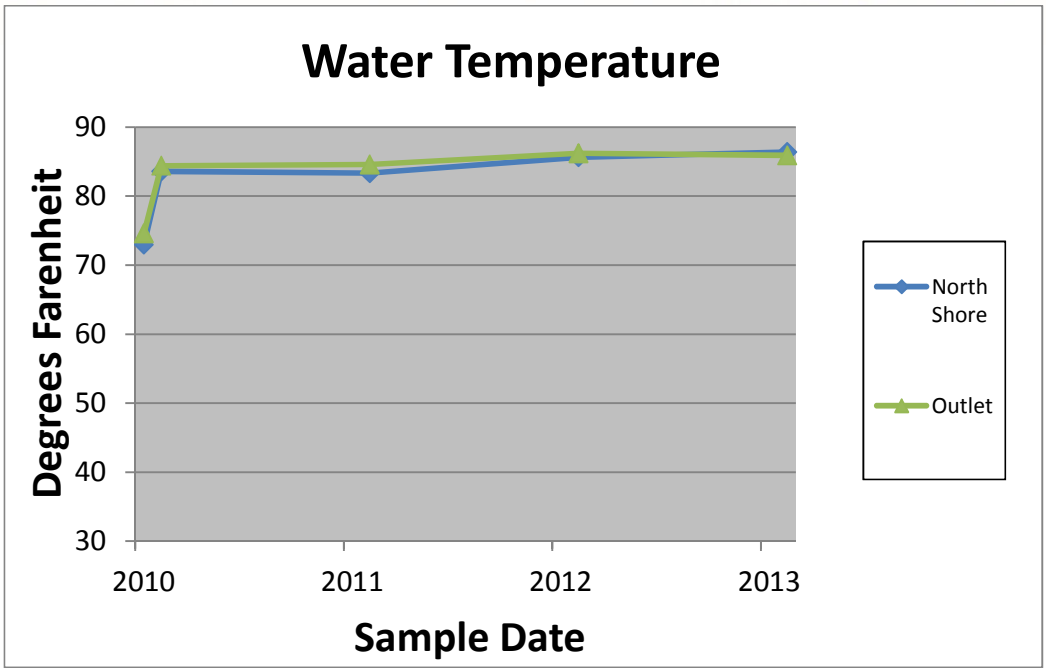
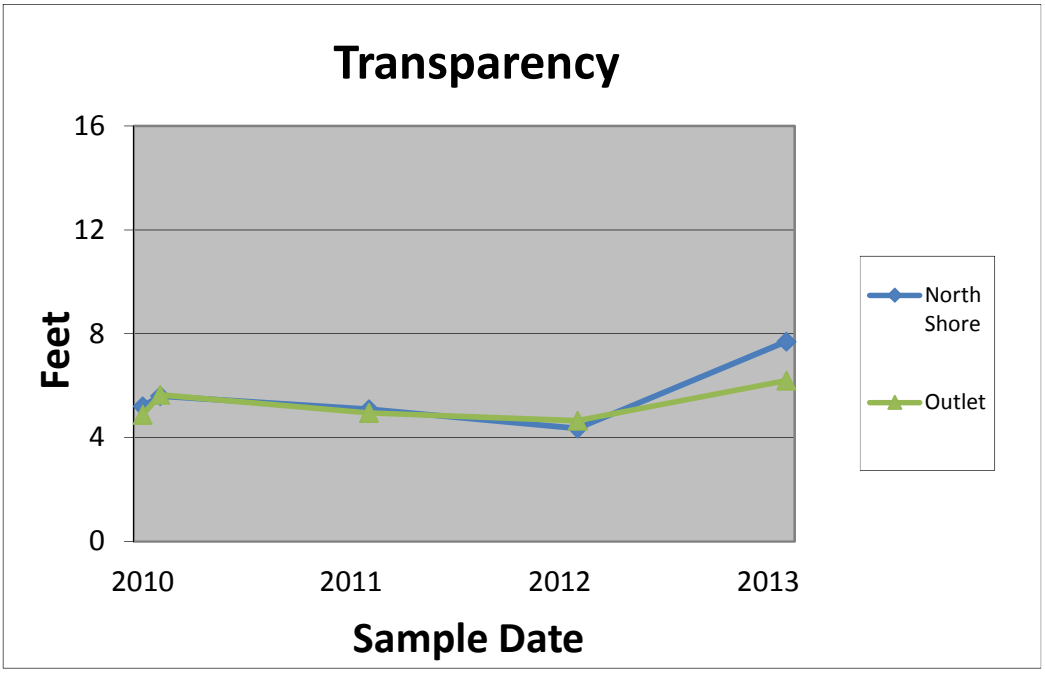


