

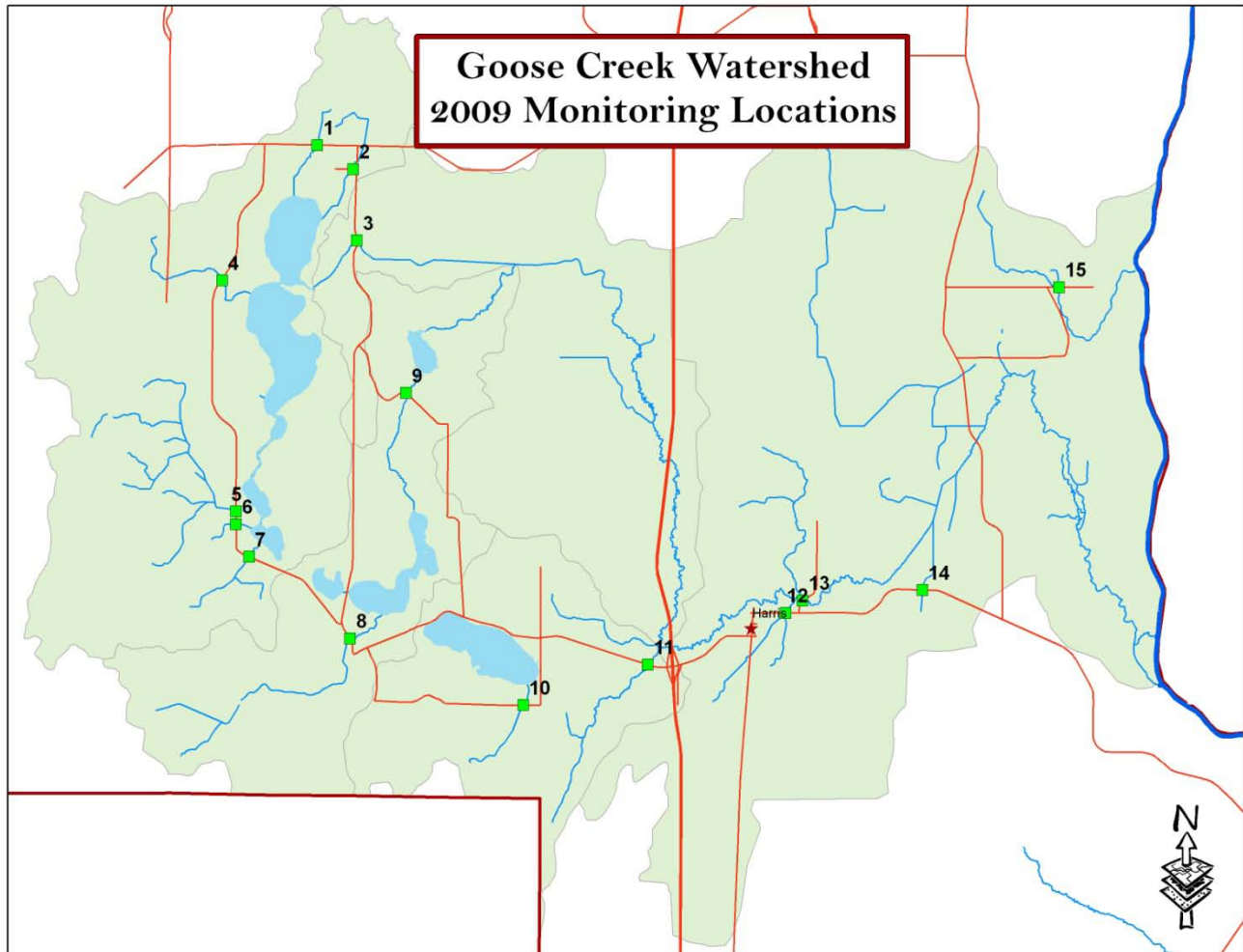
# Goose Creek Watershed

# 2009

---

In 2009 the Goose Creek Watershed was monitored through a grant from the Minnesota Pollution Control Agency. Lake Association Volunteers and Chisago SWCD Staff collected water quality samples at 15 locations within the Goose Creek Watershed.

Surface  
Water  
Assessment  
Grant



The Goose Creek Watershed covers 76 square miles in the middle portion of Chisago County. Members of the Goose Chain of Lakes Association volunteered many hours to collect water samples at 11 locations (sites 1-11) throughout the watershed. Chisago SWCD staff collected samples at 4 locations (sites 12-15) in the watershed. The goal of the project was to collect 10 samples at each location in 2009. The monitoring season extends from April 1<sup>st</sup> through October 31<sup>st</sup>. 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. At the sites where SWCD staff took data, there were more parameters measured.

## Expected Ranges for Water Quality Parameters for Chisago County

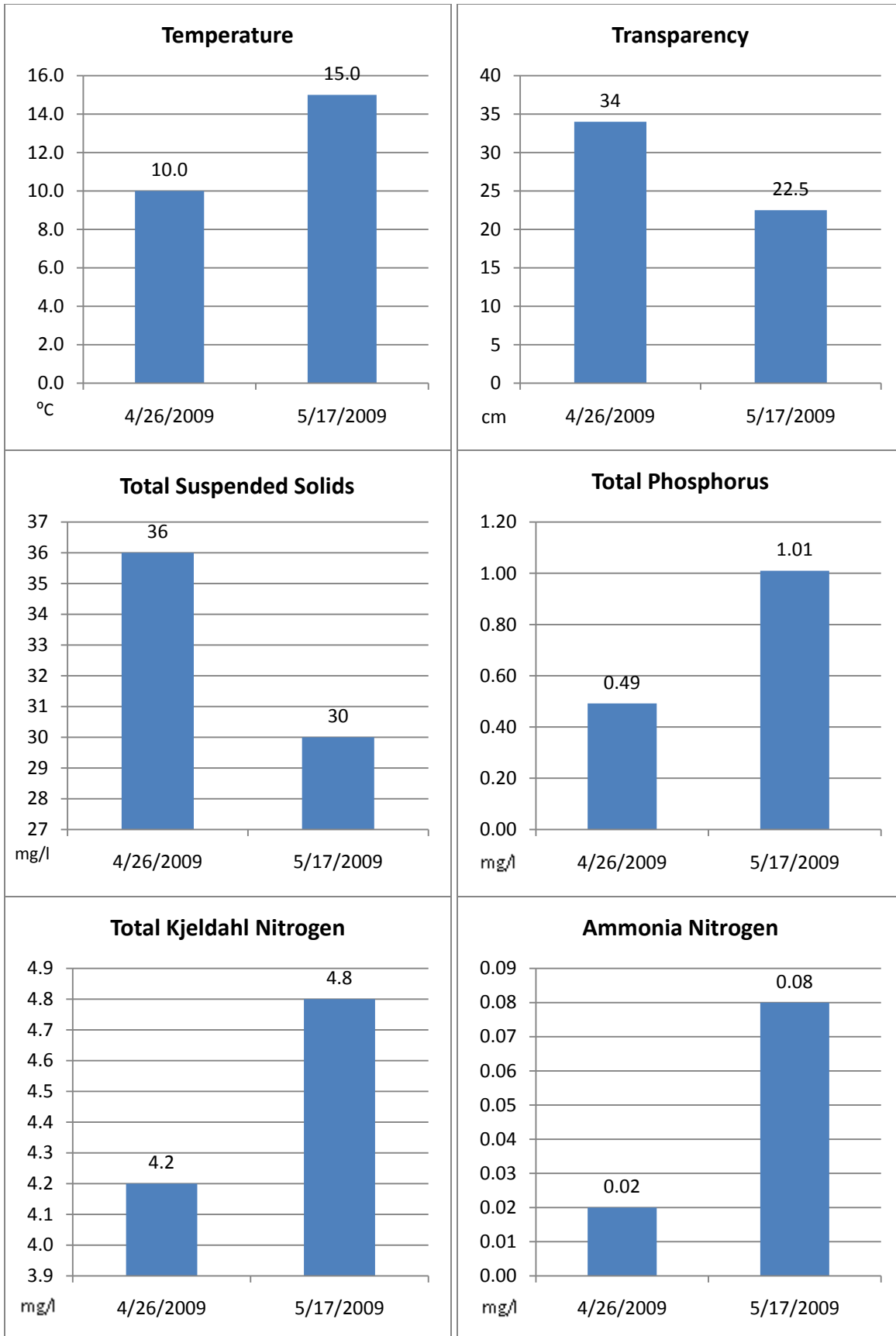
PARAMETER	EXPECTED RANGE OR STANDARD	UNIT
Total Phosphorus	0.06 – 0.15	mg/l
Total Suspended Solids	4.8 – 16.0 The lower the number, the better the water clarity.	mg/l
Total Kjeldahl Nitrogen	0.5 – 3.0	mg/l
Ammonia Nitrogen * Samples listed as 0.02 mg/l are <0.02 which is the minimum reporting limit	0.02 – 0.28	mg/l
Transparency	>40 The higher the number, the better the water clarity.	cm
Temperature	2.0 – 21.0°	Celsius
Field pH	7.9 – 8.3	
Escherichia coli	Standard 126	org/100 ml
Dissolved Oxygen	No more than 50% of samples below 7.0	mg/l

## GCW 1

S005-515 | UNNAMED STREAM TO NORTH GOOSE LAKE AT COUNTY ROAD 7

GCW 1 is a small stream entering the north end of North Goose Lake. This is a small rural watershed. Only two samples were submitted to the lab before the stream completely dried up and no more samples were able to be collected. Even early in the year there was little flow. All readings are at the upper levels of the expected range.



