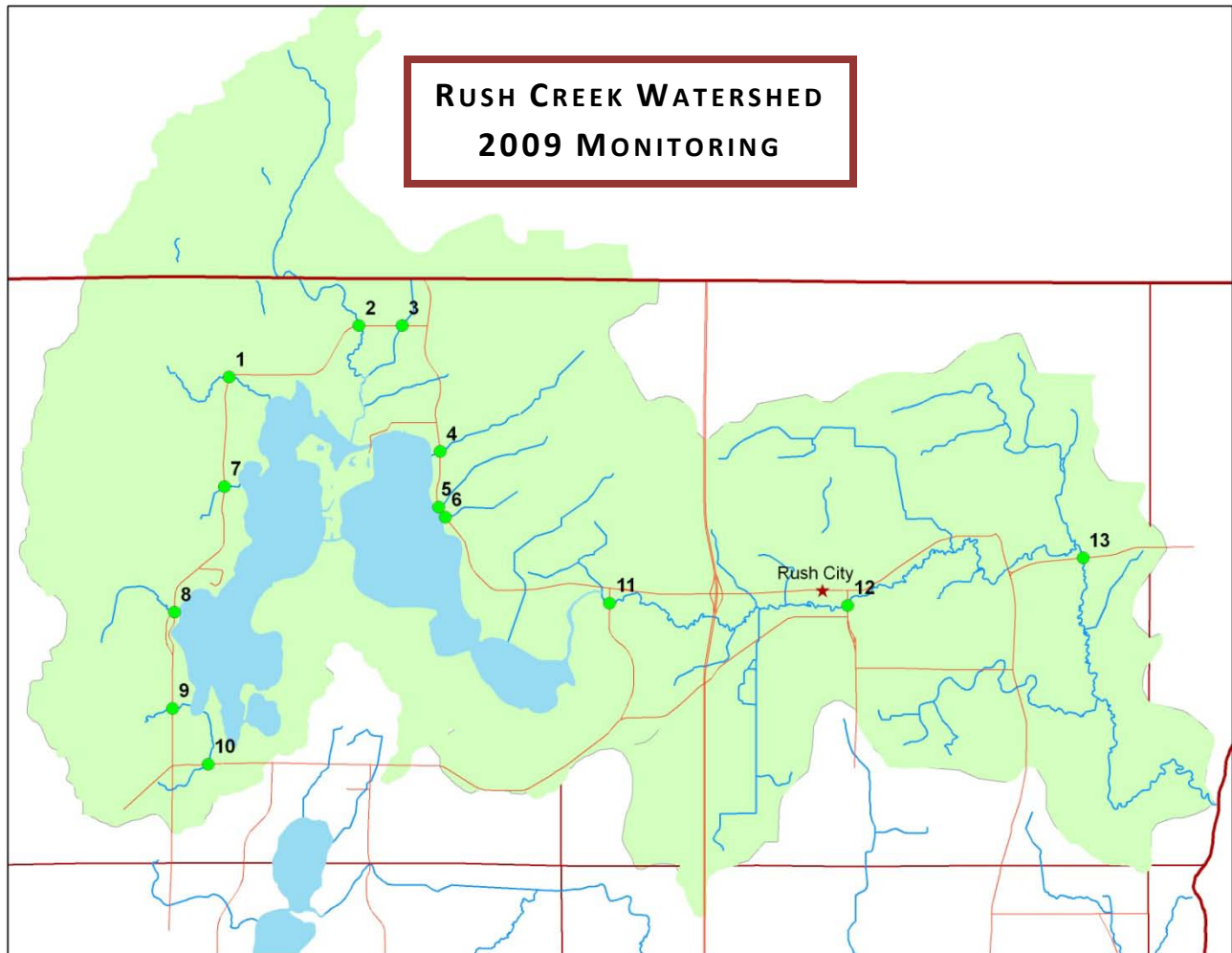


Rush Creek Watershed

2009

In 2009 the Rush Creek Watershed was monitored through a grant from the Minnesota Pollution Control Agency. Rush Lake Improvement Association Volunteers collected water quality samples at 13 locations within the Rush Creek Watershed.

Surface
Water
Assessment
Grant



The Rush Creek Watershed covers 57 square miles in the northern portion of Chisago County and a very small amount in the southern end of Pine County. Members of the Rush Lake Improvement Association volunteered many hours to collect water samples at 13 locations throughout the watershed. The goal of the project was to collect 10 samples at each location in 2009. The monitoring season extends from April 1st through October 31st. Due to the extremely dry year, many of the streams dried up in midsummer. These dry conditions made sampling nearly impossible at some other locations. This document will show data that was collected in 2009.

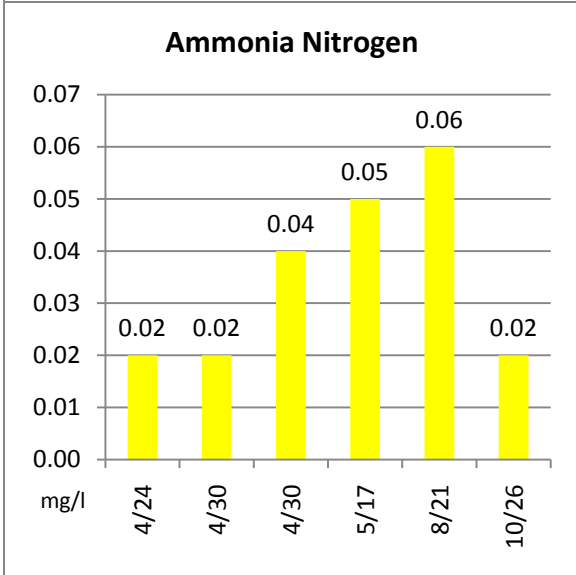
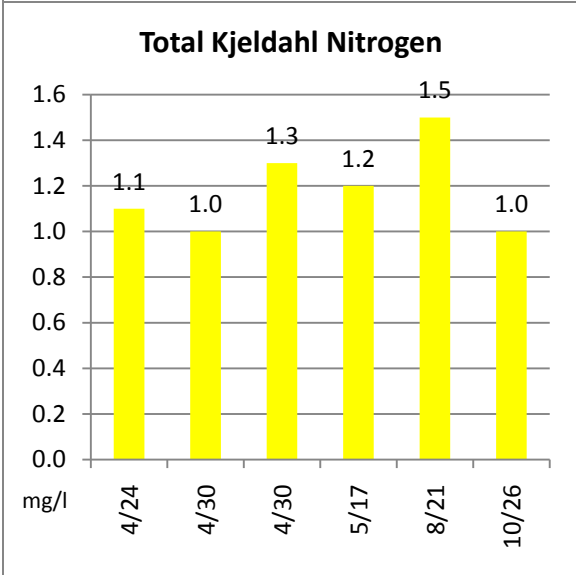
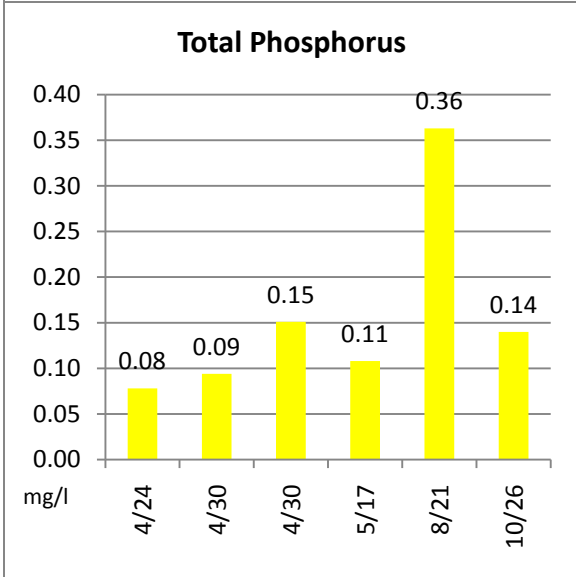
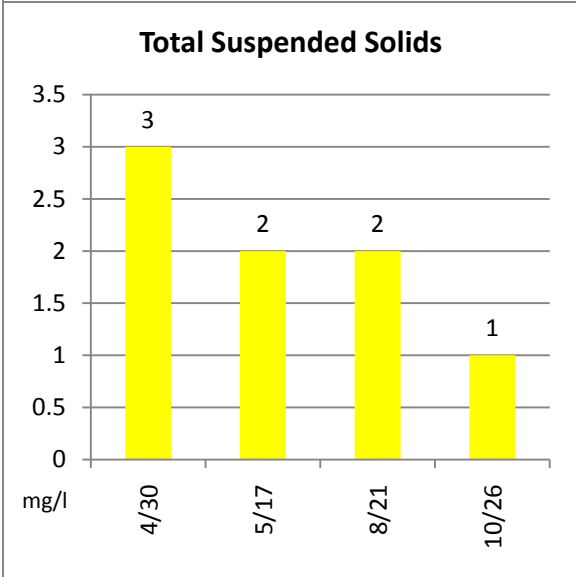
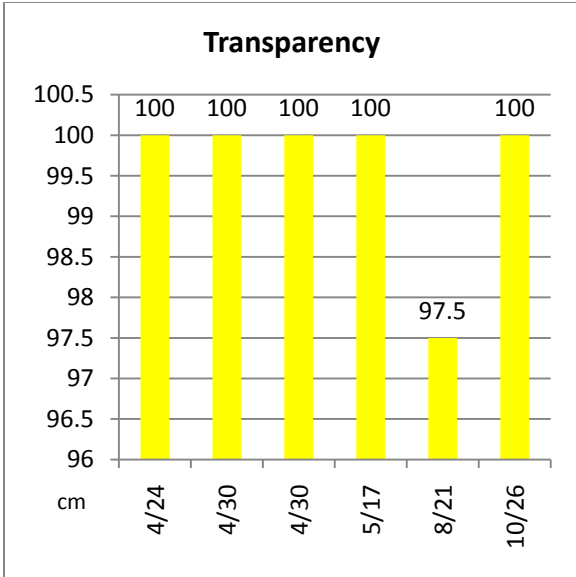
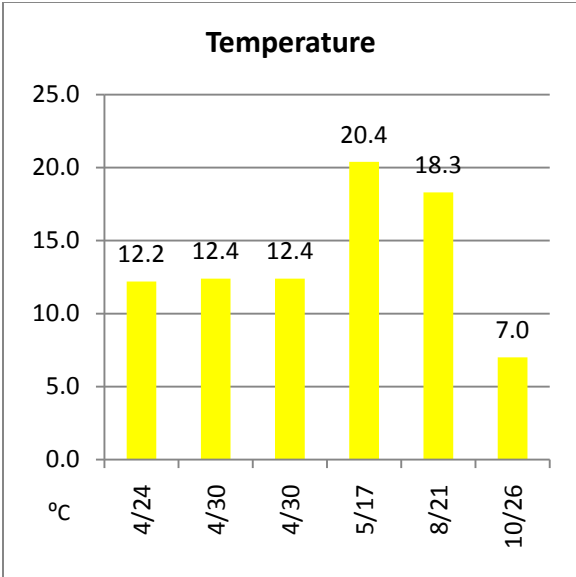
Expected Ranges for Water Quality Parameters for Chisago County

PARAMETER	EXPECTED RANGE OR STANDARD	UNIT
Temperature	2.0 – 21.0°	Celsius
Transparency	>40 The higher the number, the better the water clarity.	cm
Total Suspended Solids <small>* Samples listed as 1 mg/l are <1 which is the minimum reporting limit</small>	4.8 – 16.0 The lower the number, the better the water clarity.	mg/l
Total Phosphorus	0.06 – 0.15	mg/l
Total Kjeldahl Nitrogen	0.5 – 3.0	mg/l
Ammonia Nitrogen <small>* Samples listed as 0.02 mg/l are <0.02 which is the minimum reporting limit</small>	0.02 – 0.28	mg/l