Target Range: Less Than 80 ˚F



Target Range: More than 6.5 Feet

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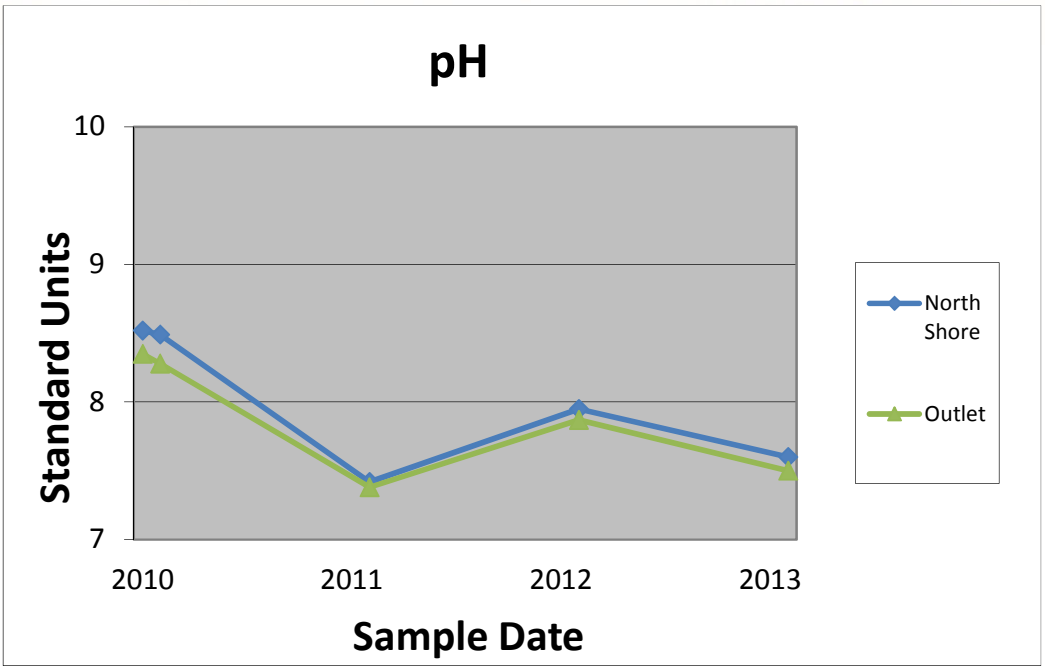
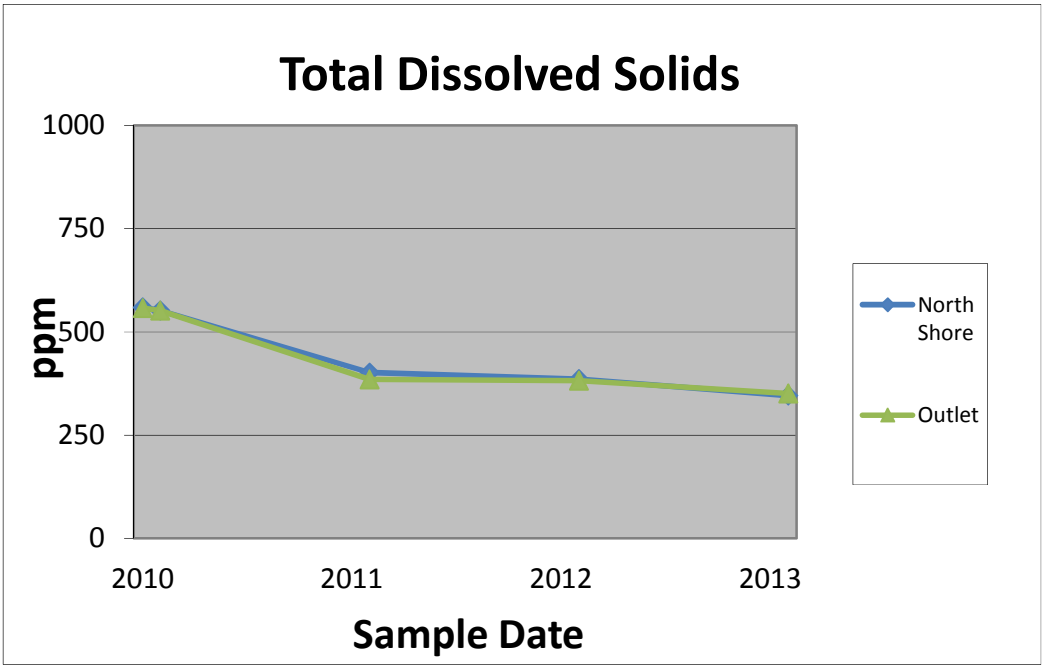