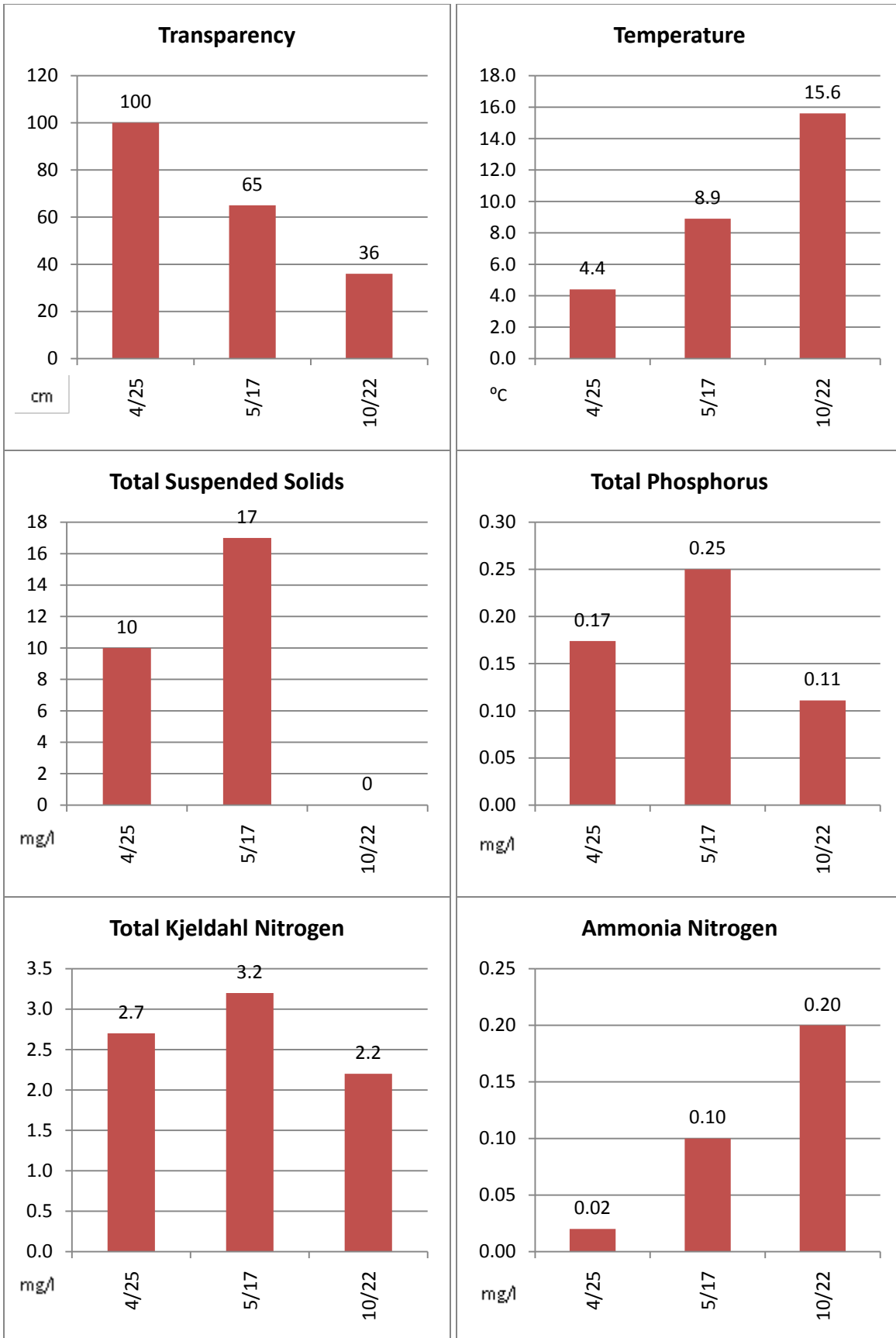


## GCW 2

S005-516 | UNNAMED STREAM TO NORTH GOOSE LAKE AT 487<sup>TH</sup> STREET

GCW 2 is a small stream from a rural watershed entering the north end of North Goose Lake. The samples taken are in the middle to high end of the expected range for Chisago County. Duck weed was present after May of 2009; this is only possible in low flow situations. The stream flows increased some with late season rains, this leads us to believe that GCW 2 could be very flashy and could bring a lot of water and pollutants to the lake in a short amount of time.



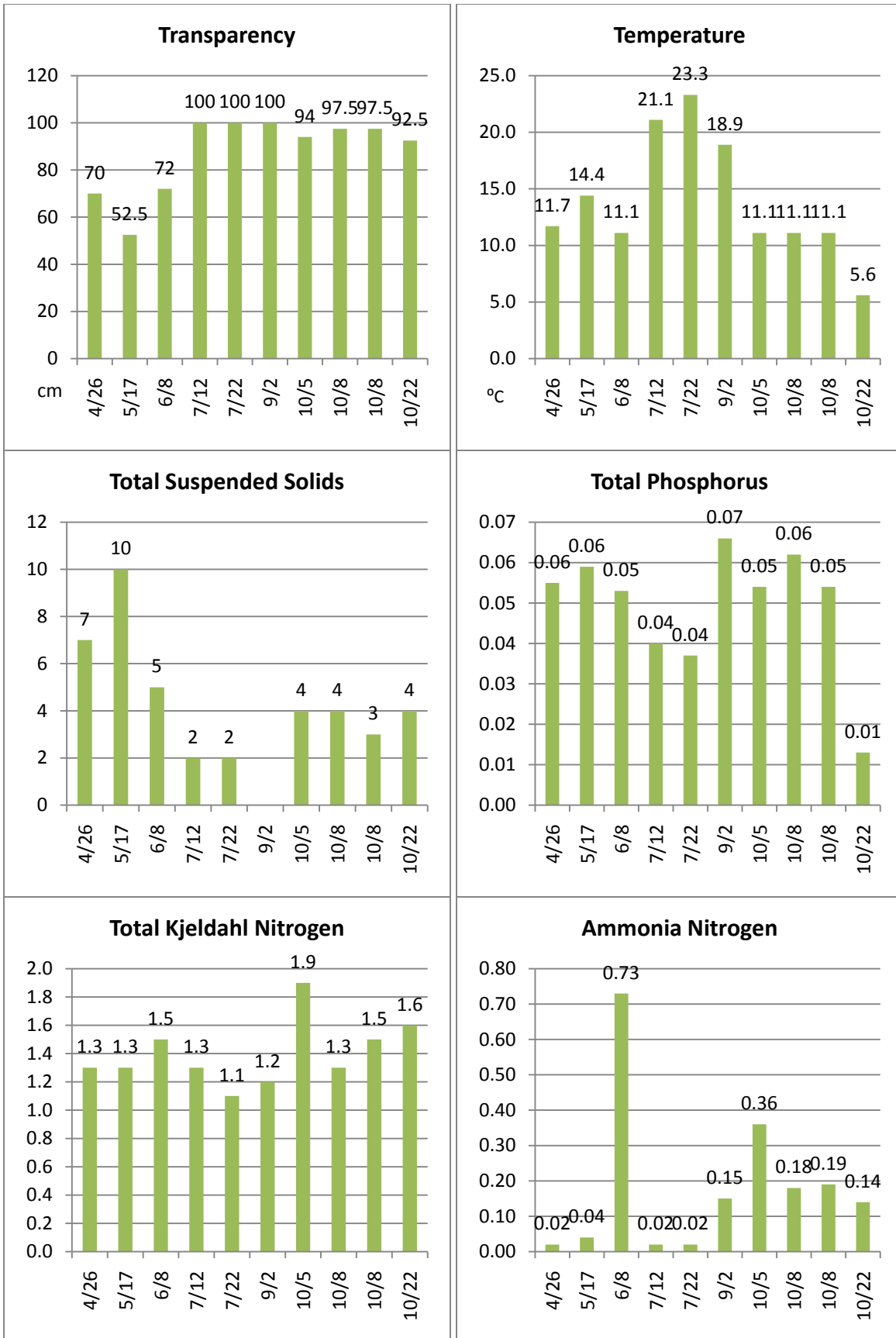


## GC 3

S003-479 | GOOSE CREEK AT CEDARCREST TRAIL

This is the main stem of Goose Creek as it leaves the north end of Goose Lake. These samples should give us a good idea of what is happening for water quality in North Goose Lake. This site flows year round. All samples tested were within the typical ranges for Chisago County. Many of the samples are even lower than the expected range. This stream meets water quality standards for 2009.