RCW 1

S005-503 | UNNAMED STREAM TO WEST RUSH LAKE AT CR-4

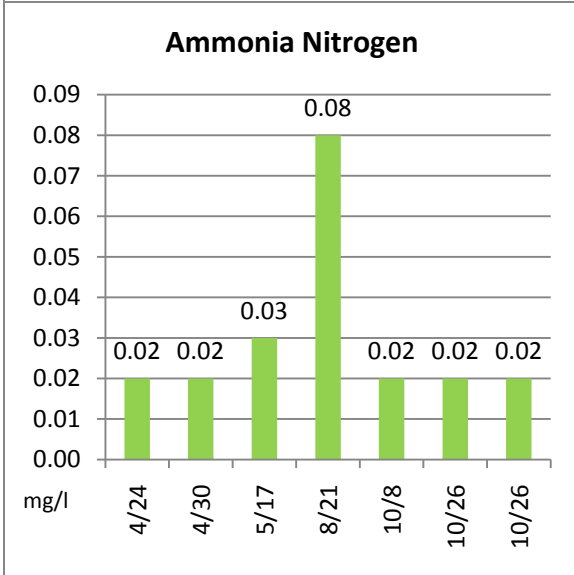
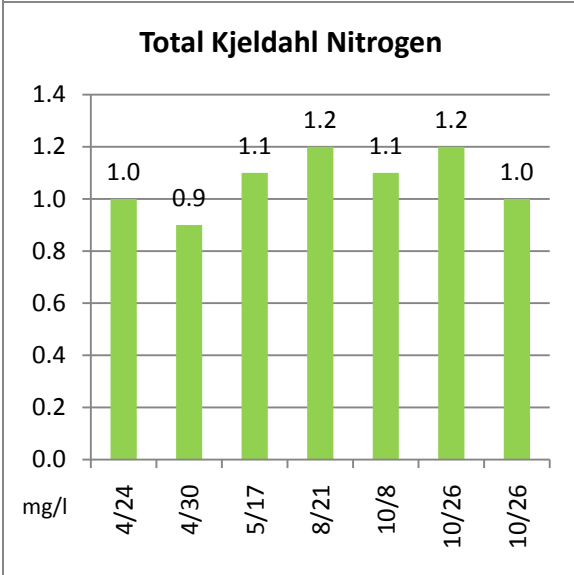
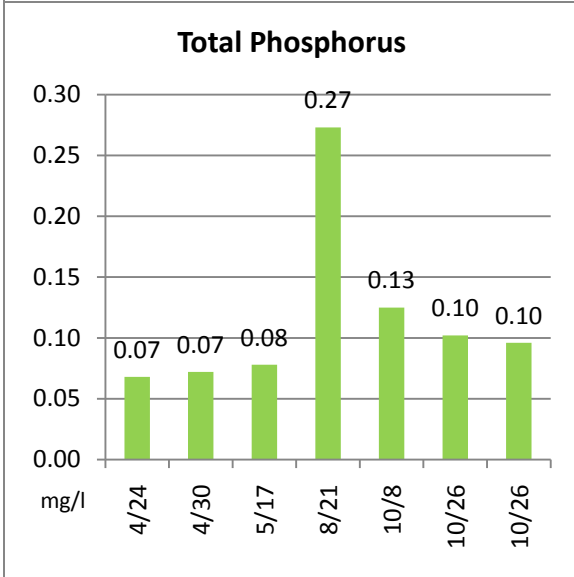
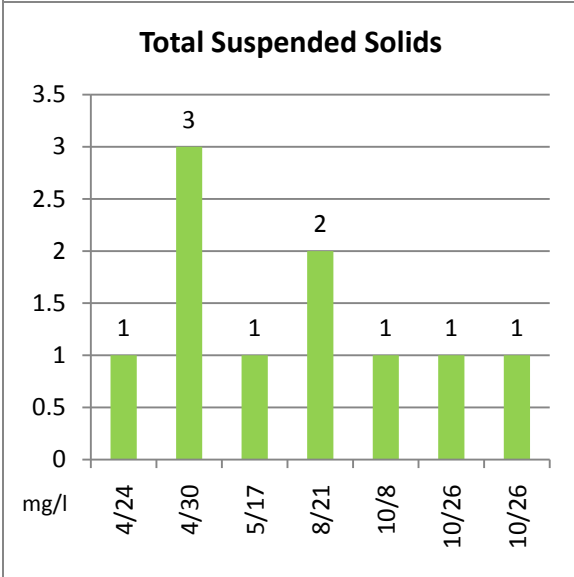
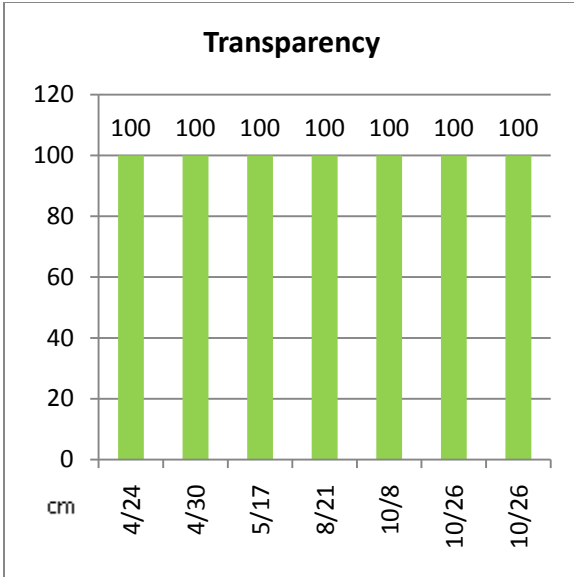
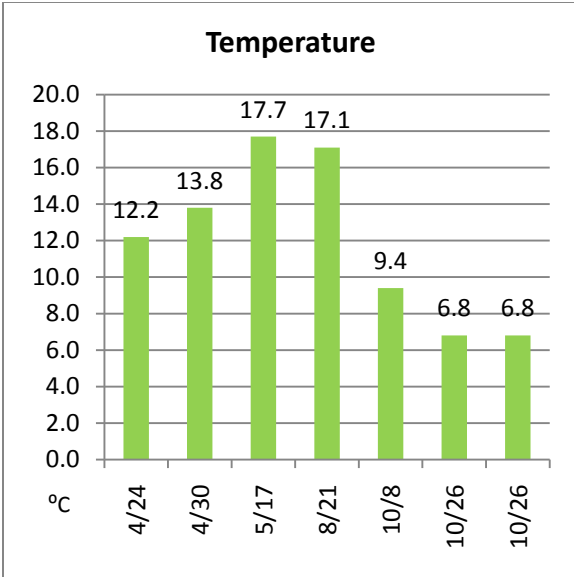
RCW 1 is a small stream entering the northwest corner of West Rush Lake near Dennis Frandsen County Park. The small rural watershed has steep slopes and has large wooded areas and wetlands. The water samples mostly meet or exceed standards and expected ranges for Chisago County. One Total Phosphorus sample was high; this sample was taken after a rain event. The water clarity of the stream is very good: high transparency readings and very low Total Suspended Solids levels. Samples were not taken in June and July due to low water levels.



RCW 2

S005-504 | UNNAMED STREAM TO WEST RUSH LAKE AT CR-2

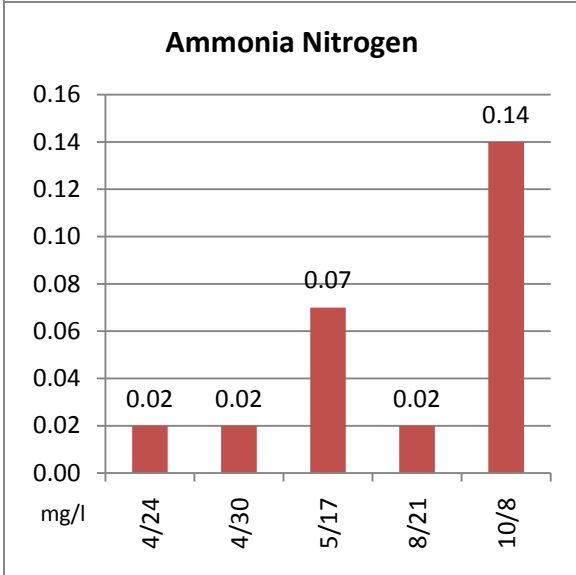
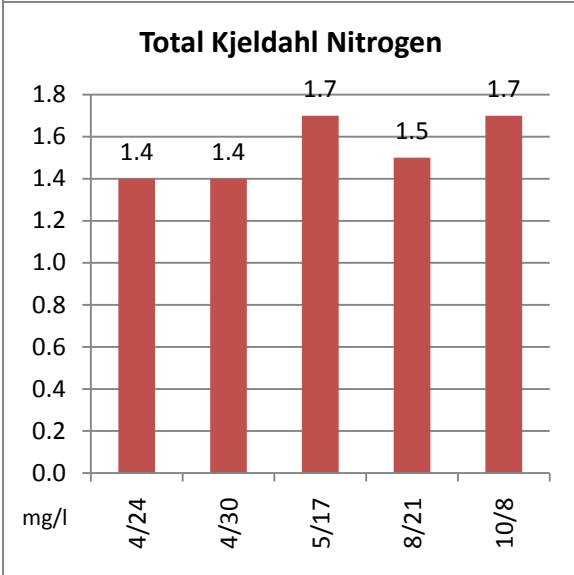
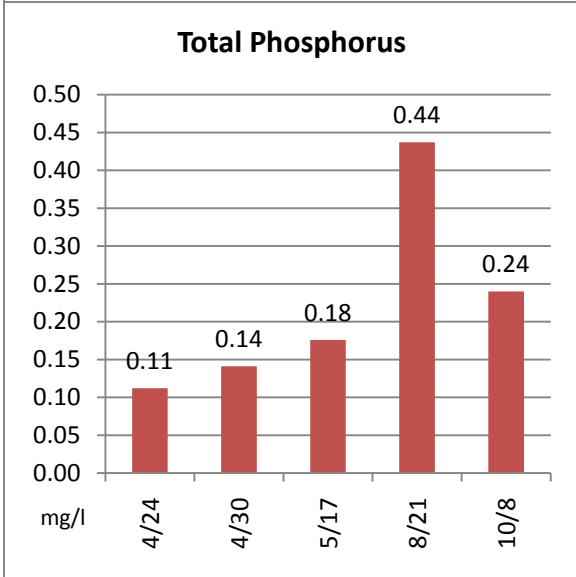
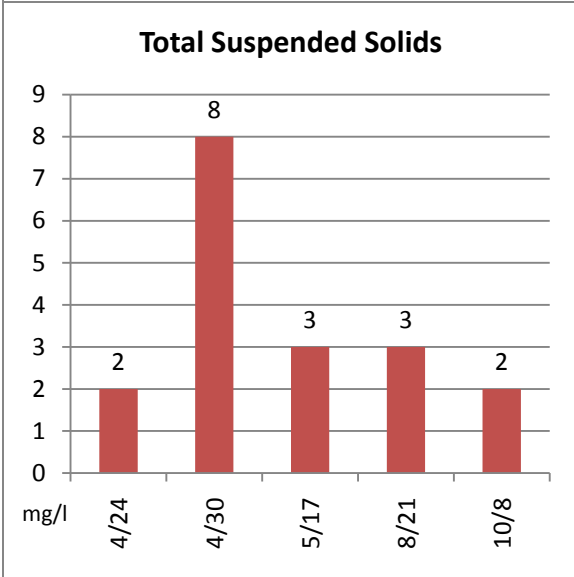
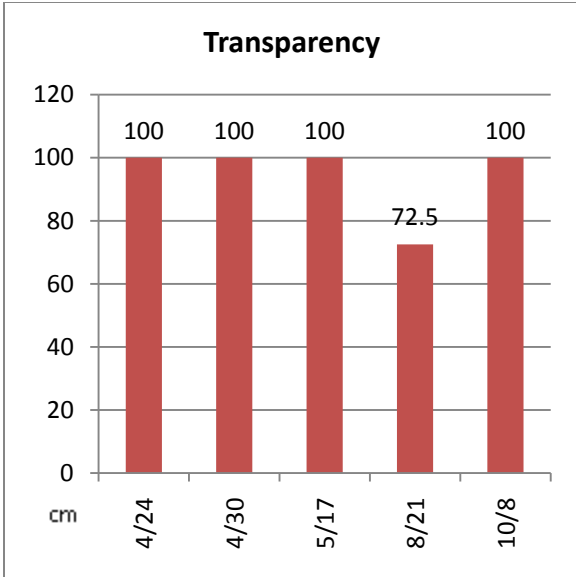
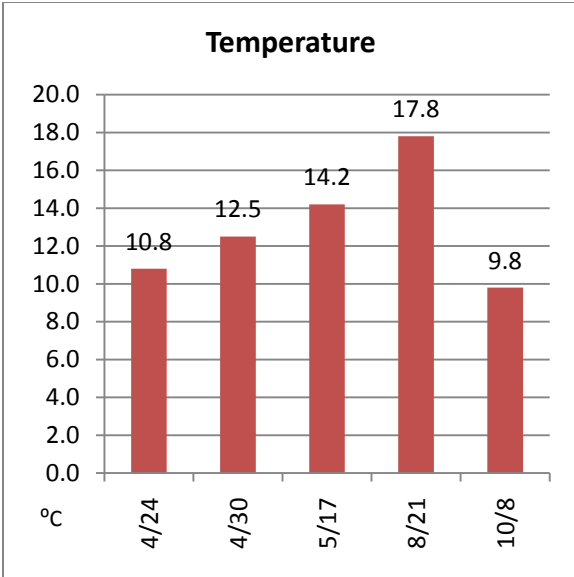
RCW 2 is a small stream entering the north end of West Rush Lake through a wetland complex. The majority of this watershed is in Pine County. The rural watershed has steep slopes and has large wooded areas and wetlands. The water samples mostly meet or exceed standards and expected ranges for Chisago County. One Total Phosphorus sample was high; this sample was taken after a rain event. The water clarity of the stream is very good: very high transparency readings and very low Total Suspended Solids levels. The Ammonia Nitrogen levels are also very low (5 of 7 samples <0.02 mg/l). Samples were not taken in June and July due to low water levels.