Target Range: 7.0 – 10.0 S.U.



Target Range: 0 – 1,000 ppm

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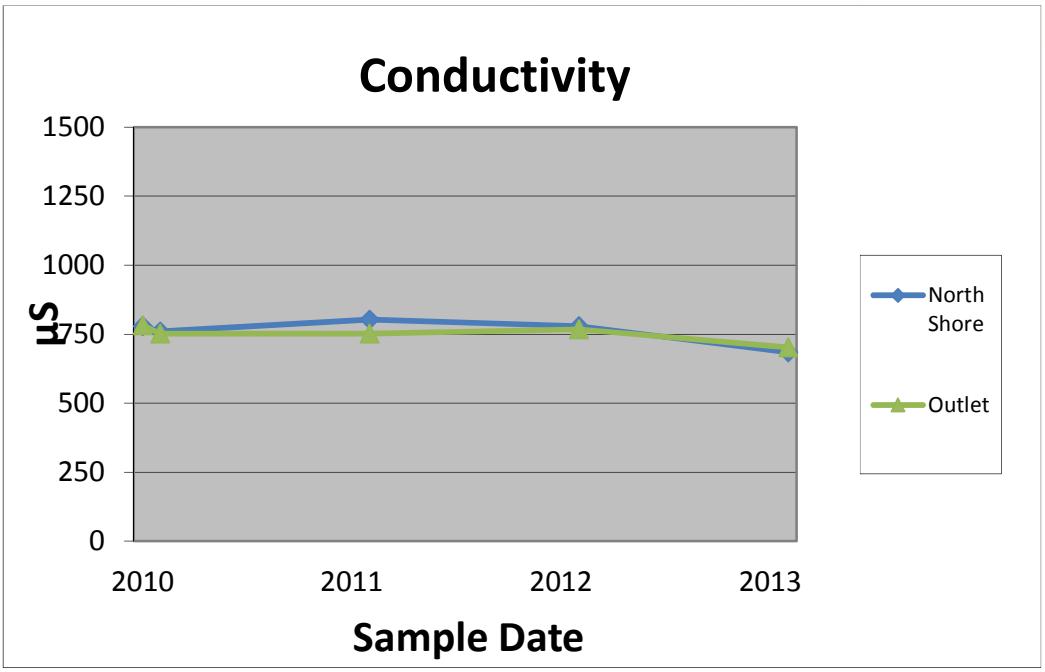
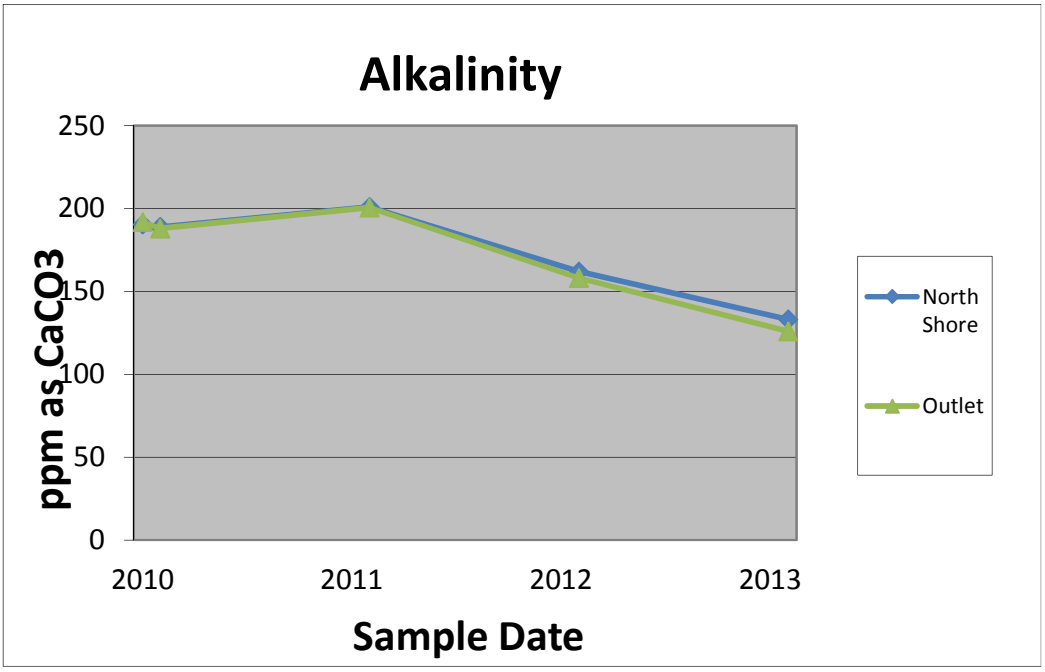