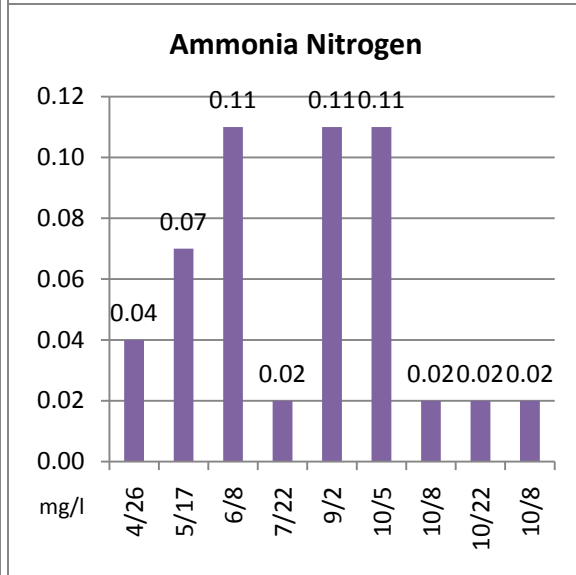
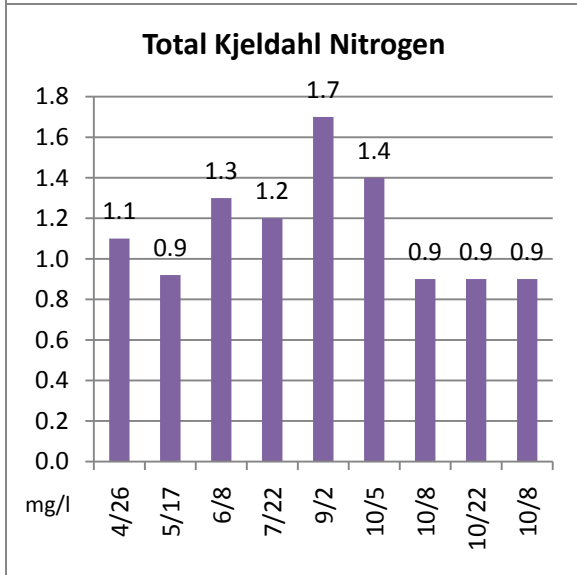
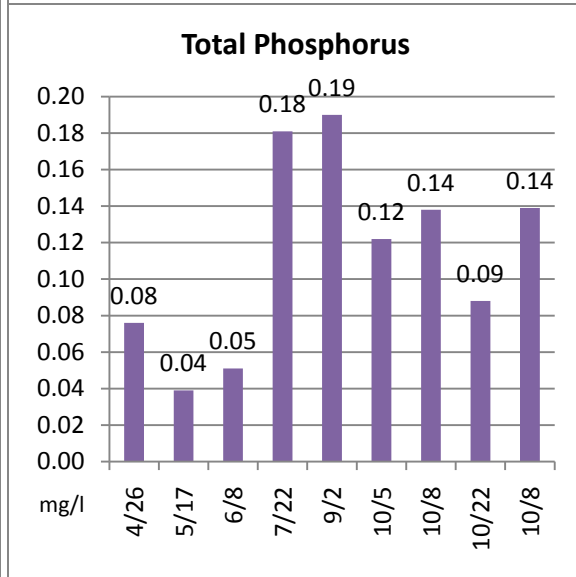
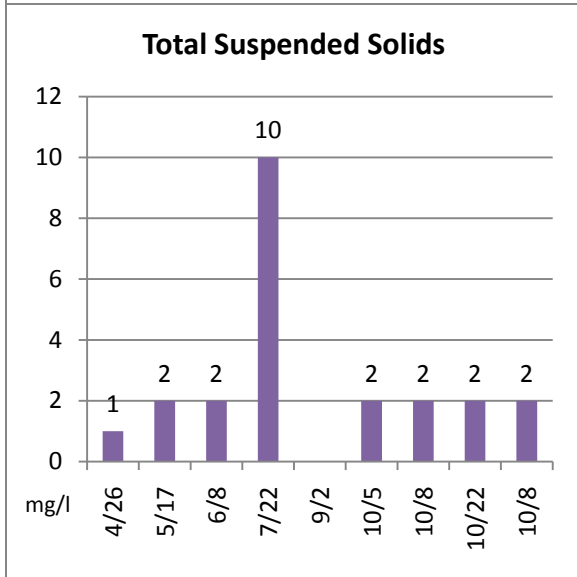
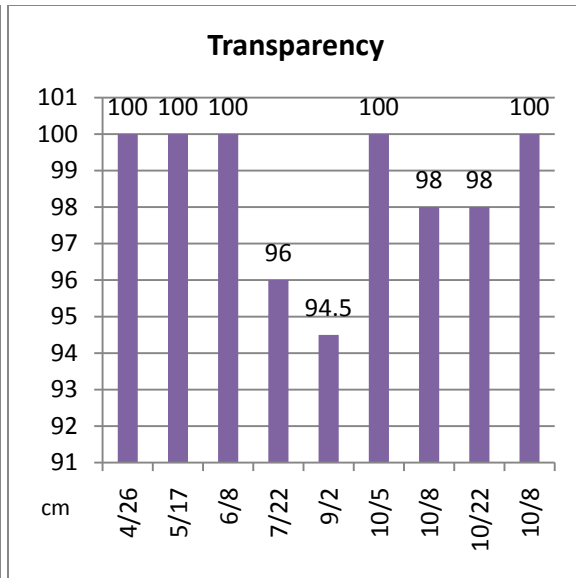
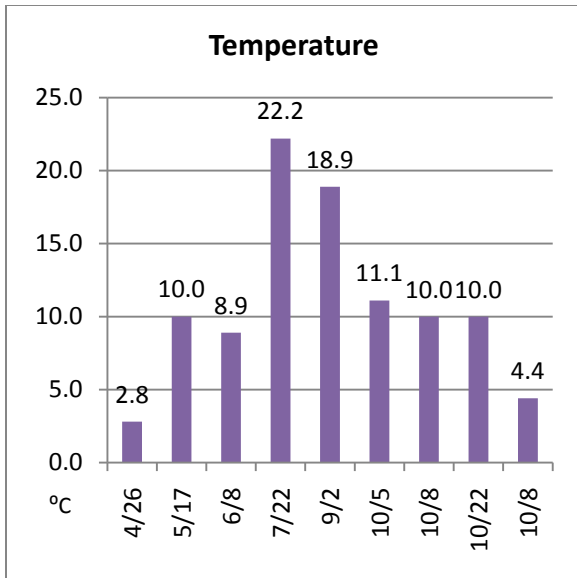


## GCW 4

S005-517 | UNNAMED STREAM TO SOUTH GOOSE LAKE AT COUNTY ROAD 62

GCW 4 enters South Goose Lake from the west near the north end of the lake. This site dried up in July at the original location. The site was then moved closer to the lake on private property. Temperature data is good. Transparency readings were very high, which means very good water clarity. Total Suspended Solids data is very low which corresponds with good water clarity. Total Phosphorus levels were good except 2 readings that were slightly high. Total Kjeldahl Nitrogen and Ammonia Nitrogen levels were good, many of the Ammonia Nitrogen levels were at the minimum reporting limit. A sulfur odor was noticed early in the monitoring season.



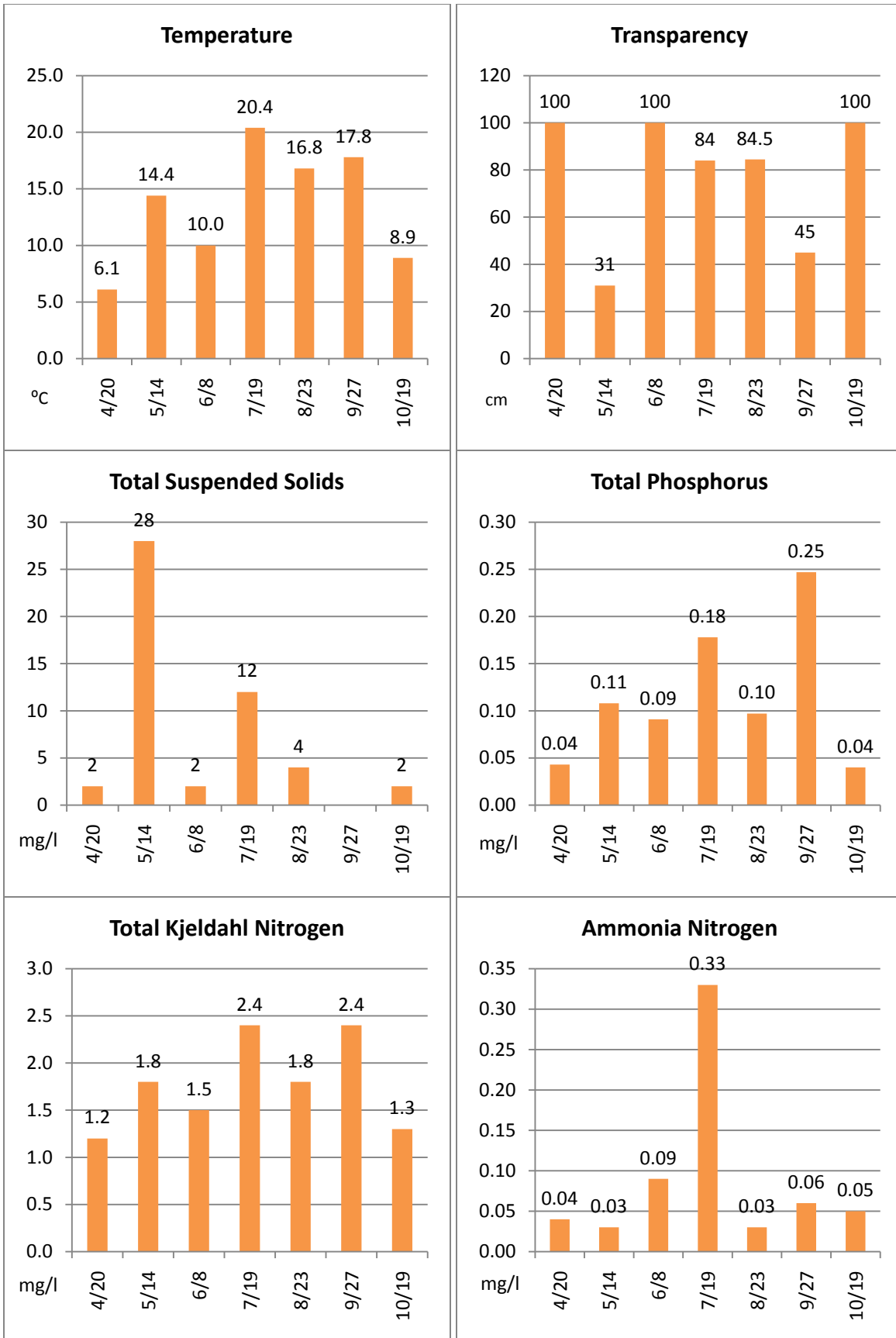


## GCW 5

S005-518 | UNNAMED STREAM TO MANDALL LAKE AT COUNTY ROAD 62

GCW 5 enters Mandall Lake on the west side. This is a large stream network that feeds the lake. Total phosphorus was high during the middle of the monitoring season. Total Suspended Solids and Transparency were good except for the 5/14/09 sample. Nitrogen levels were in the middle of the expected range.