RCW 3

S005-505 | UNNAMED STREAM TO WEST RUSH LAKE AT CR-2

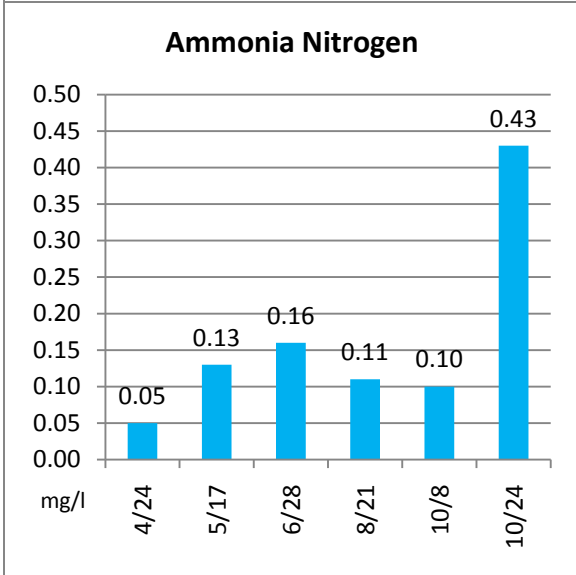
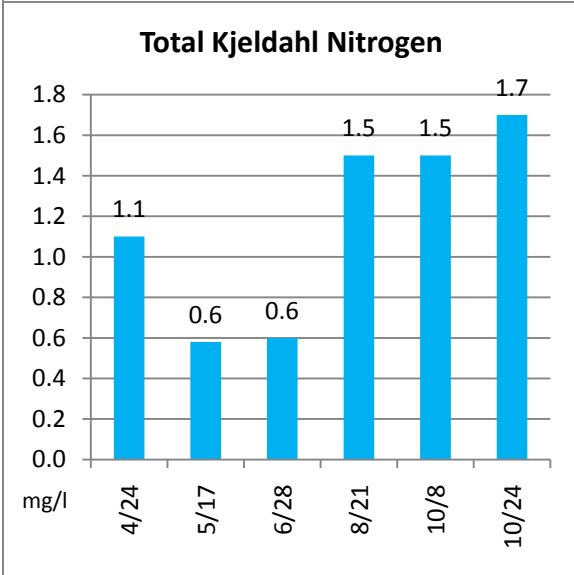
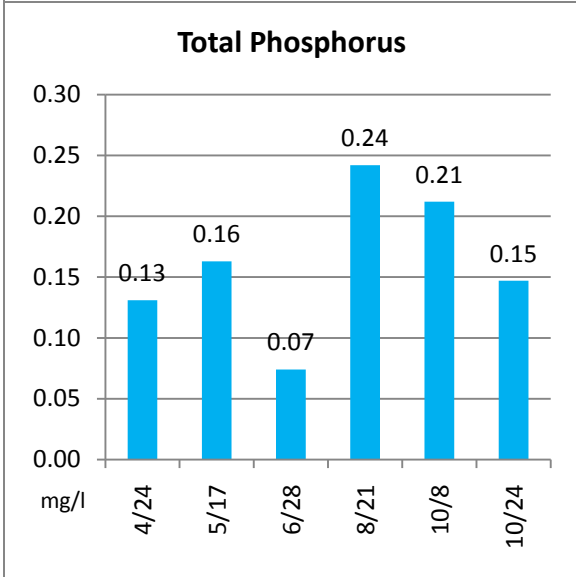
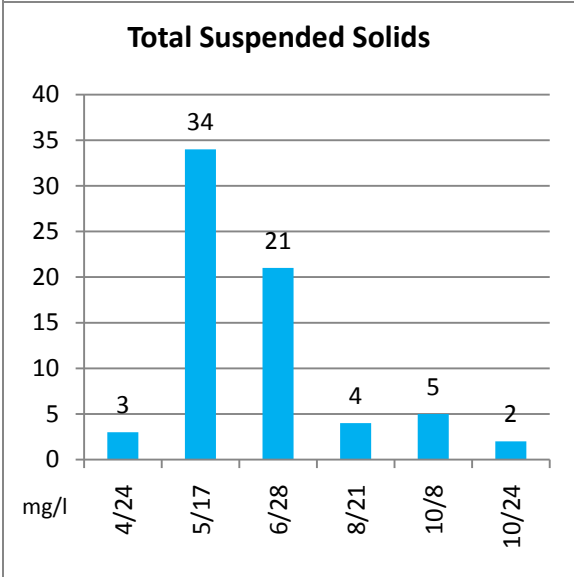
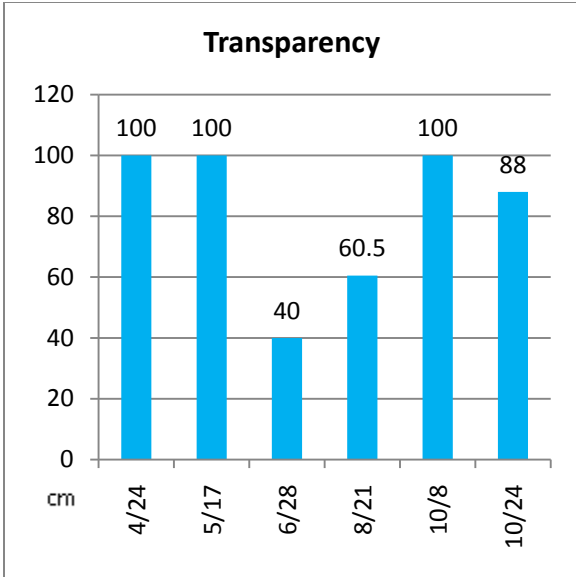
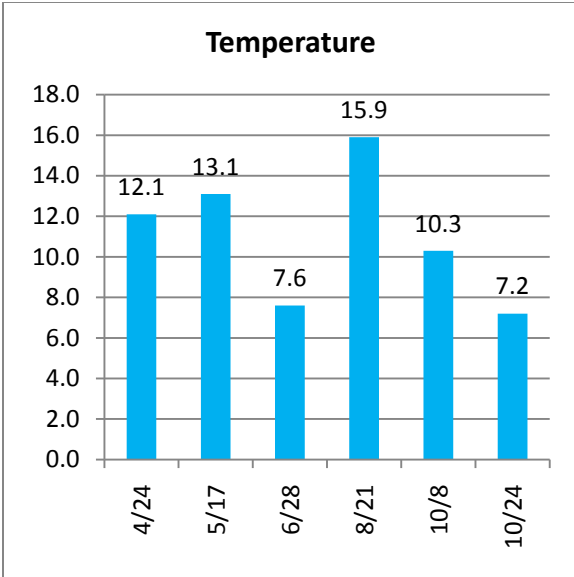
RCW 3 is a small stream entering the north end of West Rush Lake through a wetland complex. The small rural watershed has steep slopes and has large wooded areas and wetlands. A portion of the stream is ditched. The water samples mostly meet or exceed standards and expected ranges for Chisago County. Three Total Phosphorus samples were high; these samples were taken after a rain event. The water clarity of the stream is very good: very high transparency readings and very low Total Suspended Solids levels. Samples were not taken in June and July due to low water levels.



RCW 4

S005-506 | UNNAMED STREAM TO EAST RUSH LAKE AT CR-1

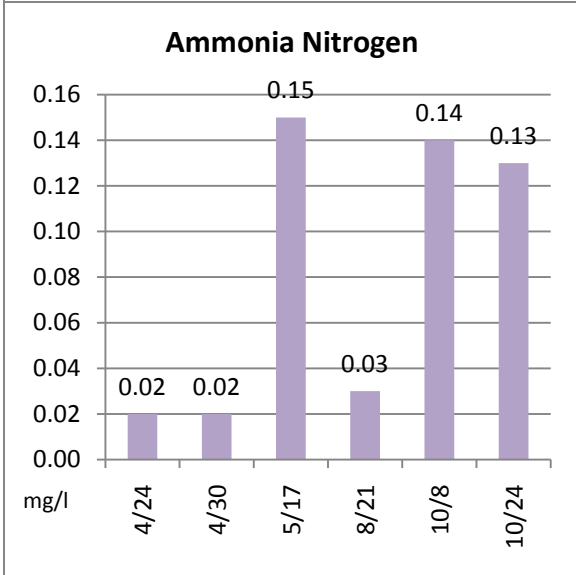
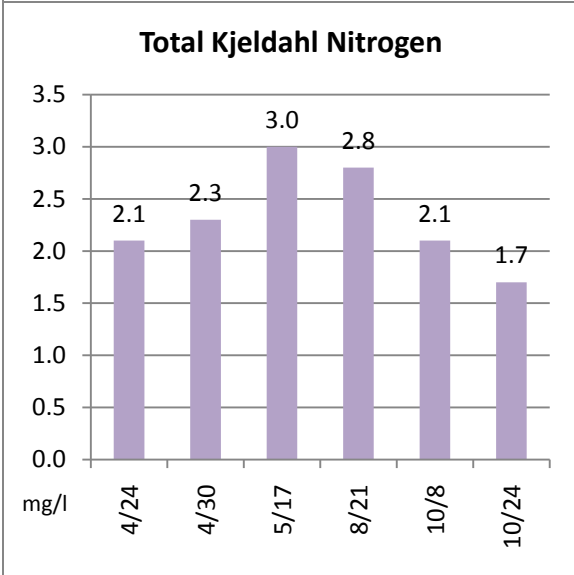
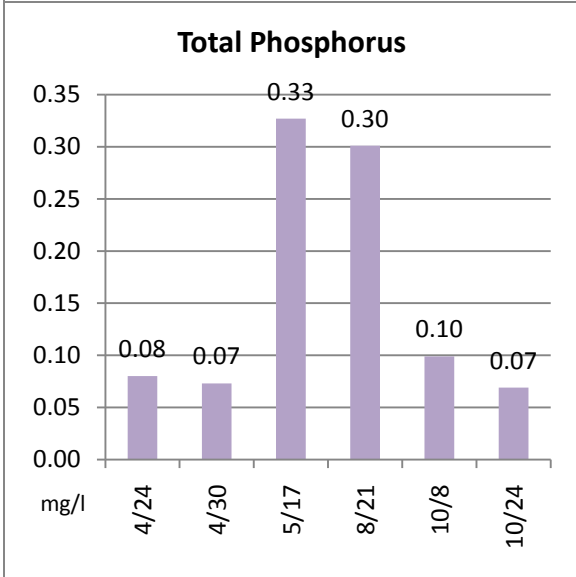
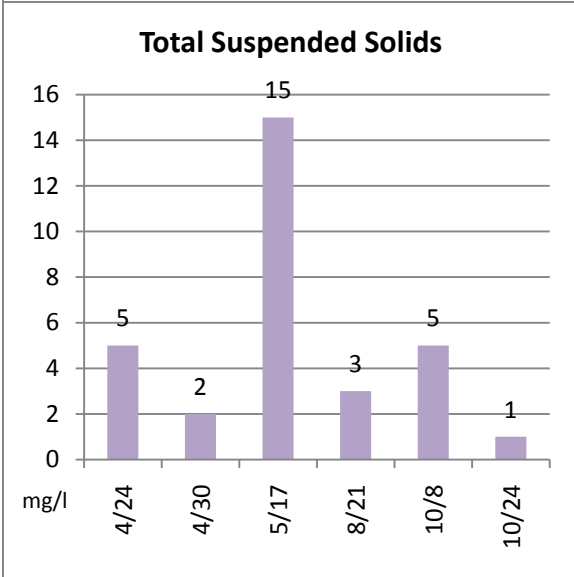
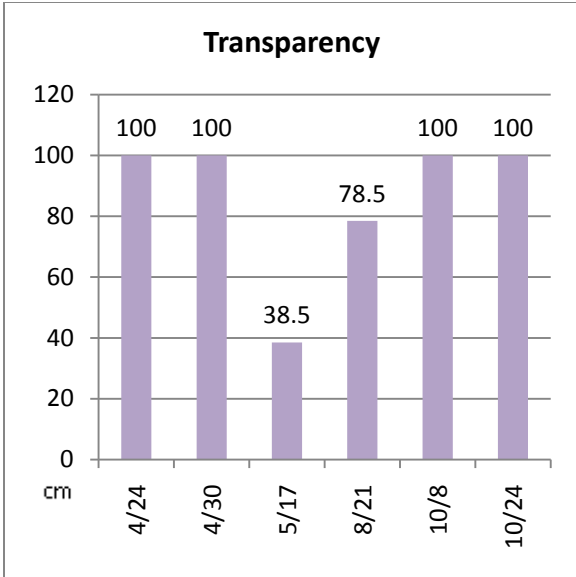
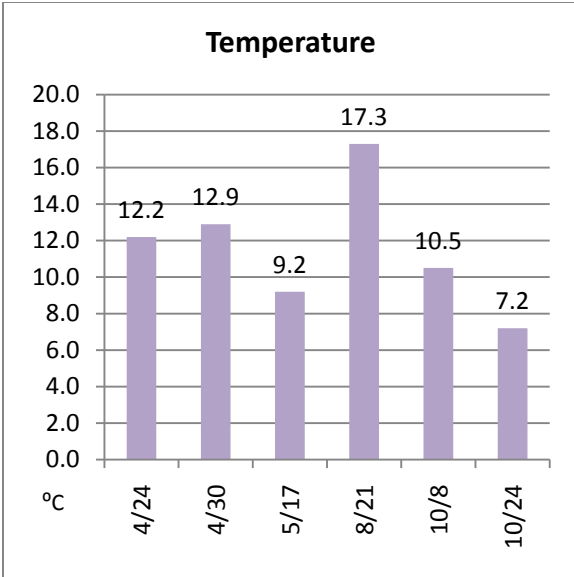
RCW 4 is a small stream entering the east side of East Rush Lake. The small rural watershed drains agriculture land and also flows through many wetlands. The water samples mostly meet or exceed standards and expected ranges for Chisago County. One Transparency reading is low, while two Total Suspended Solids readings are higher than expected. Two Total Phosphorus samples are high; these samples were both taken after rain events. Samples were not taken in July due to low water levels. The Ammonia Nitrogen levels were mostly good, with one exceeding ranges. High levels of tannin in this stream cause the water to appear brown or rust colored. The tannin is caused by breaking down leaves and organic matter.