Target Range: 0 – 1,500 µS



Target Range: 0 – 250 ppm

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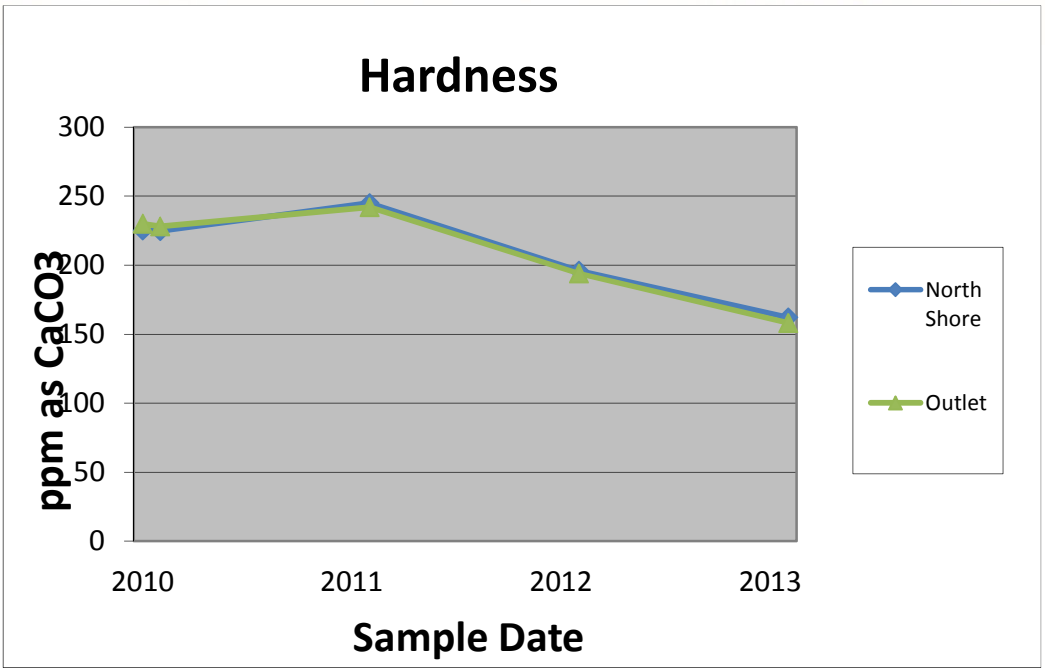
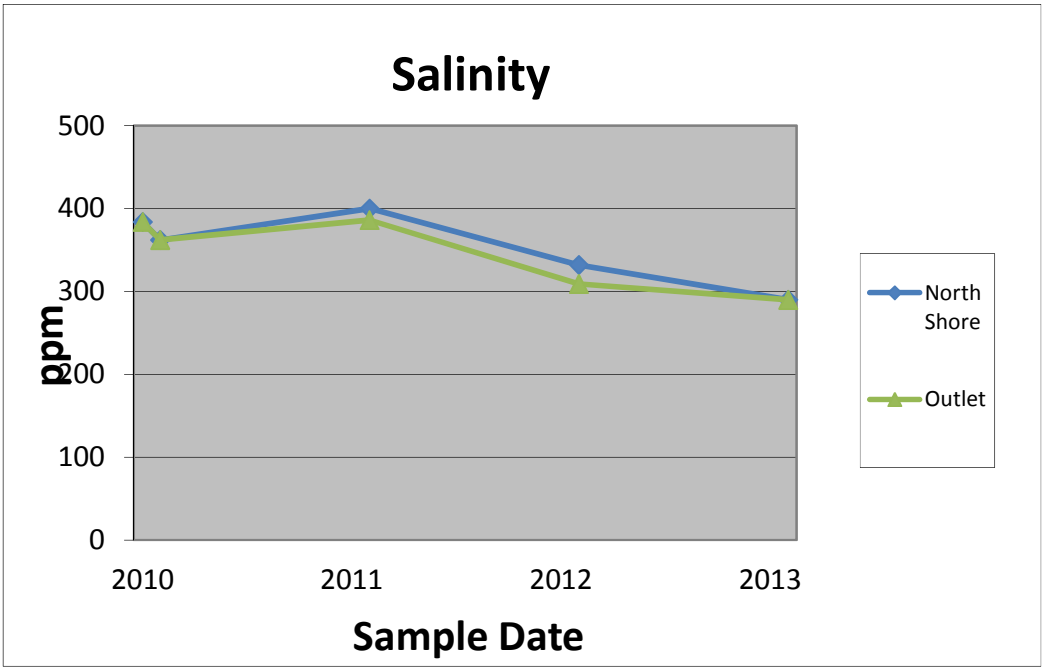