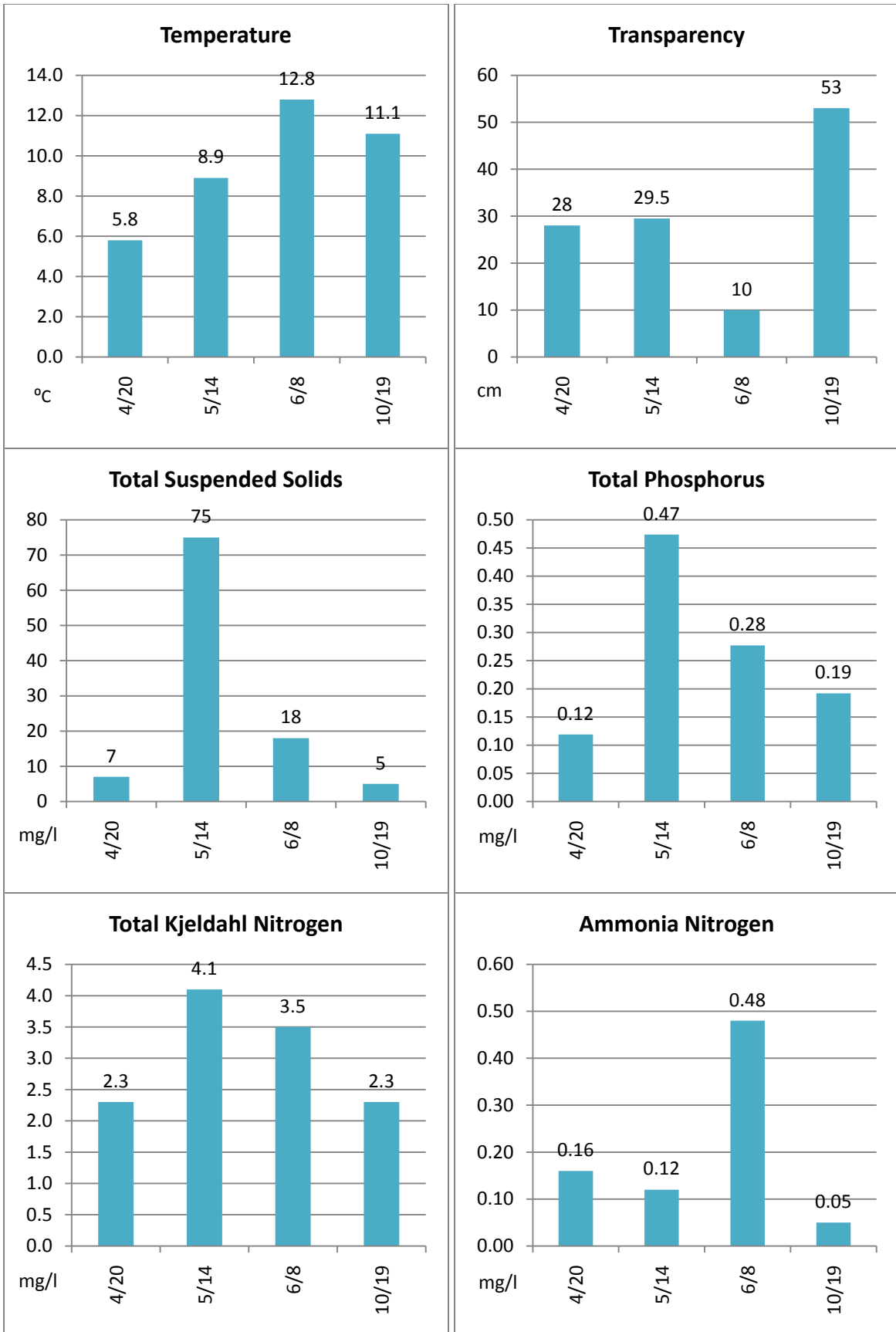
There was a sample taken in November which falls outside of MPCA protocol, therefore was not sent to the lab for analysis.



## GCW 6

S005-519 | UNNAMED STREAM TO ROBOUR LAKE AT COUNTY ROAD 62

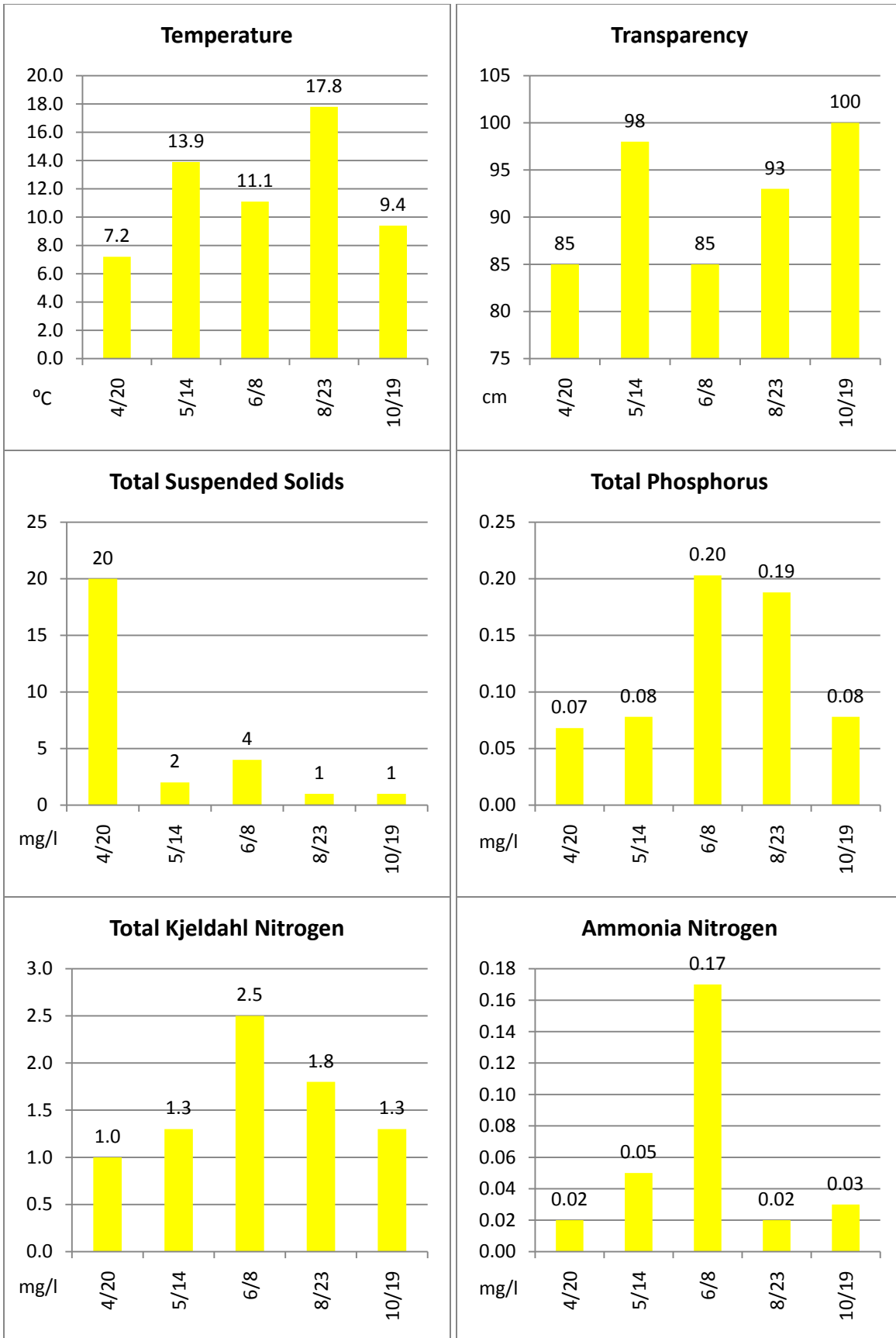
GCW 6 enters the northwest portion of Robour Lake. This stream has very low flow causing low water levels. The samples for Total Phosphorus, Total Kjeldahl Nitrogen were high. While one Total Suspended Solids sample was high, the other 3 were acceptable. The Transparency tube readings were very low, meaning that the water was quite turbid at all samples. The analysis levels suggest that the low flows caused the stream to have a high content of organic matter (decaying leaves, grass, and vegetation) in the water column. There is a small pasture with a few horses near this stream which could be contributing to some of the high levels.



## GCW 7

S005-520 | UNNAMED STREAM TO ROBOUR LAKE AT COUNTY ROAD 63

GCW 7 enters the middle portion of Robour Lake from the west. This stream also had low flows and was nearly impossible to collect samples in the driest part of 2009. Most of the samples returned good results with levels in the expected range for Chisago County. The stream flows increased some with late season rains, this leads us to believe that GCW 7 could be very flashy and could bring a lot of water and pollutants to the lake in a short amount of time.