RCW 5

S005-507 | UNNAMED STREAM TO EAST RUSH LAKE AT CR-1

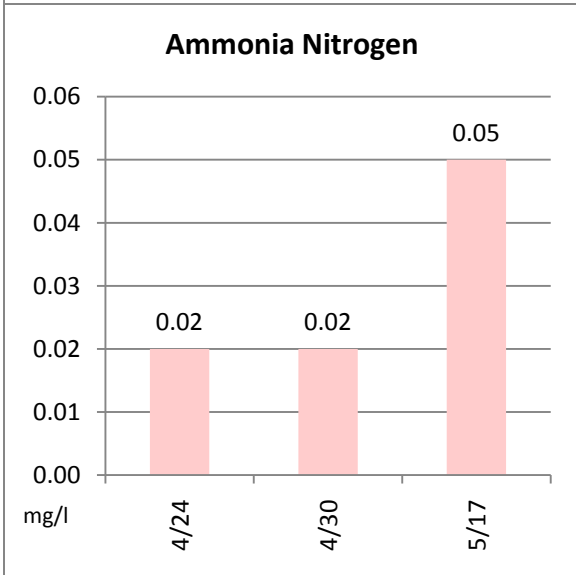
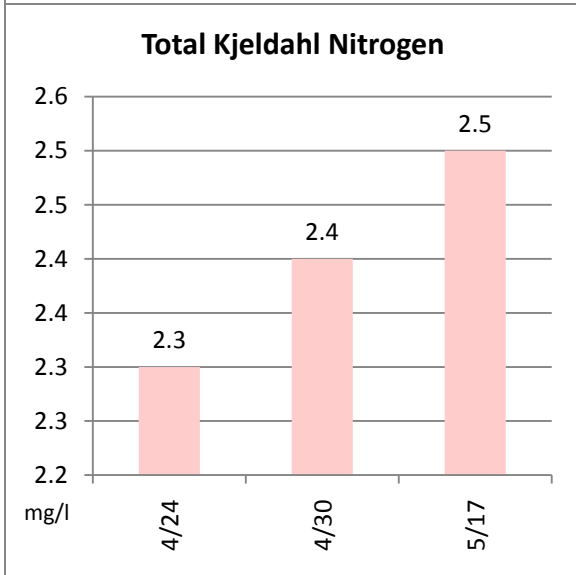
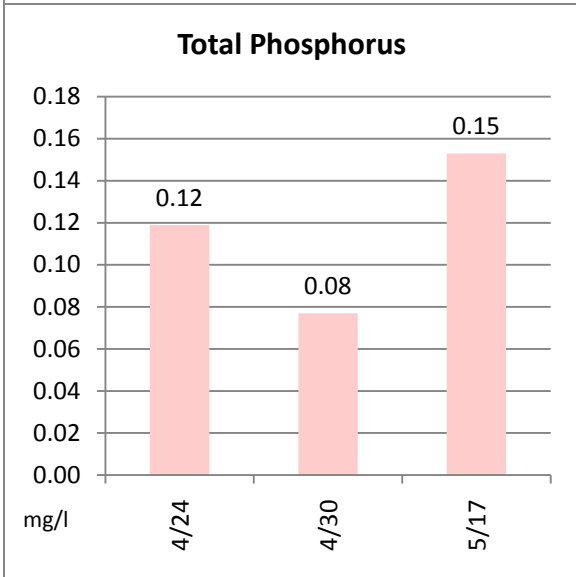
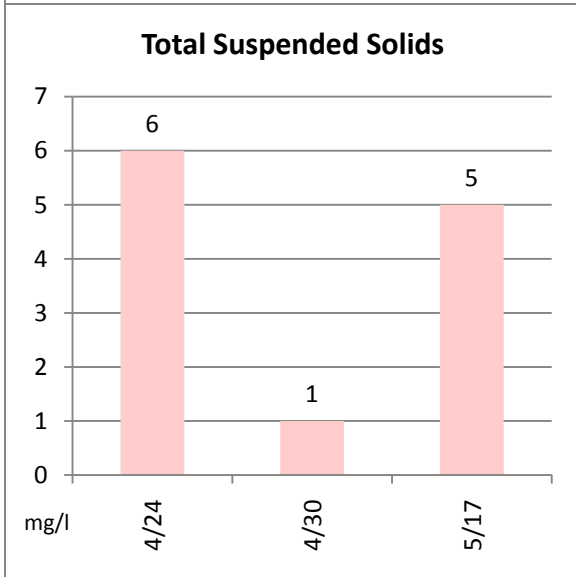
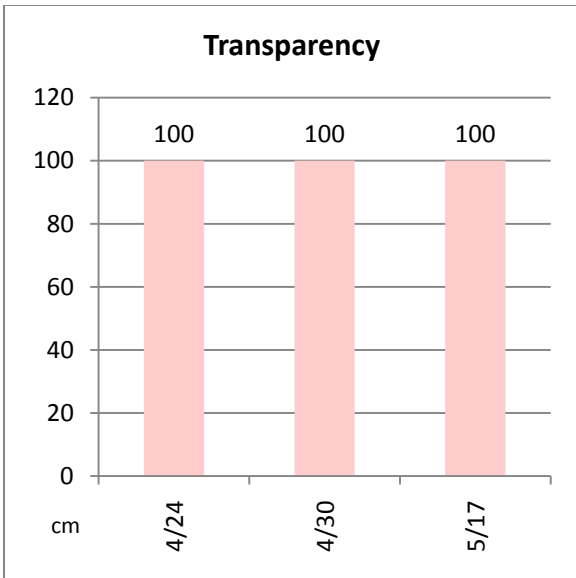
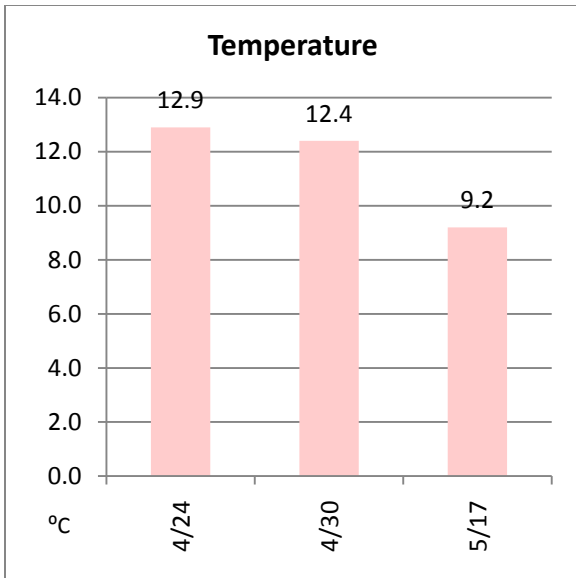
RCW 5 is a small stream entering the east side of East Rush Lake. The small rural watershed drains from a large wetland complex. The water samples mostly meet or exceed standards and expected ranges for Chisago County. One Transparency reading is low, while all Total Suspended Solids readings are within the range or lower than expected. Two Total Phosphorus samples are high; these samples were both taken after rain events. Total Kjeldahl Nitrogen levels are on the high end of the expected range. Samples were not taken in July due to low water levels. The Ammonia Nitrogen levels were within the expected range. High levels of tannin in this stream cause the water to appear brown or rust colored. The tannin is caused by breaking down leaves and organic matter.