Target Range: 100 – 300 ppm



Target Range: 0 – 500 ppm

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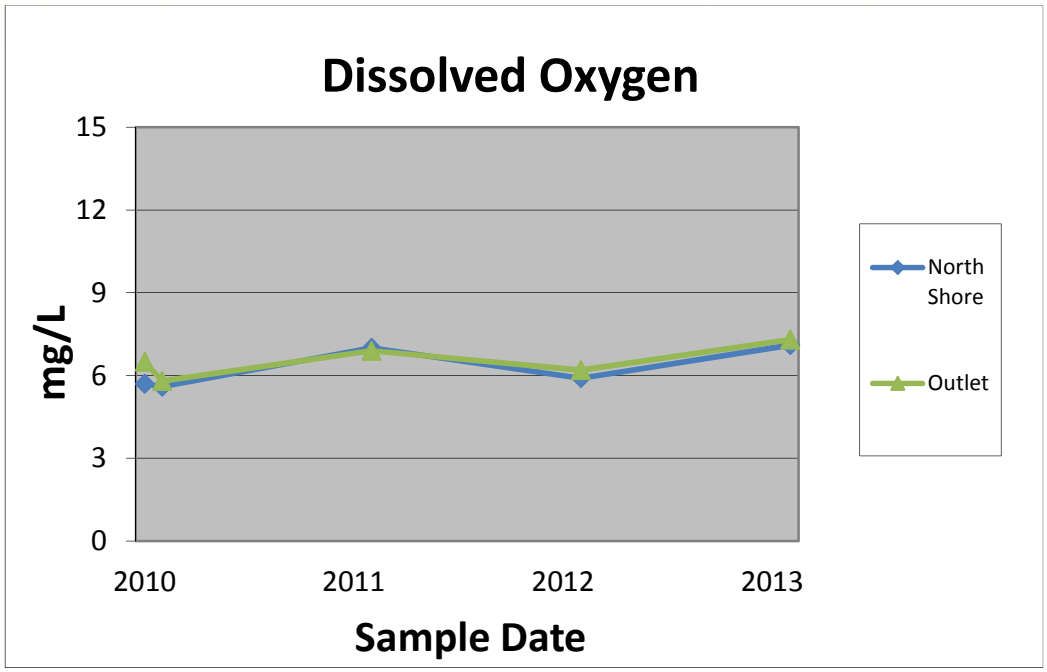
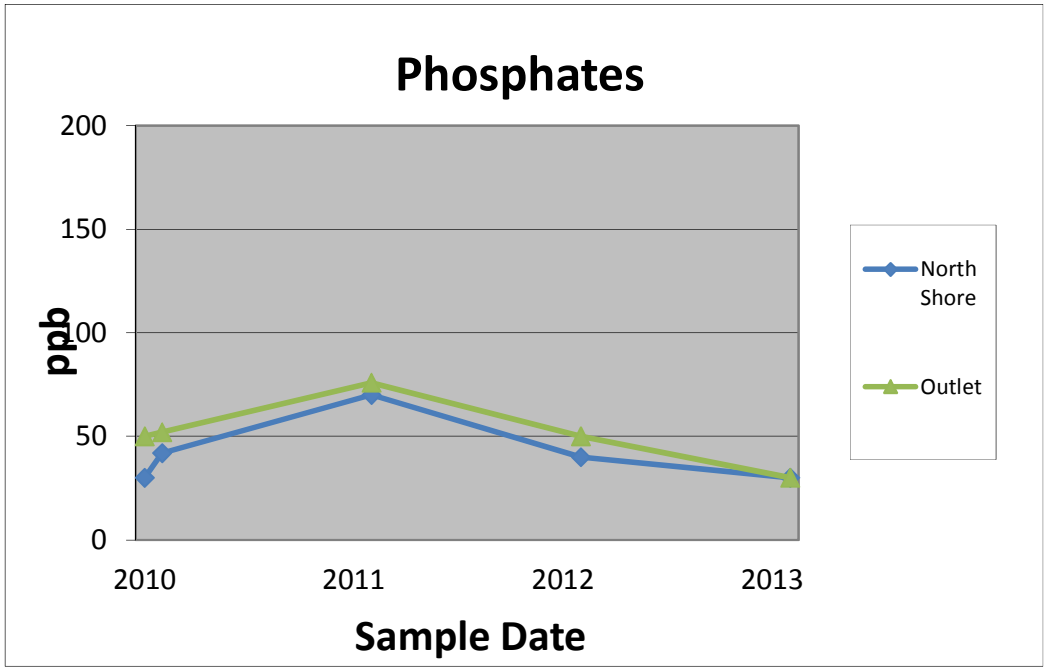