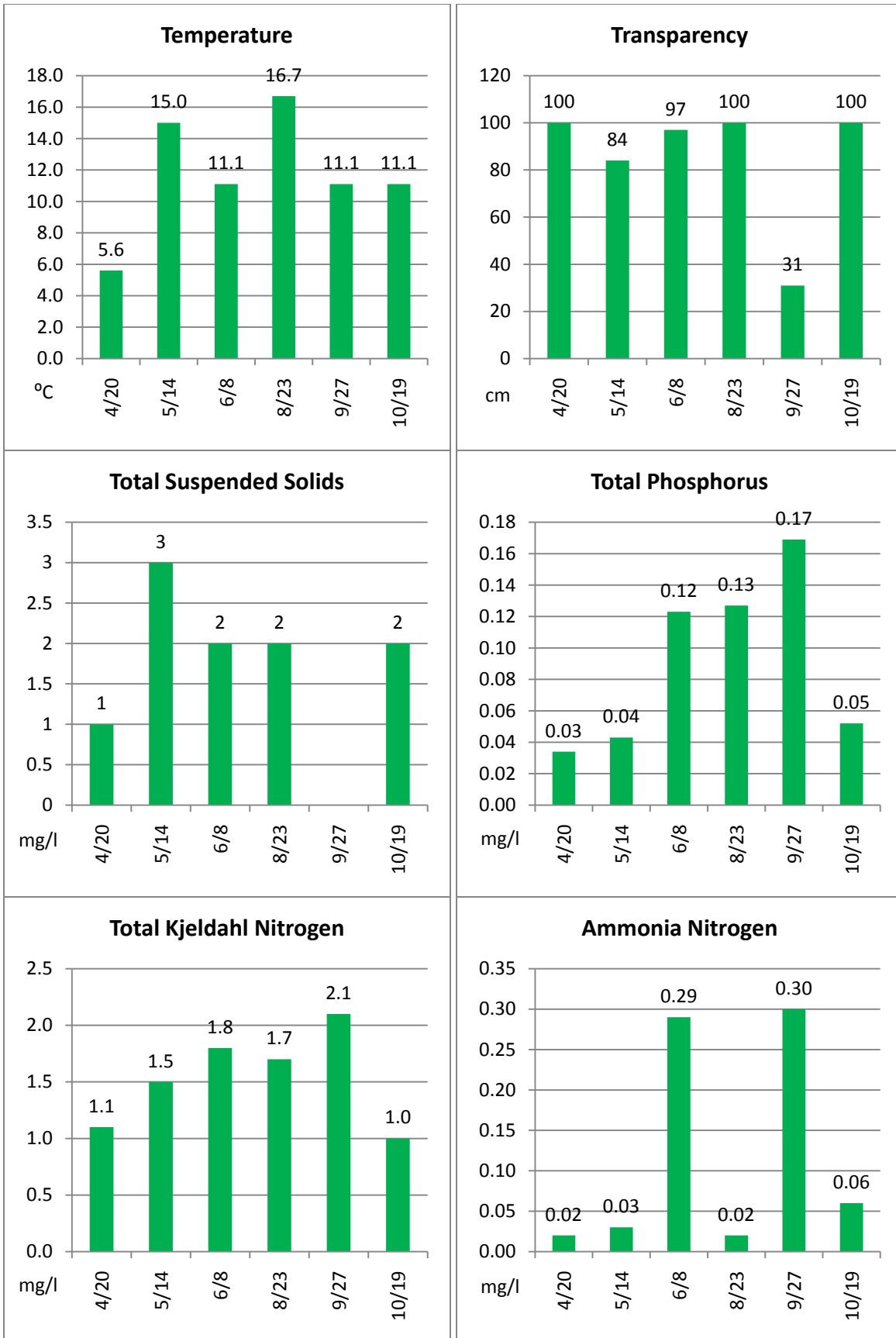


## GCW 8

S005-521 | UNNAMED STREAM TO HORSESHOE LAKE AT COUNTY ROAD 8

GCW 8 enters the southern portion of Horseshoe Lake. This stream had good flow early in the year but had very little flow during the driest part of 2009. The volunteers reported the water to be rusty at the start of the monitoring season. This rusty color is due to a substance called tannin; the tannin is present as leaves and other organic matter break down and leach into the water. Tannin does carry some nutrients but does not affect water clarity. Transparency and Total Suspended Solids levels are very good, and the Total Phosphorus and Total Kjeldahl Nitrogen Levels were in the middle of the expected range.

There was a sample taken in November which falls outside of MPCA protocol, therefore was not sent to the lab for analysis.

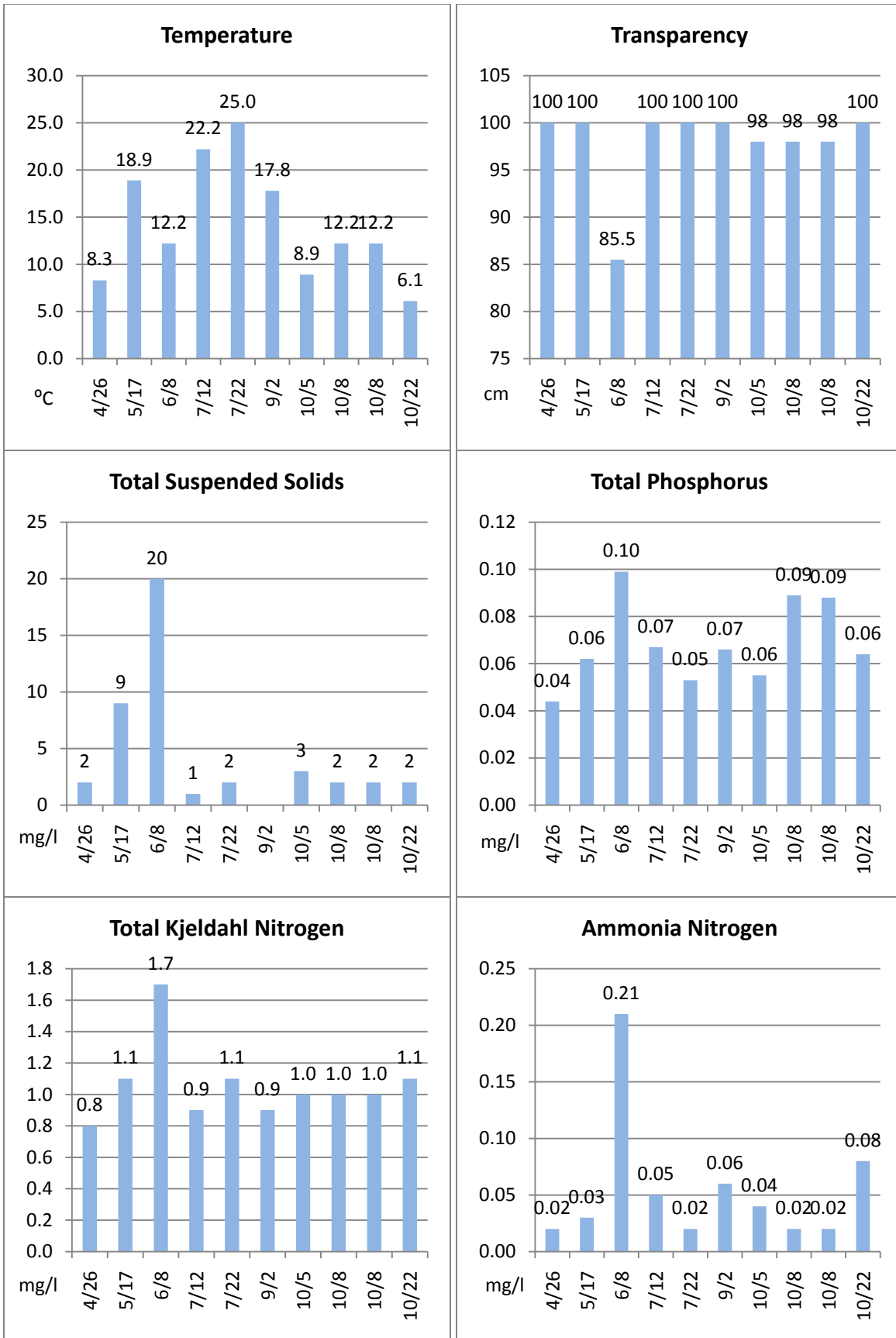


## GCW 9

S005-522 | UNNAMED STREAM TO NEANDER LAKE AT COUNTY ROAD 61

GCW 9 is the outlet of Horseshoe Lake. The samples are taken near the entrance to Neander Lake. All parameters were within the expected ranges with the exception of the samples on 6/8/2009.

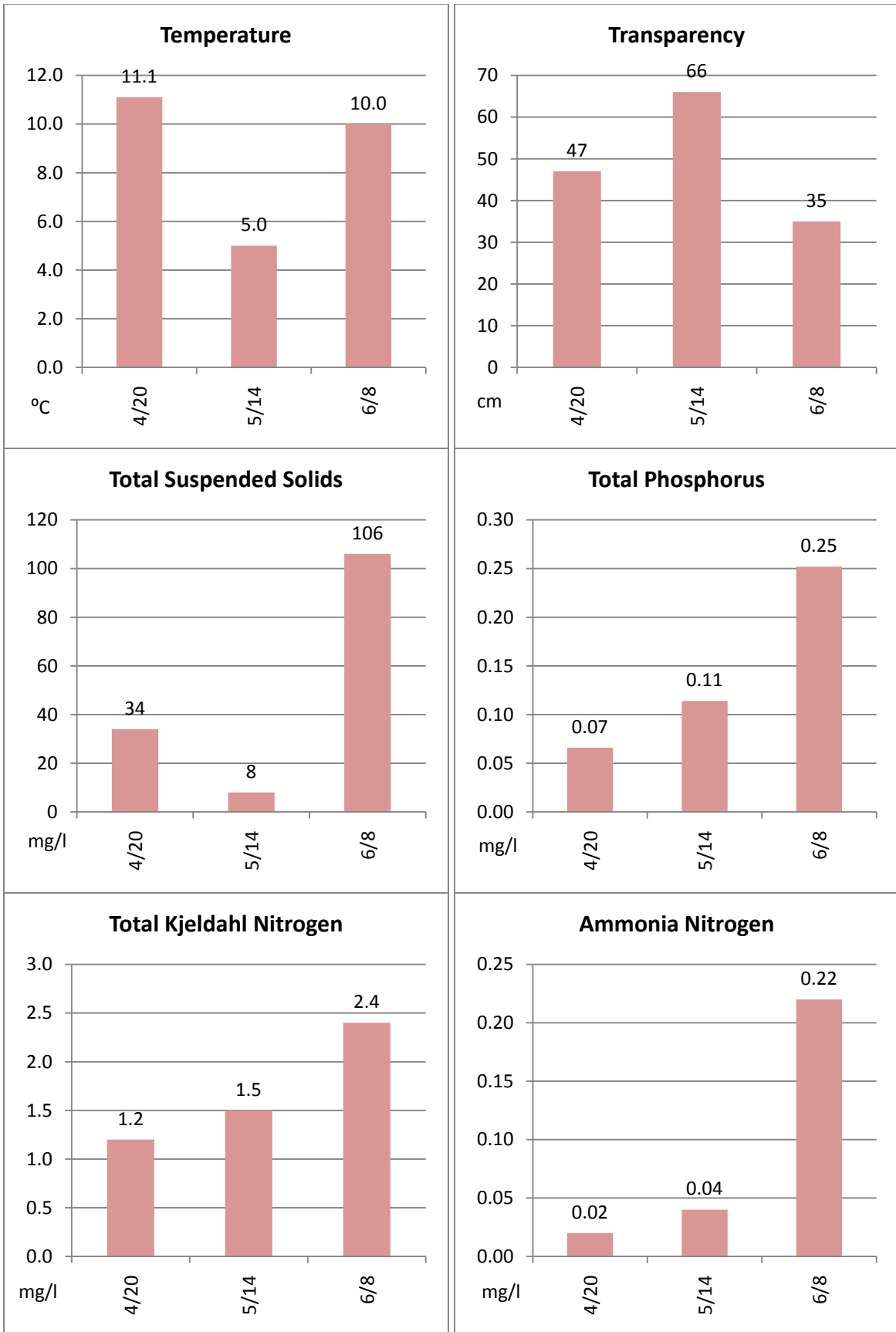




## GCW 10

S005-523 | UNNAMED STREAM TO FISH LAKE AT 430<sup>TH</sup> STREET

GCW 10 enters the southeast corner of Fish Lake near the swimming beach and the boat access. Very few samples were taken. The stream was dry after June. The samples taken in June had high Total Phosphorus and Total Suspended Solids levels. The Transparency was lower than most streams in the area. Total Kjeldahl Nitrogen was within the normal range. The high numbers could be due to large amounts of organic matter in the samples.