RCW 6

S005-508 | UNNAMED STREAM TO EAST RUSH LAKE AT CR-1

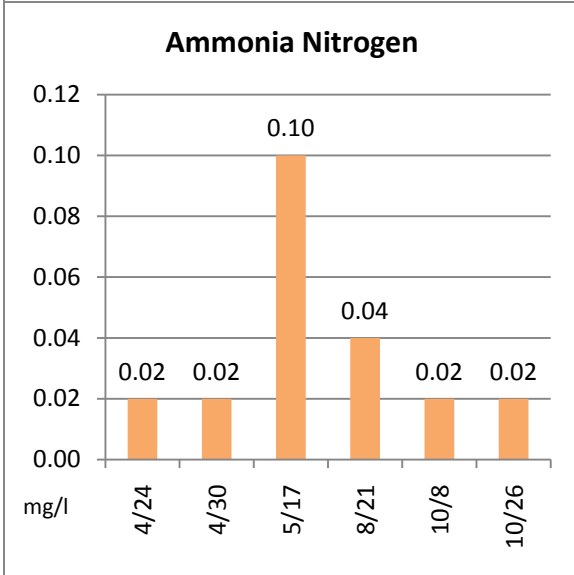
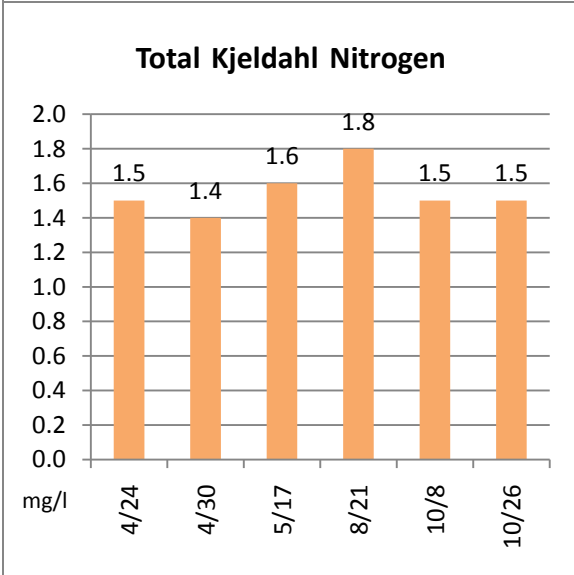
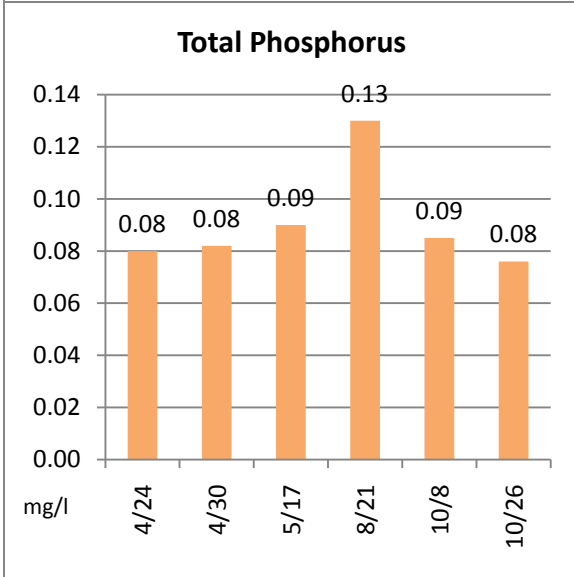
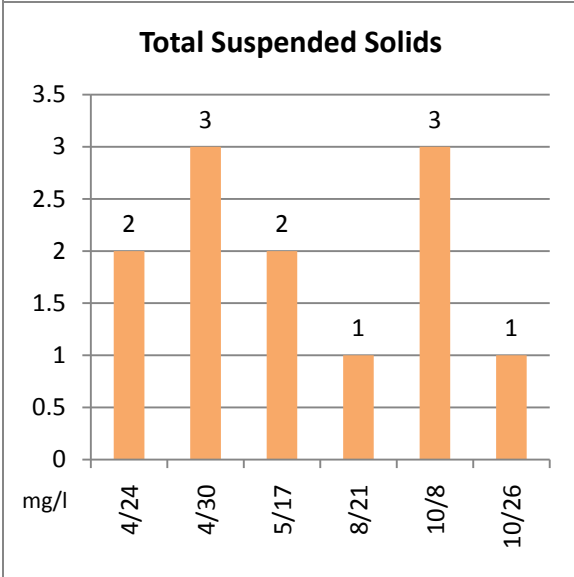
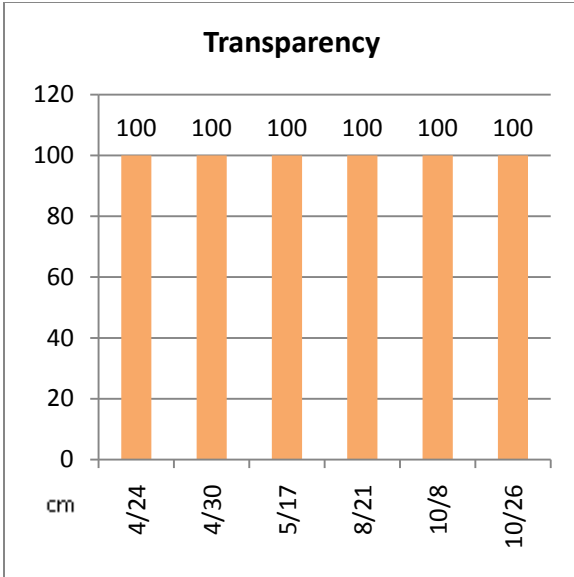
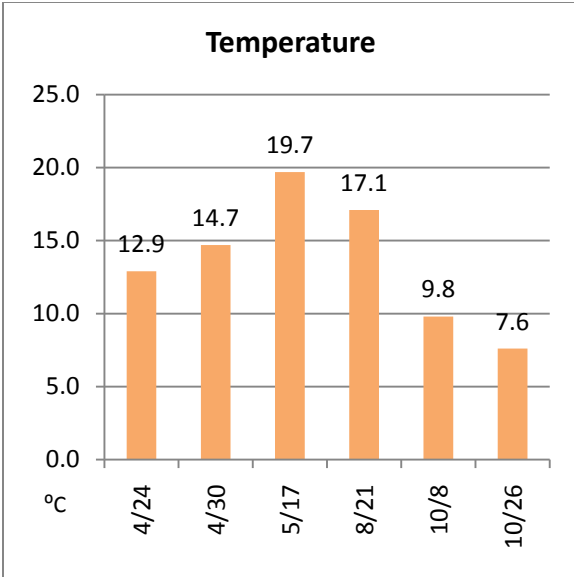
RCW 6 is a small stream entering the east side of East Rush Lake. The small rural watershed drains from the same large wetland complex as RCW 5. The water samples all meet and exceed standards and expected ranges for Chisago County. Transparency readings are very high and all Total Suspended Solids readings are lower than expected. Total Phosphorus, Total Kjeldahl Nitrogen and Ammonia Nitrogen levels are all within the expected range for Chisago County. Samples were only taken in April and May due to low water levels. High levels of tannin in this stream cause the water to appear brown or rust colored. The tannin is caused by breaking down leaves and organic matter.



RCW 7

S005-509 | UNNAMED STREAM TO WEST RUSH LAKE AT CR-4

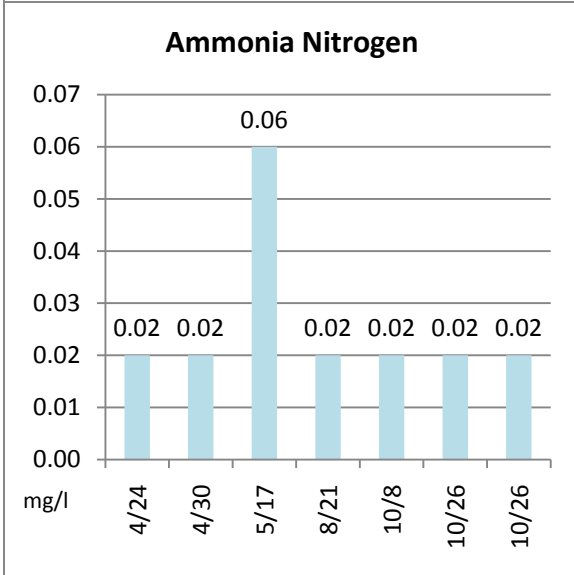
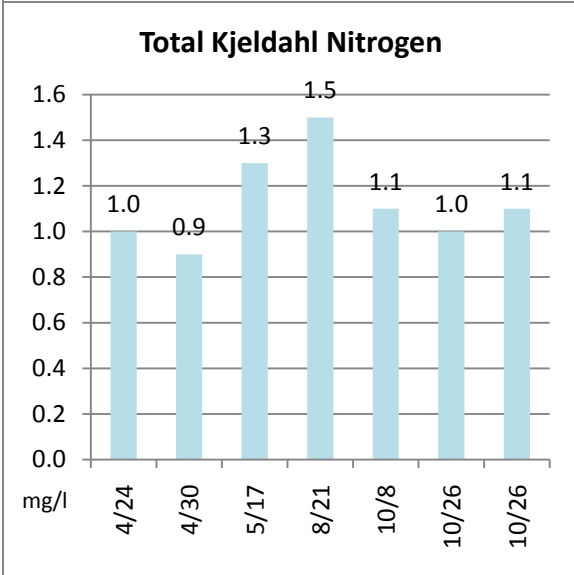
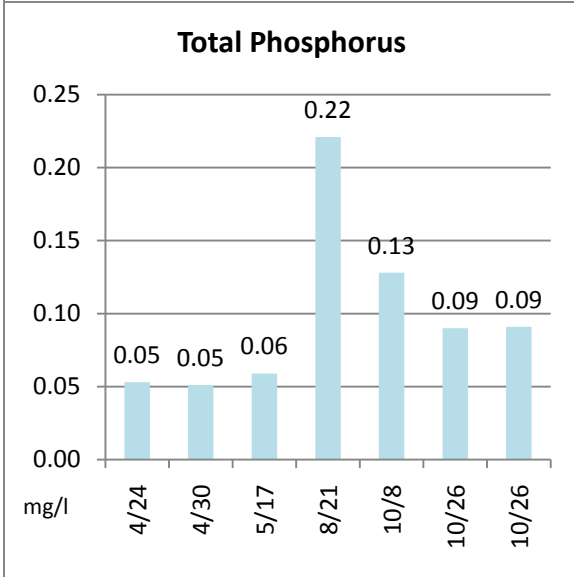
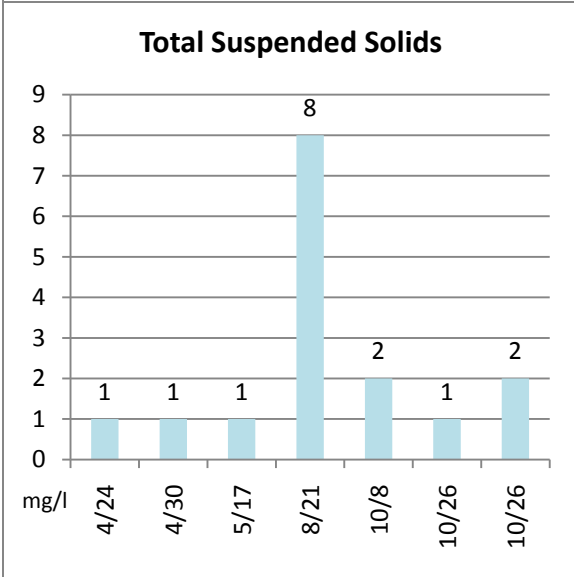
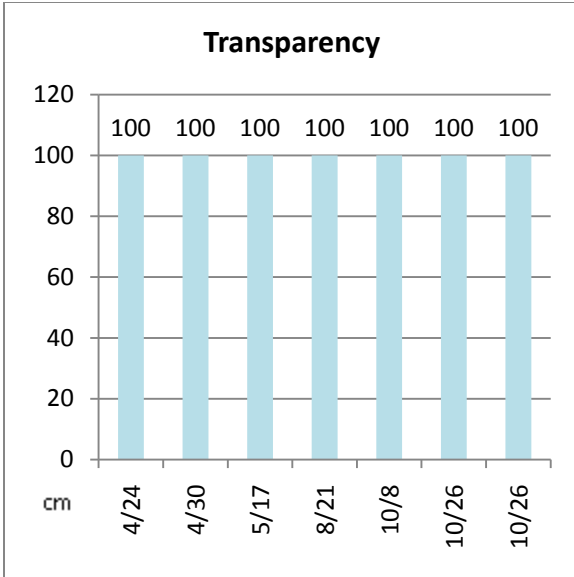
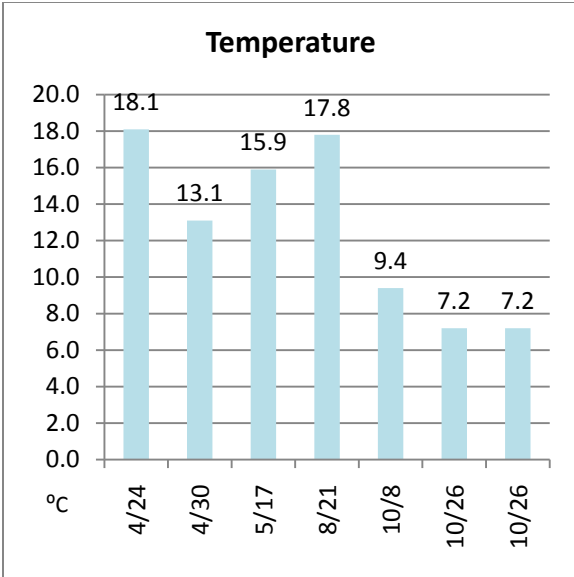
RCW 7 is a small stream entering the west side of West Rush Lake. The small rural watershed drains a large wooded wetland complex. The water samples all meet and exceed standards and expected ranges for Chisago County. Transparency readings are very high and all Total Suspended Solids readings are lower than expected. Total Phosphorus, Total Kjeldahl Nitrogen and Ammonia Nitrogen levels are all within the expected range for Chisago County. Samples were not taken in June and July due to low water levels.