Target Range: 6 – 12 mg/L



Target Range: 0 – 100 ppm

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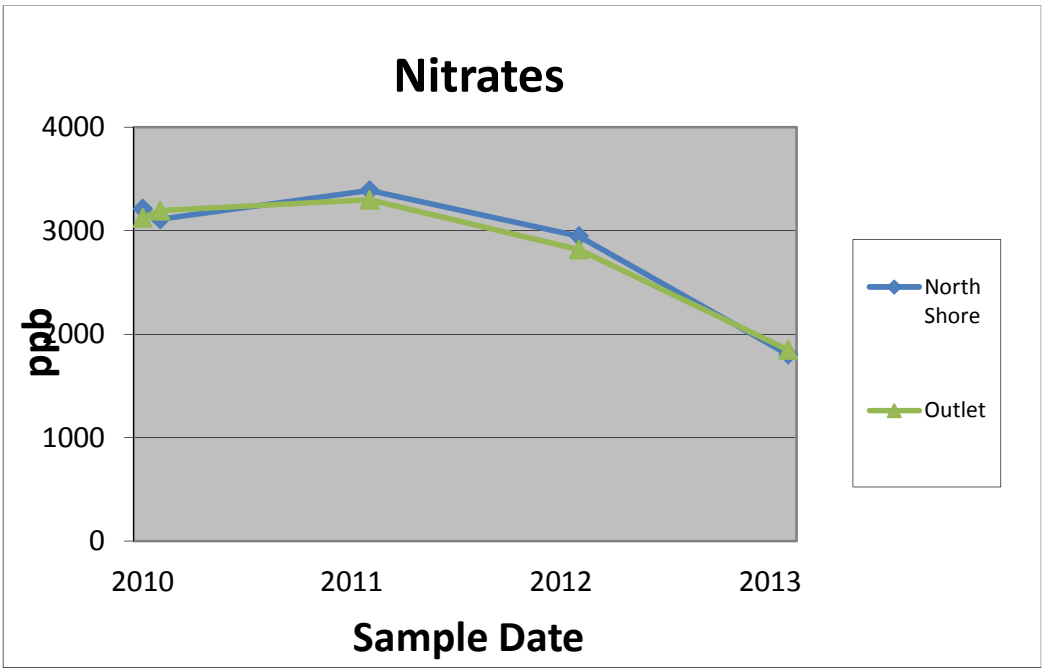
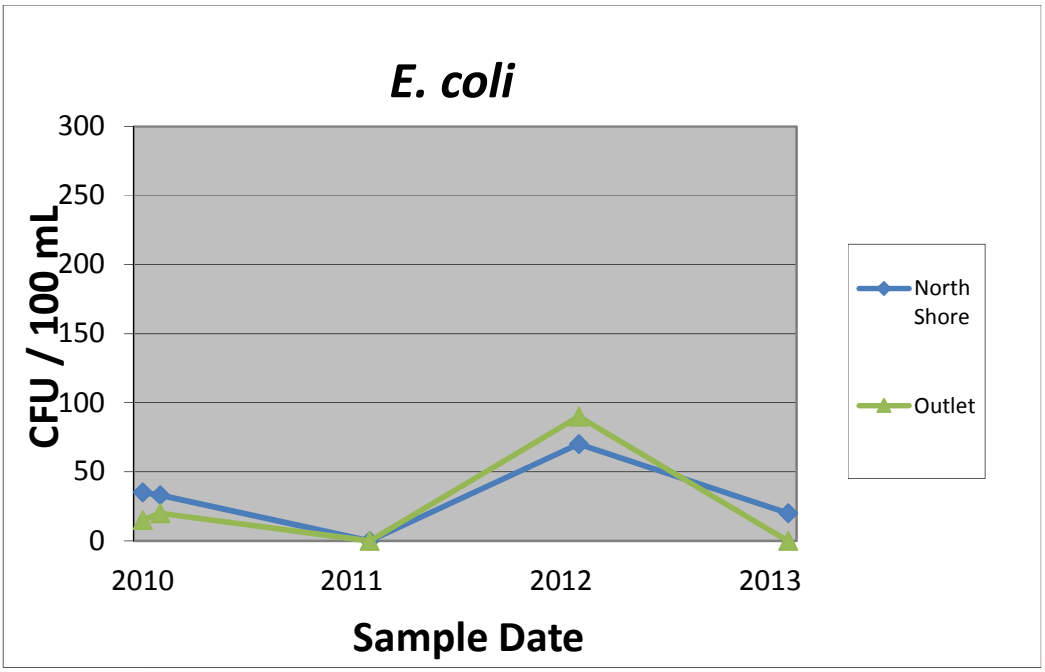


Target Range: 0 – 1,000 ppm



Target Range: 0 – 300 CFU / 100 mL

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Analysis Information

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 pond bottom and may result in vegetation growth.
pH:	pH is a measure of acidity or alkalinity. pH is a general measure of pond 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 pond through wave action, rain, fountains and aerators.
Phosphates:	Phosphorus is an essential nutrient for plant 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 *E. coli*, are coliforms found in the intestines of warm-blooded animals and humans. The presence of fecal coliforms indicates contamination from either animals or humans.

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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 pond 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 pond 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.