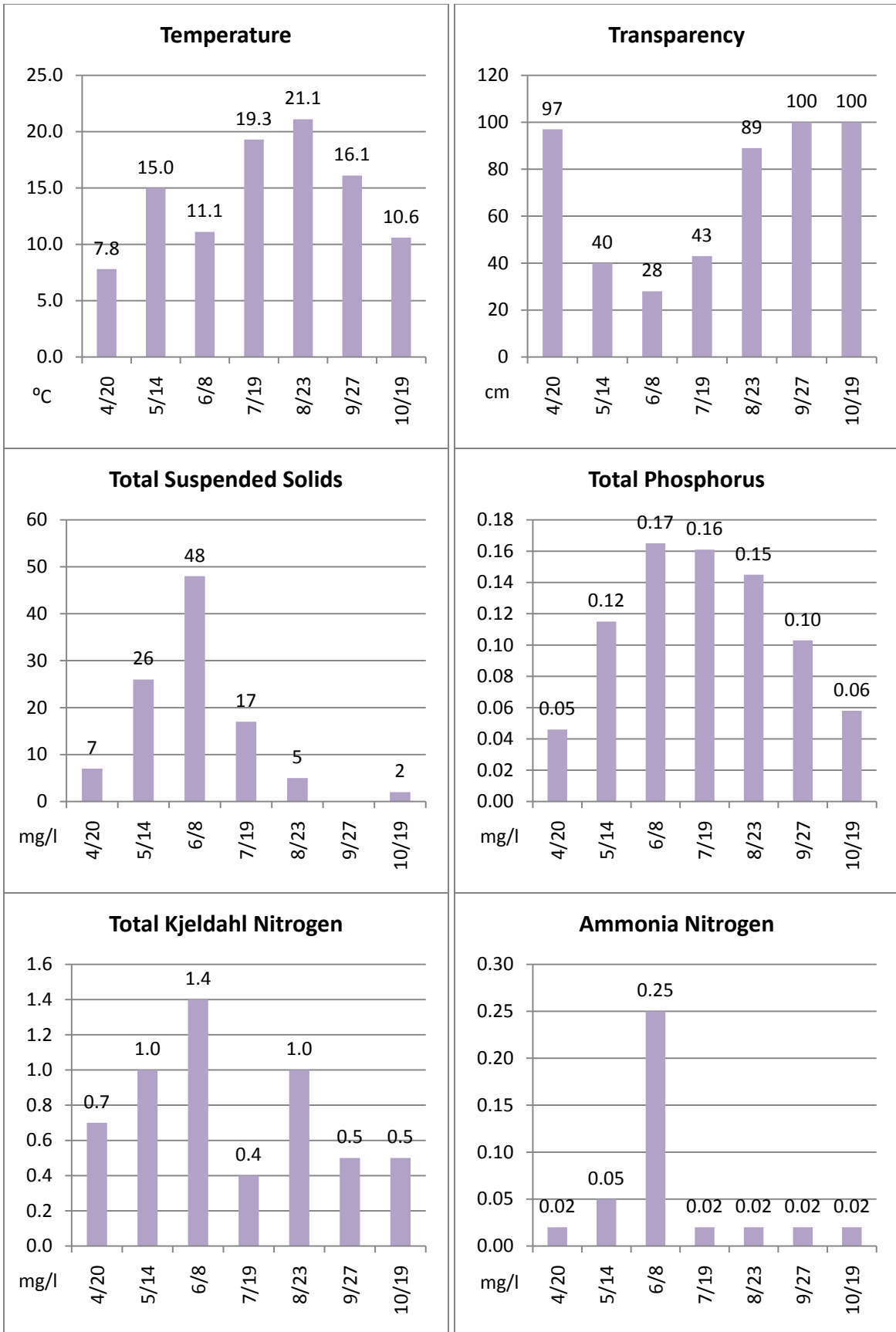


## FISH GCW 11

S005-524 | FISH LAKE CREEK AT COUNTY ROAD 10

The Fish GCW 11 site is near the confluence of Fish Lake Creek and Goose Creek. This stream generally has high flows throughout the year. Total Phosphorus levels were within the range. Transparency was low for 3 samples in the year which correlates with a spike in Total Suspended Solids and Nitrogen levels. Total Kjeldahl Nitrogen levels were on the low end of the range, while all but one Ammonia Nitrogen readings were very low.

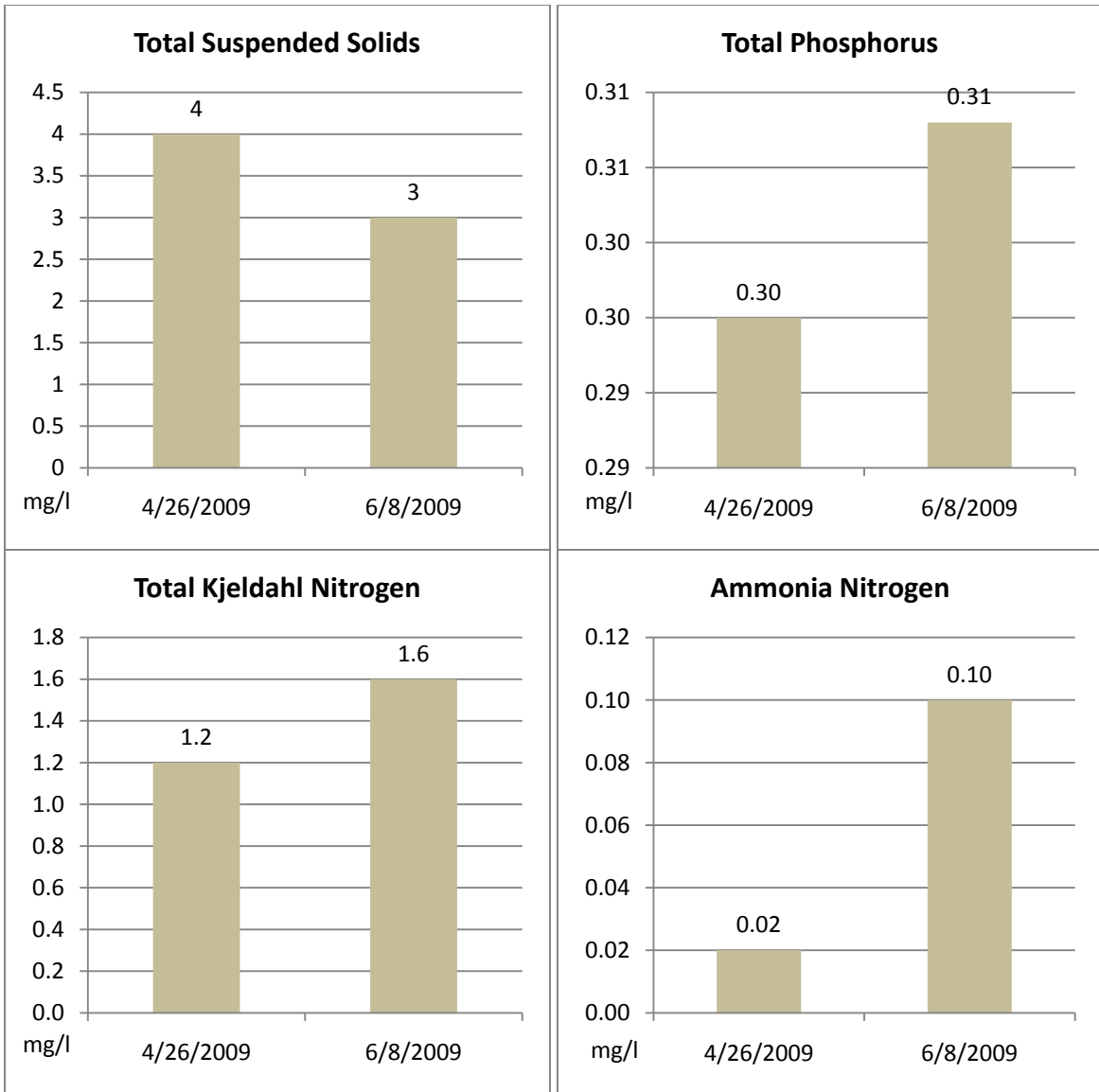
There was a sample taken in November which falls outside of MPCA protocol, therefore was not sent to the lab for analysis.