RCW 8

S005-510 | UNNAMED STREAM TO WEST RUSH LAKE AT ACACIA LANE

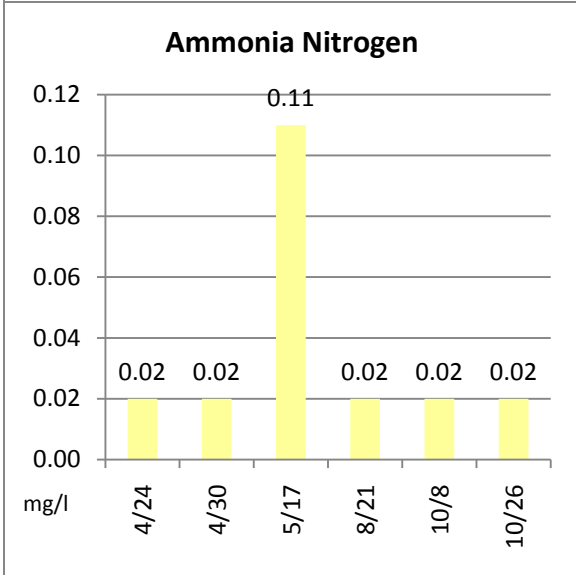
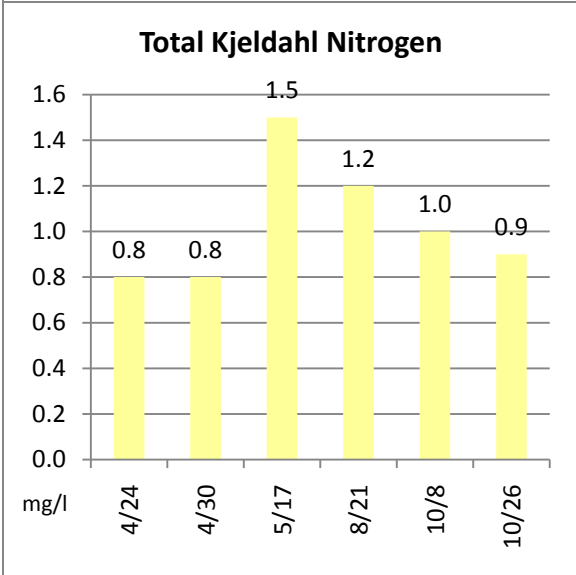
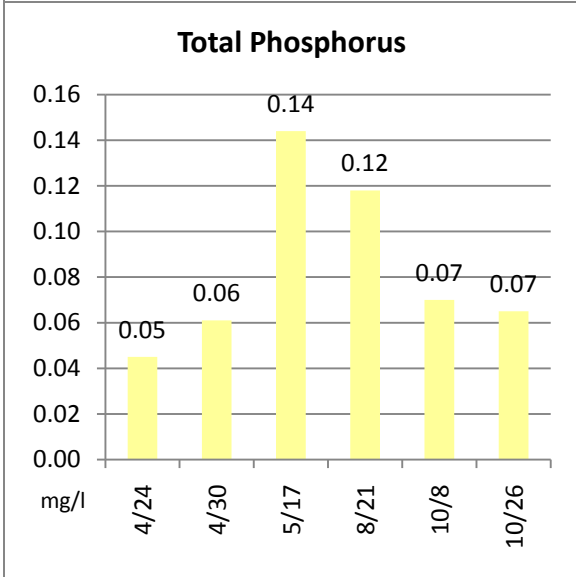
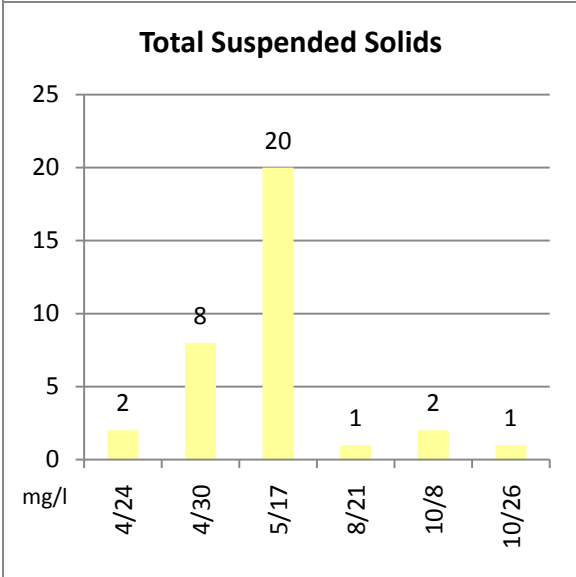
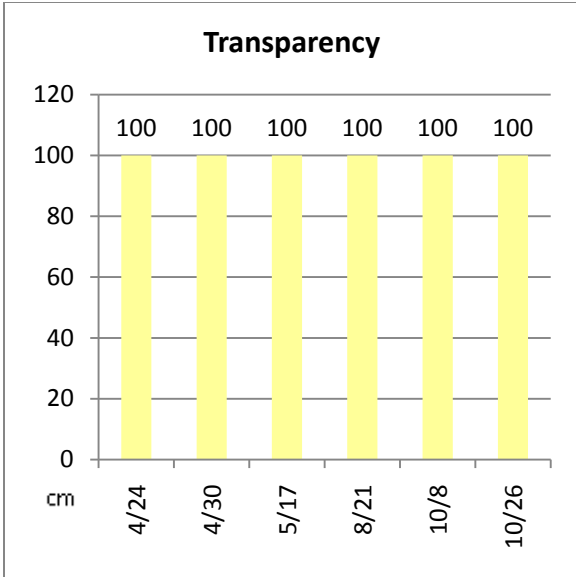
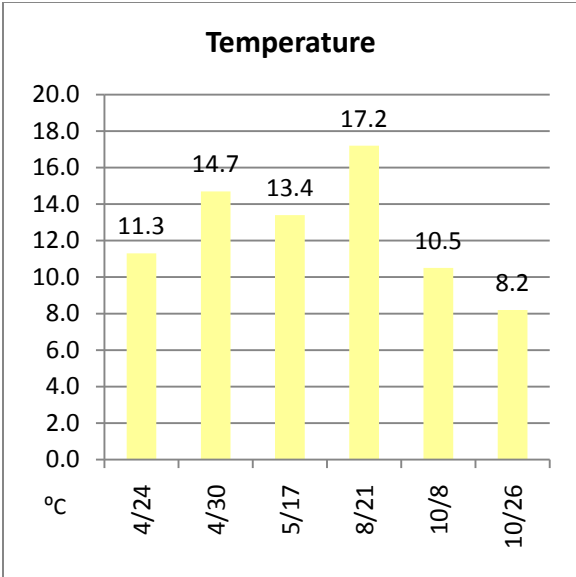
RCW 8 is a small stream entering the west side of West Rush Lake. The small rural watershed drains from Stauffer Lake through a large wetland complex. The water samples mostly meet and exceed standards and expected ranges for Chisago County. The water clarity of the stream is very good: very high Transparency readings and very low Total Suspended Solids levels. One Total Phosphorus sample was above the expected range for Chisago County. The Ammonia Nitrogen levels are also very low (6 of 7 samples <0.02 mg/l). Samples were not taken in June and July due to low water levels. High levels of tannin in this stream cause the water to appear brown or rust colored. The tannin is caused by breaking down leaves and organic matter.



RCW 9

S005-511 | UNNAMED STREAM TO WEST RUSH LAKE AT CR-4

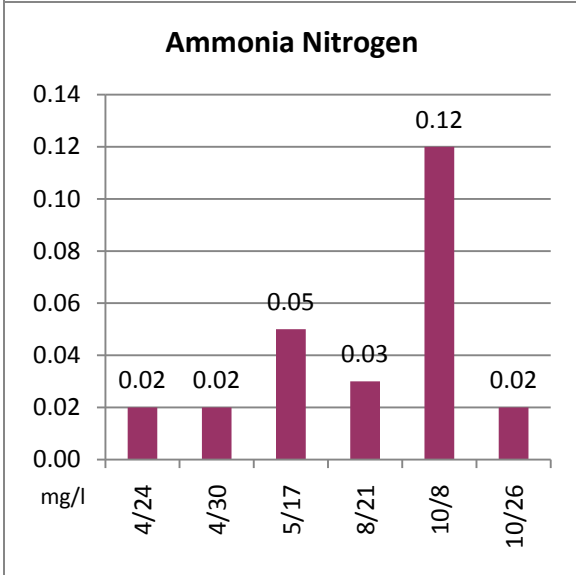
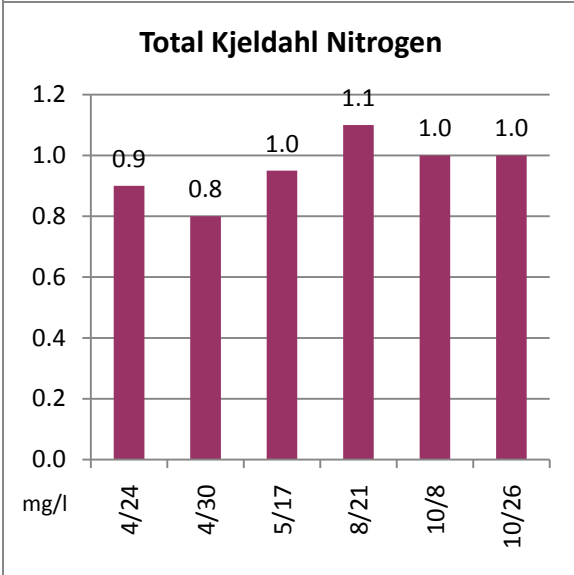
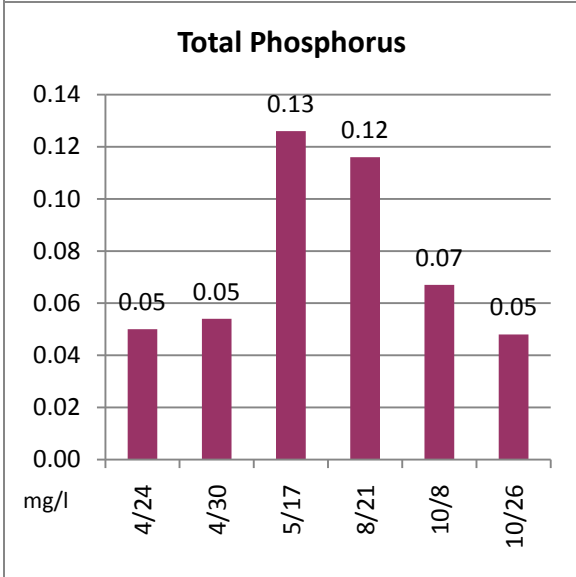
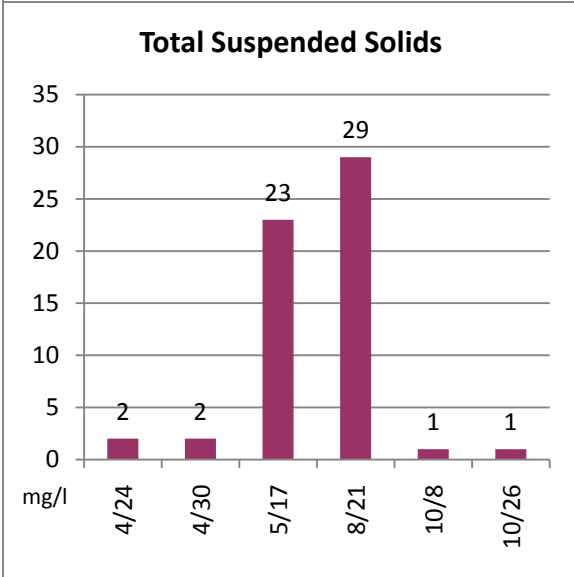
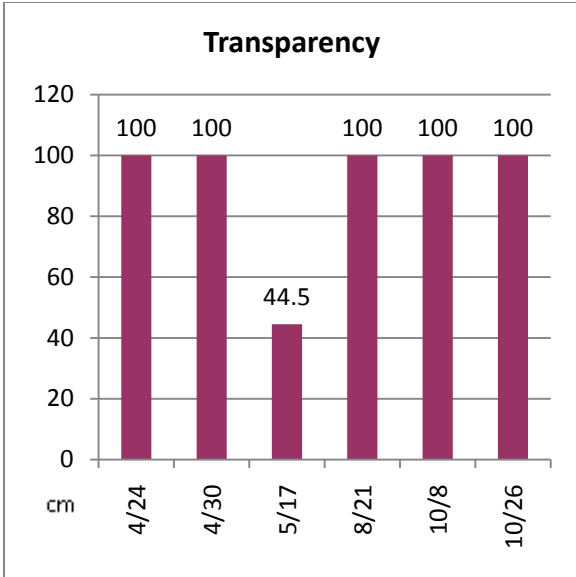
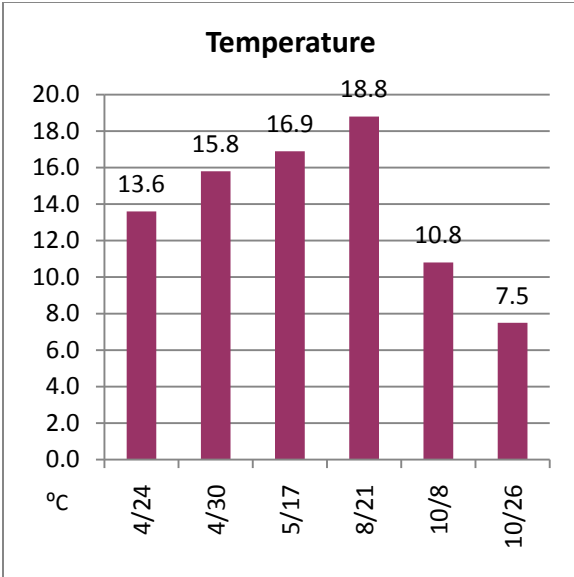
RCW 9 is a small stream entering the southwest corner of West Rush Lake. The small rural watershed drains from a mostly forested area. The water samples mostly meet and exceed standards and expected ranges for Chisago County. The water clarity of the stream is very good: very high Transparency readings and all but one low Total Suspended Solids sample. The Ammonia Nitrogen levels are also very low (5 of 6 samples <0.02 mg/l). Samples were not taken in June and July due to low water levels. High levels of tannin in this stream cause the water to appear brown or rust colored. The tannin is caused by breaking down leaves and organic matter.



