Monitoring Data

The following data are collected in the field

Dissolved oxygen (DO) - A measure of the amount of oxygen dissolved or carried within the water column. DO is measured in milligrams/Liter. This measurement is taken with a YSI-85 water quality meter in the field. In freshwater systems, oxygen levels can reach 0 mg/L (anoxic conditions) or can become supersaturated and reach levels >20mg/L. A range around 9 is considered about 'the middle value' for DO.

pH – A measure of the amount of dissolved hydrogen ions in water. Also known as the measurement of acidity or alkalinity. pH has no units of measurement but the scale ranges from 1 (very acidic) to 14 (very alkaline or basic). A unit of 7 is neutral water. This measurement is made in the field using a Hanna pHep meter.

Secchi disk (pronounced Sec-key) - A Secchi disk is used to measure water transparency. This is measured in centimeters and numerous factors effect transparency including wind, wave action, total suspended solids, lake morphometry, and fish. Secchi disks are taken at designated points throughout the lakes.

Temperature – Measurement of how hot or cold the water is. Field measurements are recorded in degrees Celsius. This measurement is taken using a YSI-85 water quality meter. Temperature is ultimately derived from sunlight heating water.

The following samples are collected in the field and sent to a lab for analysis

Chlorophyll-a –A measure of the amount of chlorophyll-a per cubic meter. Chlorophyll-a is the green pigment found in plants, algae, and cyanobacteria. These samples are analyzed by a certified laboratory.

Escherichia coli (*E. coli*) –*E. coli* levels are measured as the number of colony forming units (cfu) per 100 millileters (mL). *E. coli* is a sub-group of fecal coliform, and is usually present in water along with fecal coliform. Factors affecting bacteria levels include seasonal weather, stream flow, water temperature, distance from pollution sources, livestock management practices, wildlife activity, age of fecal material, sewage overflows, and rainfall (MN Pollution Control Agency). E.coli standards are 126 cfu / 100 mL monthly average, and 1,260 cfu/ 100 mL maximum.

Nitrate - Nitrogen-containing compounds act as nutrients in streams and rivers. Nitrate reactions [NO_{3-}] in fresh water can cause oxygen depletion. Thus, aquatic organisms depending on the supply of oxygen in the stream will die. The major routes of entry of nitrogen into bodies of water are municipal and industrial wastewater, septic tanks, feed lot discharges, and animal wastes. Bacteria in water quickly convert nitrites [NO_{2-}] to nitrates [NO_{3-}].

Orthophosphorus (OP or $P\text{-}PO_4$) – Orthophosphorus is soluble reactive phosphorus (SRP) and is readily available for biological uptake. Orthophosphorus can stimulate excess algal growth leading to the depletion of dissolved oxygen. Major sources of OP are wastewater treatment plants, feedlot runoff, fertilizer, and failing septic systems.

Total Phosphorus (TP) – The total amount of all forms of phosphorus within a given sample. These samples are analyzed by a certified laboratory. Samples are measured in milligrams per liter and the state standard for acceptable phosphorus levels within water, determined by the US Environmental Protection Agency (EPA), is 0.10 mg/L.

Total Suspended Solids (TSS) – The total amount of all suspended solids within the water column. These samples are measured in milligrams per liter and are analyzed by a certified laboratory. Suspended solids enter aquatic systems via urban and agricultural runoff and once in the lake, these solids can become resuspended by environmental factors (ex. wind).

Turbidity – Turbidity is a measure of the degree to which the water looses its transparency due to the presence of suspended particulates. Turbidity is measured in NTU: Nephelometric Turbidity Units. The instrument used for measuring it is called nephelometer or turbidimeter, which measures the intensity of light scattered at 90 degrees as a beam of light passes through a water sample. The Environmental Protection Agency (EPA) sets a standard of 25 NTU as a sign of good water quality.