## GCW 12

S005-525 | UNNAMED DITCH TO GOOSE CREEK AT COUNTY ROAD 9

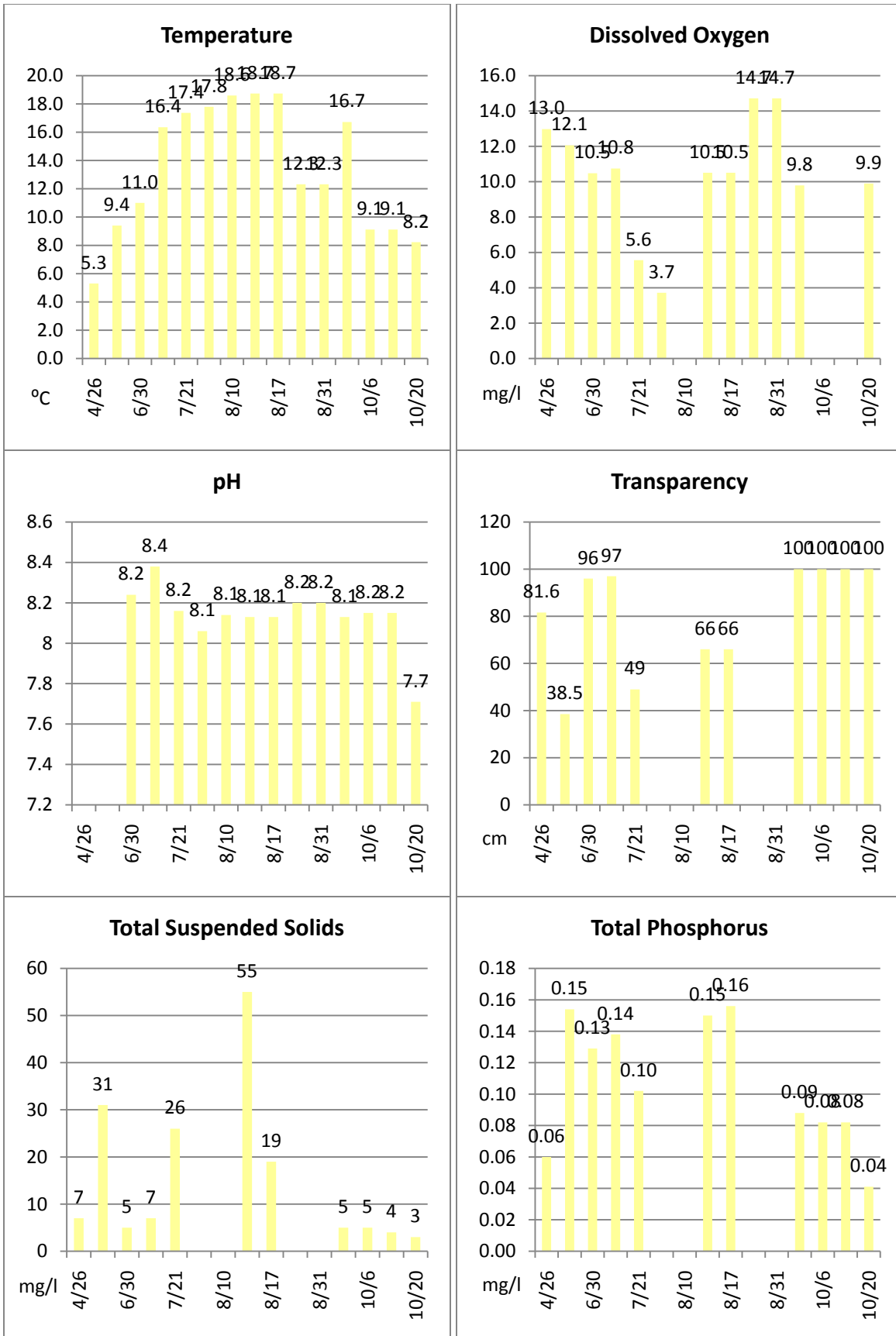
GCW 12 is a small ditch that leaves the Waste Water Treatment Facility for the City of Harris. Water only flows through this ditch during spring runoff, when there is a large rain, or when the Waste Water Treatment Facility outlets. Because of the size of the waste water plant and the amount of inputs to the plant, it rarely outflows – as the population of the City of Harris grows, this water should be monitored more closely. Total Phosphorus levels are very high; this could be due to the small amount of water in the stream, which could be due to organic matter in the water column. The Nitrogen levels are within range. The Total Suspended Solids measurements are very low. After June the stream was dry for the remainder of the monitoring season in 2009.

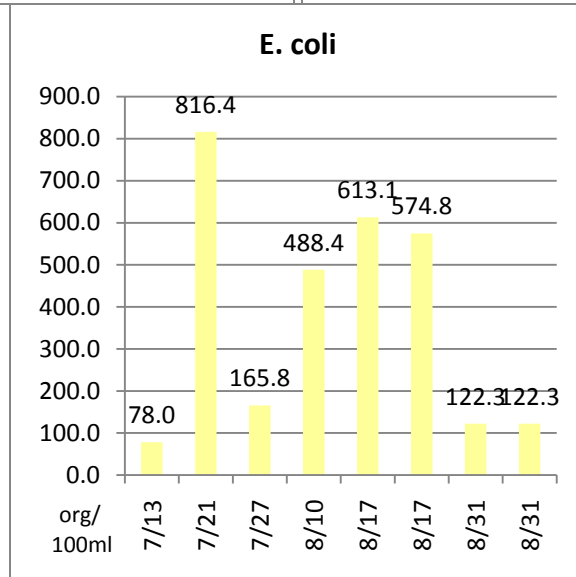
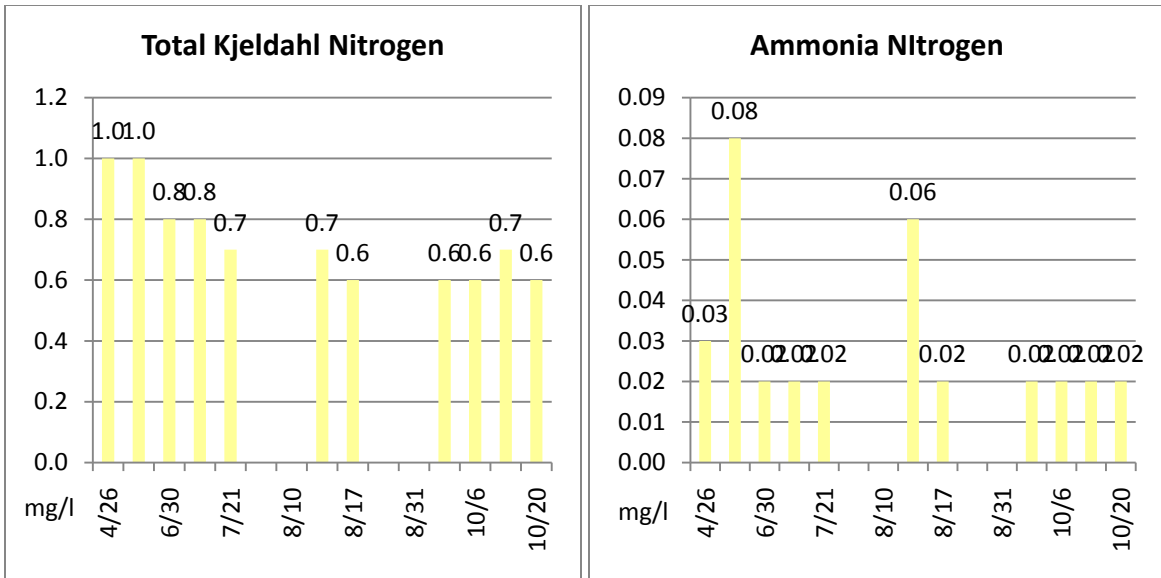


# GC 13

S005-526 | GOOSE CREEK AT HOLMAN AVENUE

GC 13 is the main stem of Goose Creek. High flows were present early in the monitoring season and steady flows continued throughout the season. The field data collected by staff, including Temperature, pH, and Dissolved Oxygen was good and within the expected ranges for Chisago County. All Total Phosphorus levels were within the expected range. 30% of the Total Suspended Solid and Transparency levels are above the expected ranges for Chisago County. Total Kjeldahl Nitrogen and Ammonia Nitrogen levels are low at this site, many of the Ammonia Nitrogen samples were at the lower reporting limit. E. coli bacteria levels are somewhat high at this site. Only 3 of 8 samples meet the E. coli standard for recreation at this location in 2009.