RCW 10

S005-512 | UNNAMED STREAM TO WEST RUSH LAKE AT CR-7

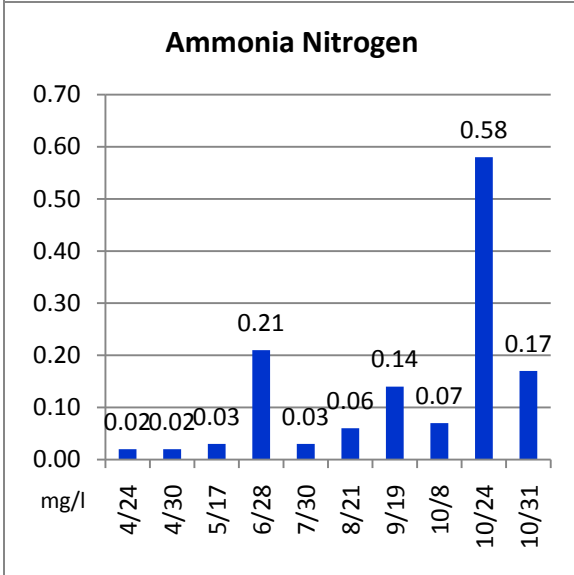
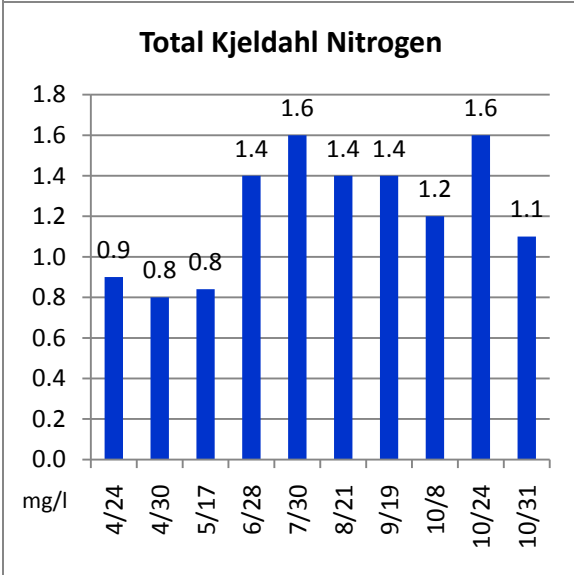
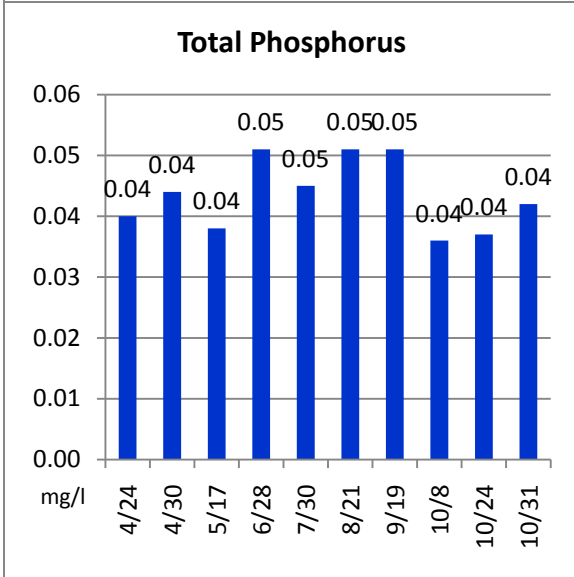
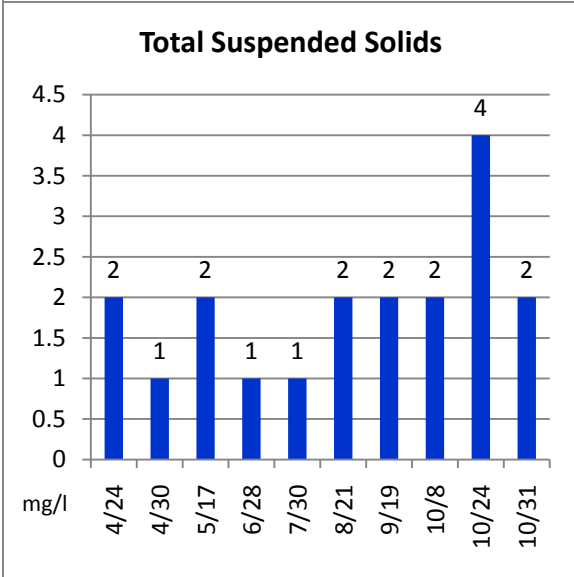
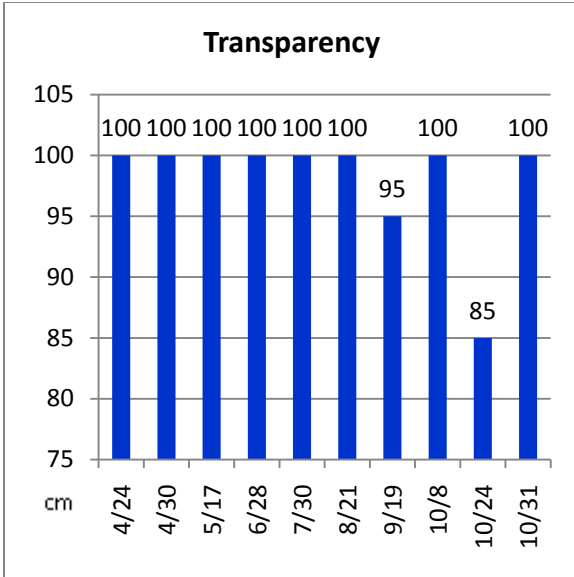
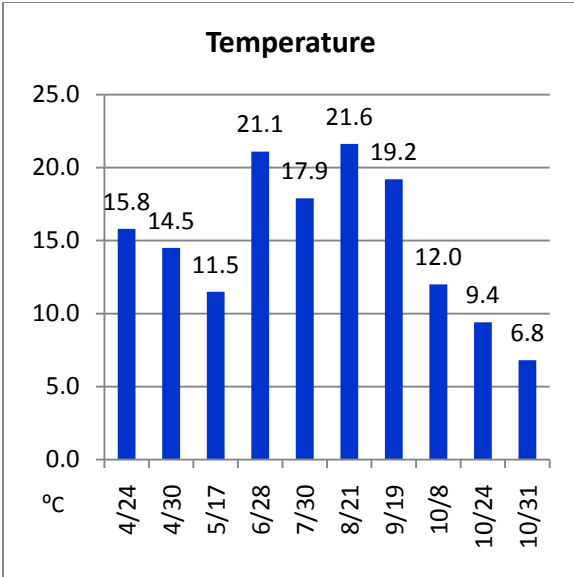
RCW 10 is a small stream entering the southwest corner of West Rush Lake near Rush Point. The very small rural watershed drains from a forested area and through a wetland complex. The water samples mostly meet and exceed standards and expected ranges for Chisago County. The water clarity of the stream is good: one low Transparency reading while the others are high and all but two low Total Suspended Solids samples. Total Phosphorus, Total Kjeldahl Nitrogen and Ammonia Nitrogen levels all fit within the expected ranges of Chisago County. Samples were not taken in June and July due to low water levels.



RC 11

S003-477 | RUSH CREEK AT EVERGREEN AVENUE

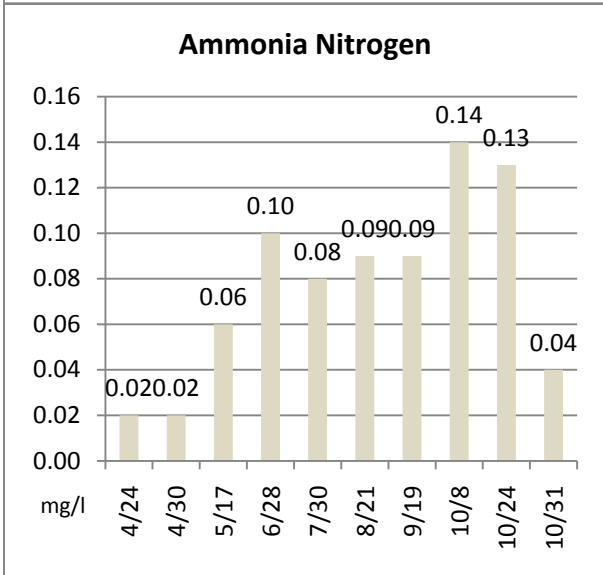
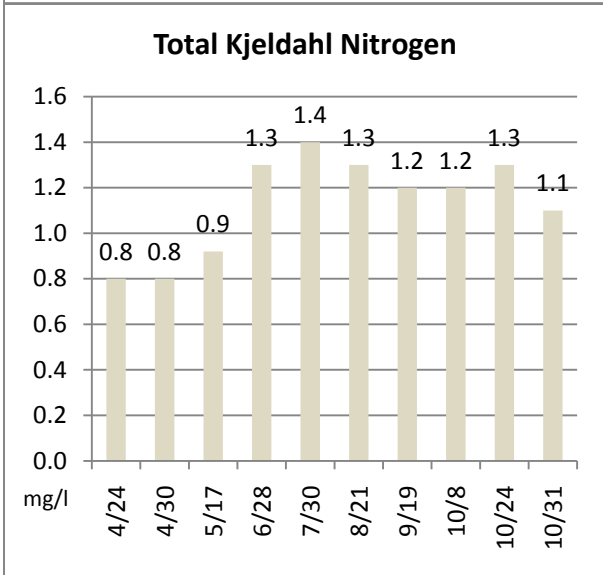
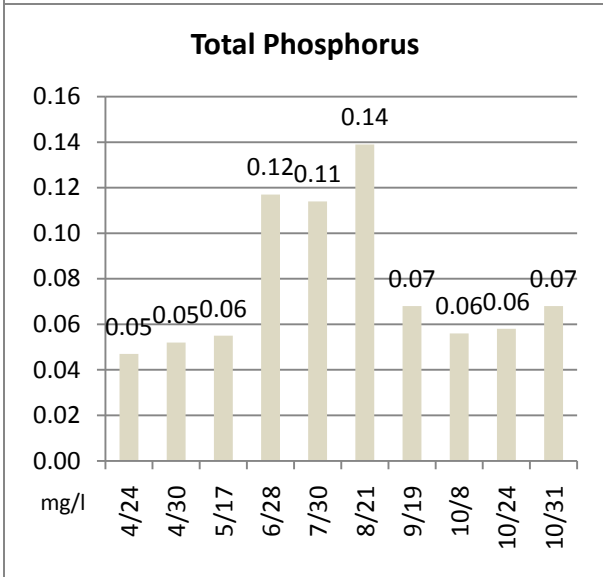
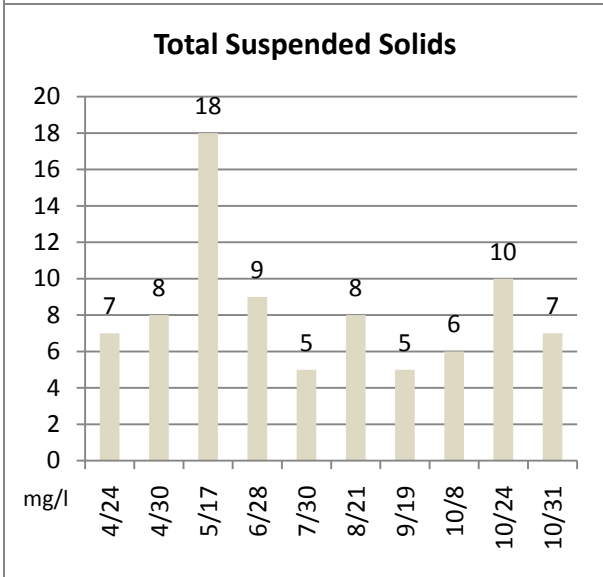
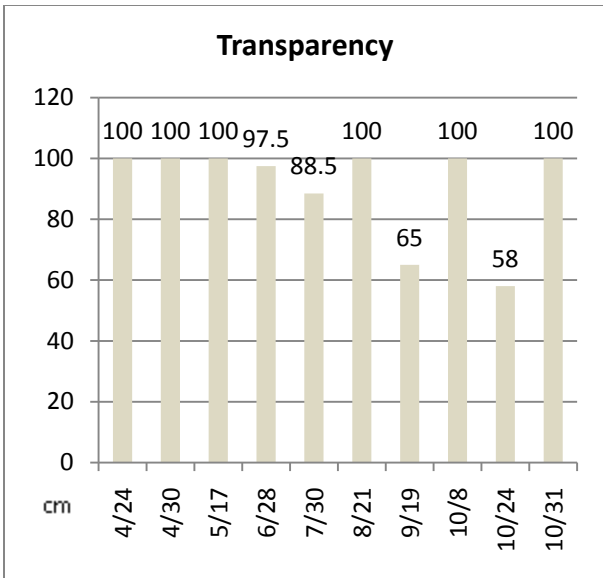
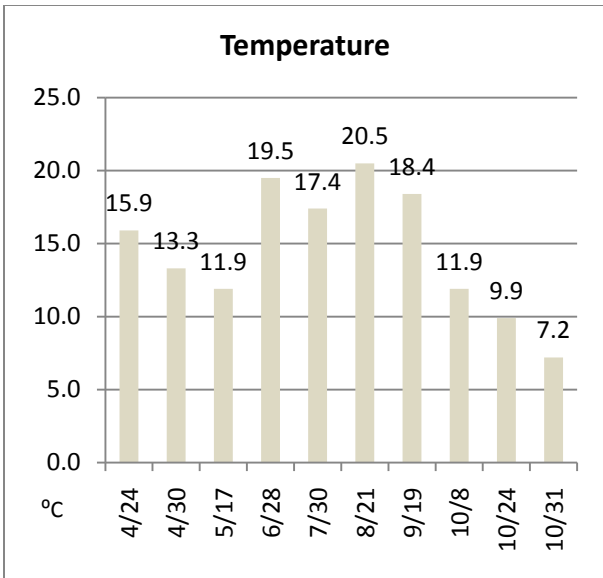
RC 11 is the first sampling point on Rush Creek after it exits East Rush Lake. The water quality at this site is very good. Water clarity, measured through Transparency and Total Suspended Solids are extremely good. Total Phosphorus levels are extremely low, barely above reporting limits. Total Kjeldahl Nitrogen levels are normal, while all but one Ammonia Nitrogen level exceed normal ranges. One high Ammonia Nitrogen sample could be due to a rain event, or a lab error.



RC 12

S003-464 | RUSH CREEK AT CR-30

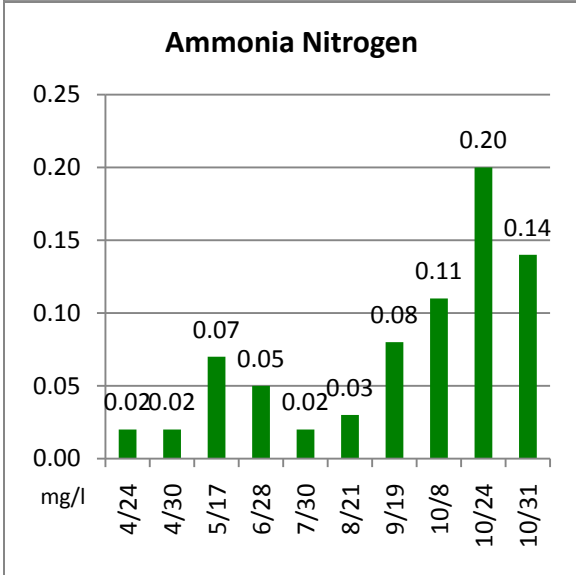
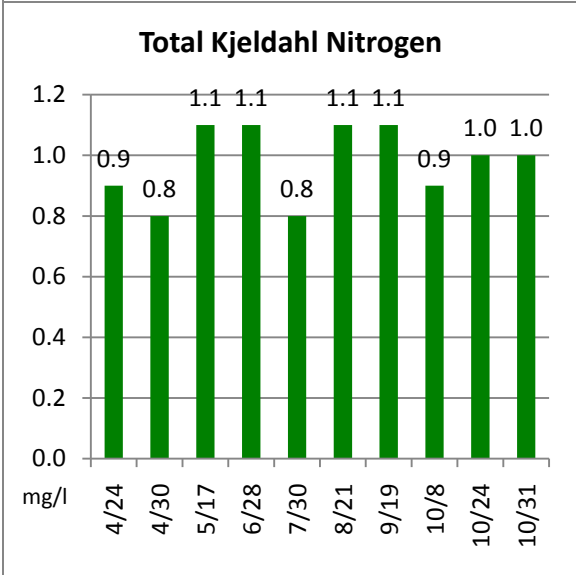
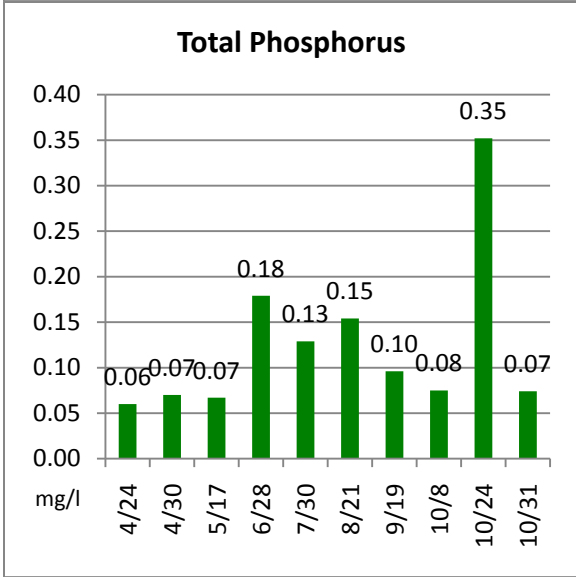
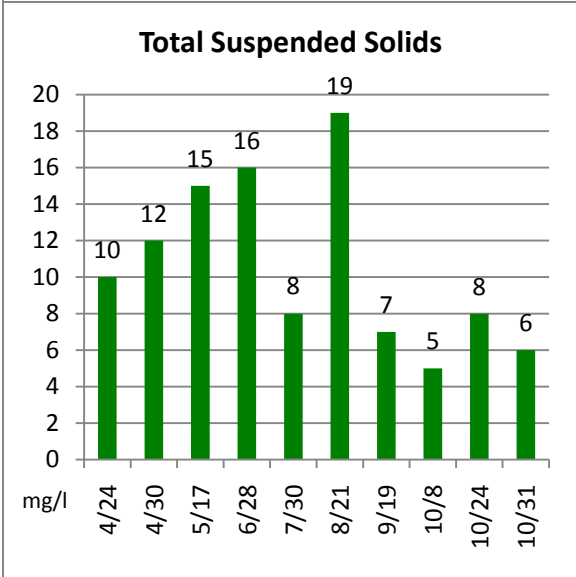
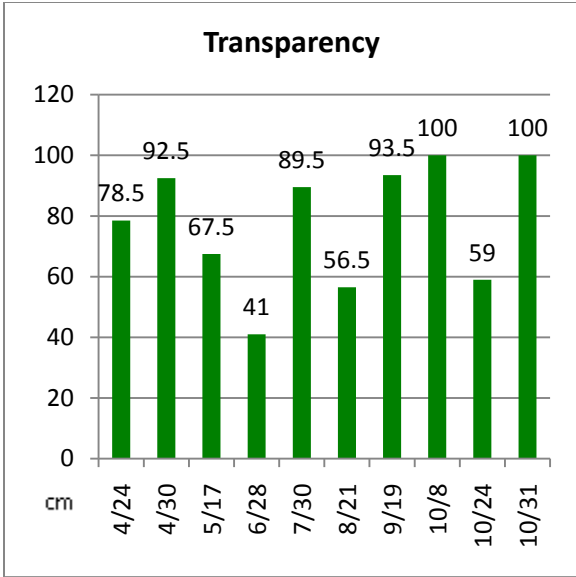
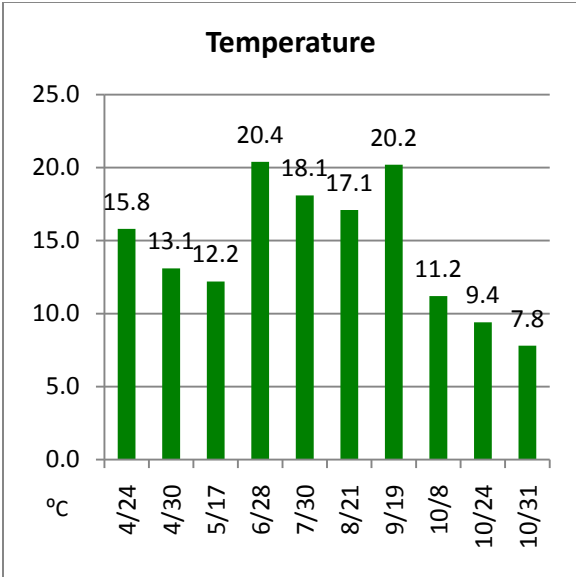
RC 12 is located in downtown Rush City. The water quality at this site is good – all samples are within the expected ranges for Chisago County. In general, the samples are slightly higher than RC 11 further upstream. The increase in levels could be due to stormwater runoff from Rush City.



RC 13

S003-468 | RUSH CREEK AT BLUEBERRY TRAIL

RC 12 is located near the outlet of Rush Creek to the St. Croix River east of Rush City. The water quality at this site is good with only a few samples exceeding expected ranges for Chisago County. In general, the samples are higher than RC 10 and RC 11 further upstream. The increase in levels could be due to elevated levels from the Waste Water Treatment Plant, rural runoff or bank erosion.



DEFINITIONS

Ammonia Nitrogen: an inorganic form of nitrogen, is contained in fertilizers, septic system effluent, and animal wastes. It is also a product of bacterial decomposition of organic matter. The minimum reporting limit for Ammonia Nitrogen is 0.02. Therefore, in the graphs $0.02 = <0.02$. Measured in mg/l.

Temperature: A measure of surface water temperature measured in °Celsius.

Total Kjeldahl Nitrogen (TKN): The sum of nitrogen and ammonia in a water body. High measurements of TKN typically result from sewage and manure discharges to water bodies (MPCA). The lower the reading, the clearer the water will be.

Total Phosphorus (TP): A nutrient essential to the growth of organisms, and is commonly the limiting factor in the primary productivity of surface water bodies. TP includes the amount of phosphorus in solution (reactive) and in particle form. Agricultural drainage, wastewater, and certain industrial discharges are typical sources of phosphorus, and can contribute to the eutrophication of surface water bodies (MPCA). The lower the reading, the clearer the water will be.

Total Suspended Solids (TSS): Very small particles remaining dispersed in a liquid due to turbulent mixing that can create turbid or cloudy conditions. Measured in milligrams per liter (mg/l). 1. A measure of the material suspended in wastewater. Total suspended solids (TSS) cause: a) interference with light penetration, b) buildup of sediment and c) potential reduction in aquatic habitat. Solids also carry nutrients that cause algal blooms and other toxic pollutants that are harmful to fish. 2. Very small particles remaining dispersed in a liquid due to turbulent mixing exceeding gravitational sinking that can create turbid or cloudy conditions (MPCA). The lower the reading, the clearer the water will be.

Transparency Tube (T-tube): A measure of water clarity in a 100 cm tube with a black and white disk at the bottom. Letting water out of the tube until you can see the disk will give you the transparency reading. The higher the reading, the clearer the water will be.



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