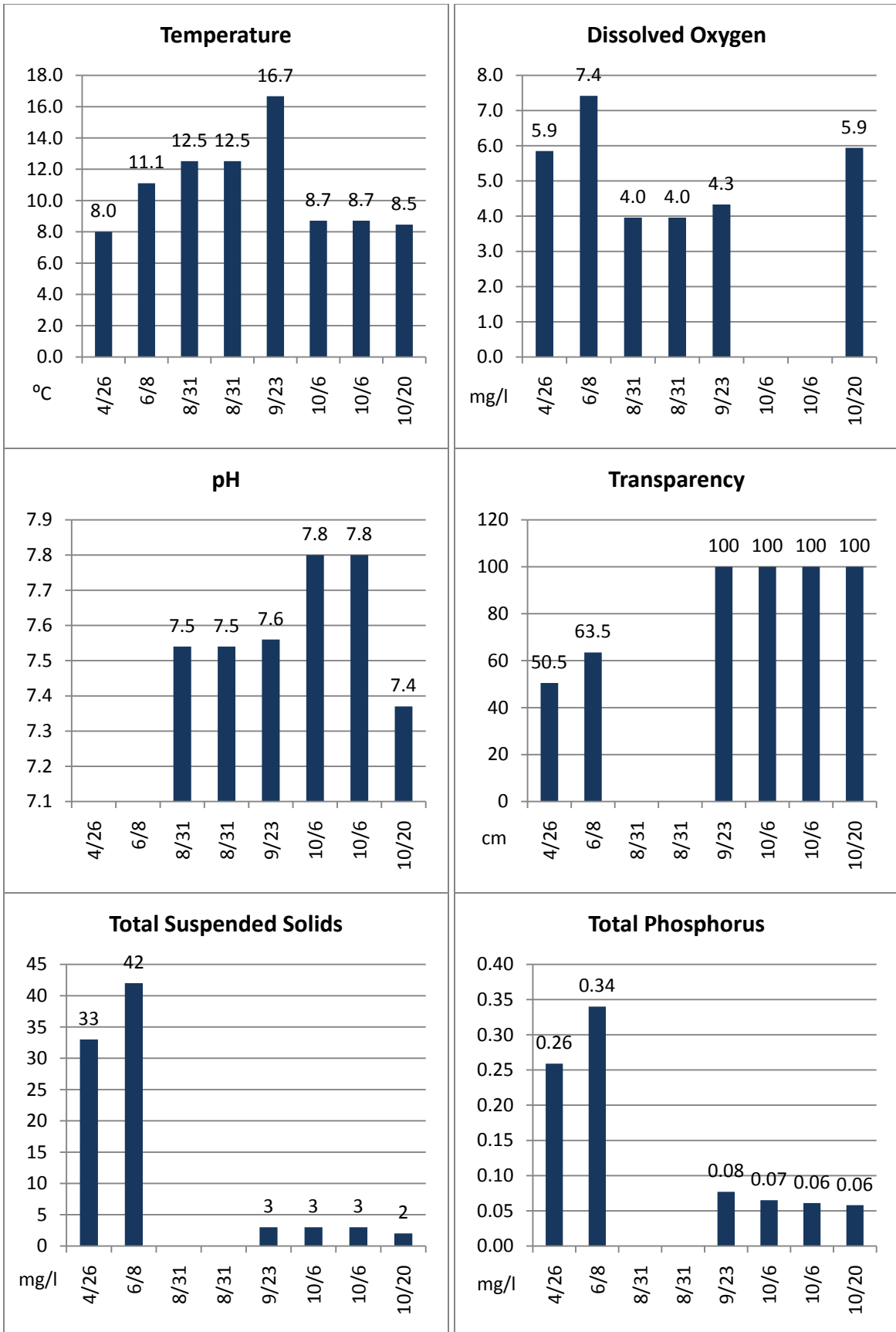


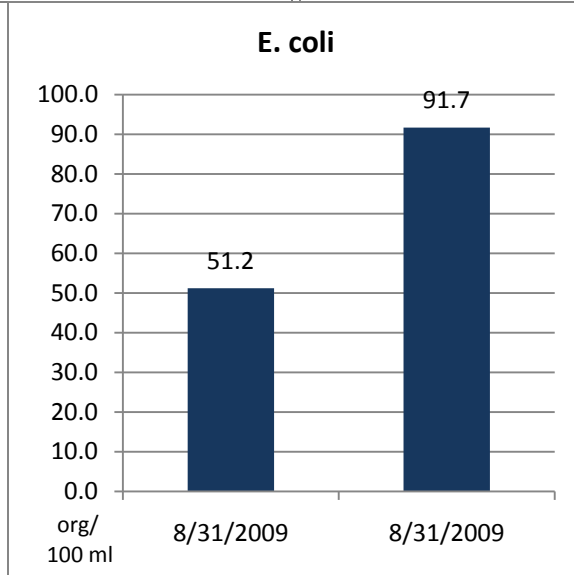
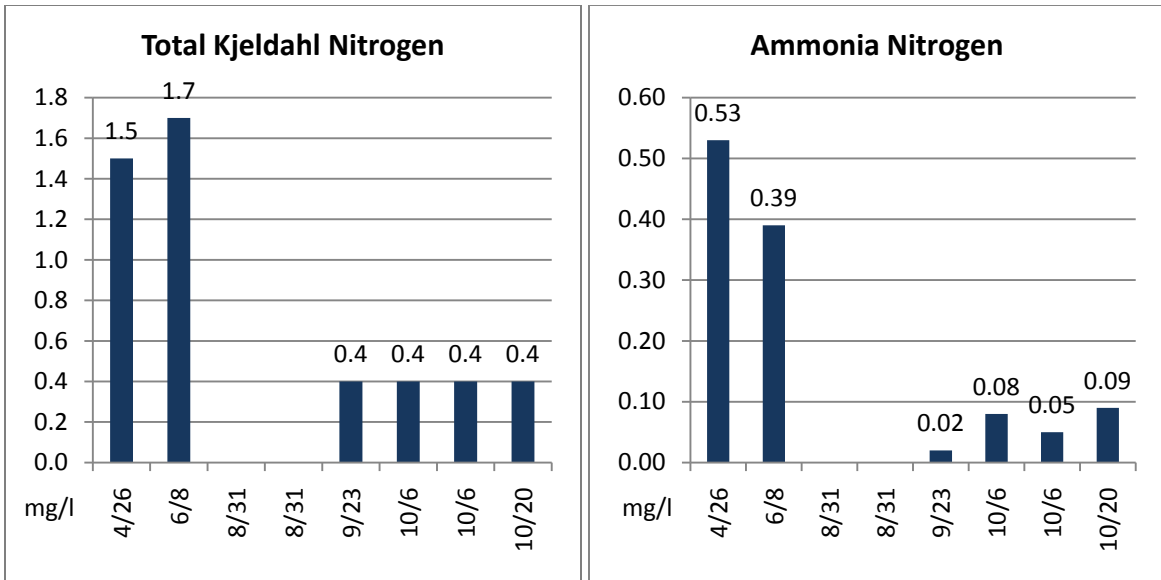


## GCW 14

S005-527 | UNNAMED DITCH TO GOOSE CREEK AT COUNTY ROAD 9

GCW 14 is a private drainage ditch used primarily for irrigation during the growing season. During the growing season this stream is mostly stagnant – therefore, samples in July and August were not taken. Temperature and pH readings were good throughout the monitoring season. Dissolved Oxygen levels were pretty low early in the season and very low later in the season. Total Suspended Solids, Total Kjeldahl Nitrogen and Ammonia Nitrogen levels were high early and low late in the season. This corresponds to Transparency levels being low early and high late in the monitoring season. These levels reported are to be expected on a drainage ditch – they correspond to tillage, planting and crop cover. E. coli bacteria samples were well below the MPCA standard.

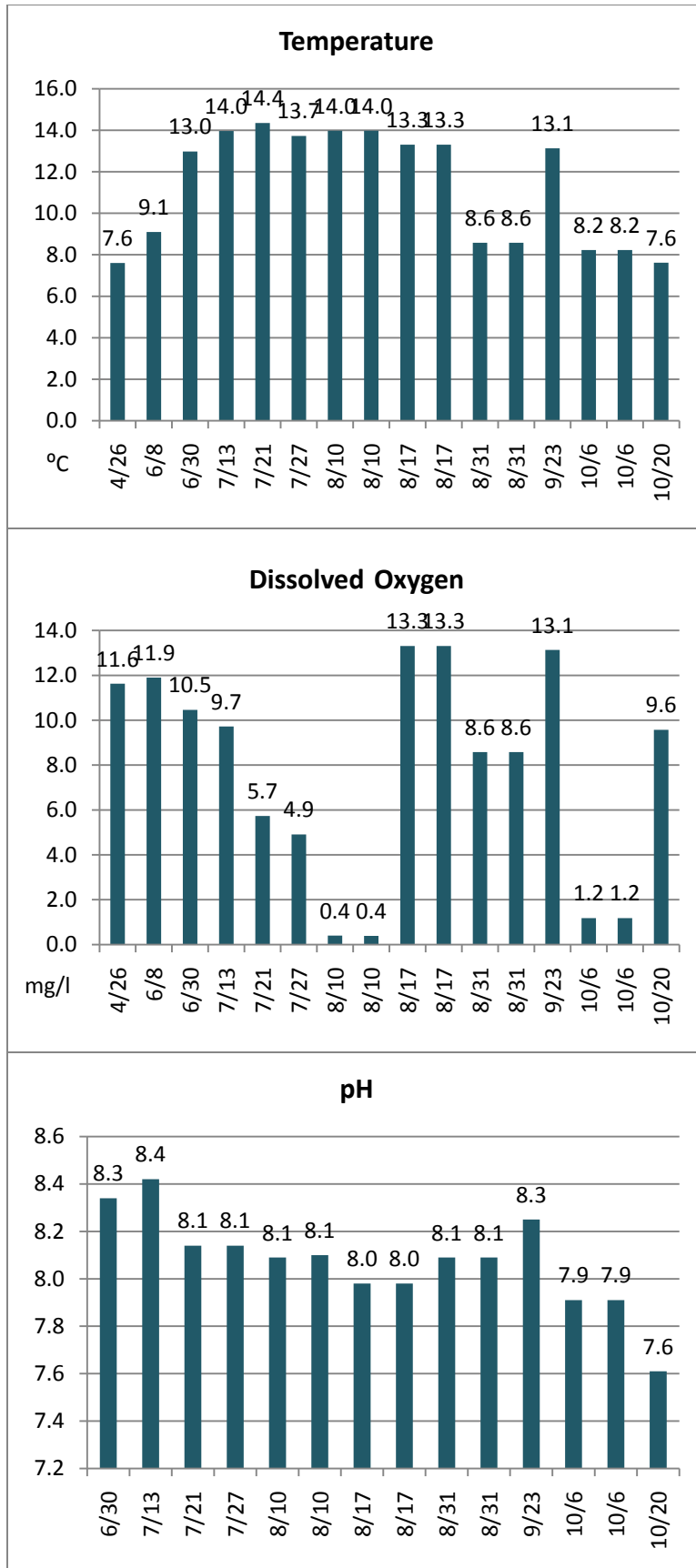


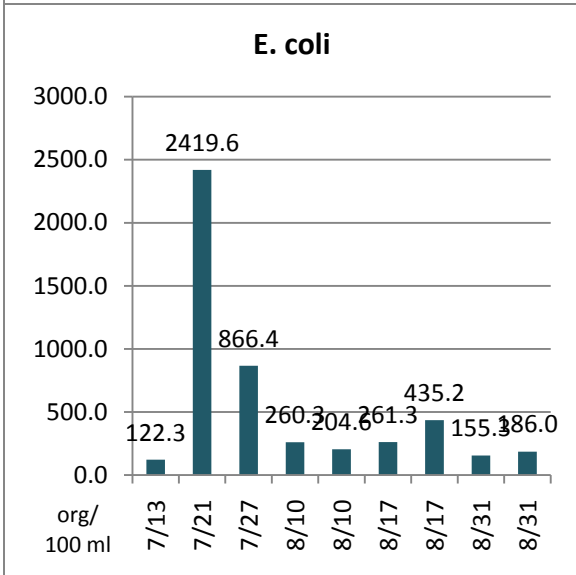
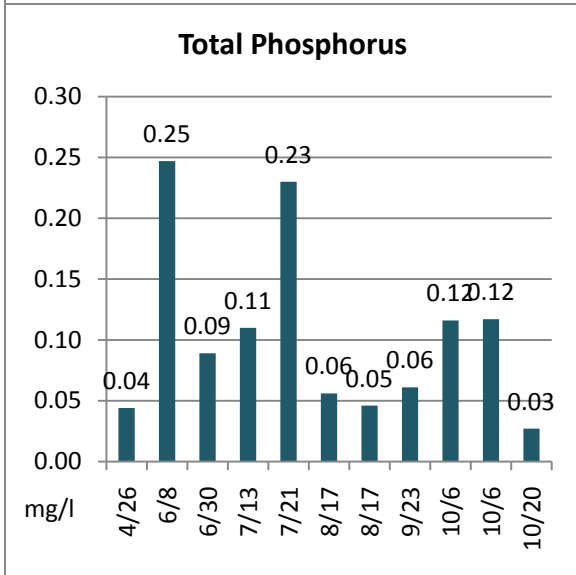
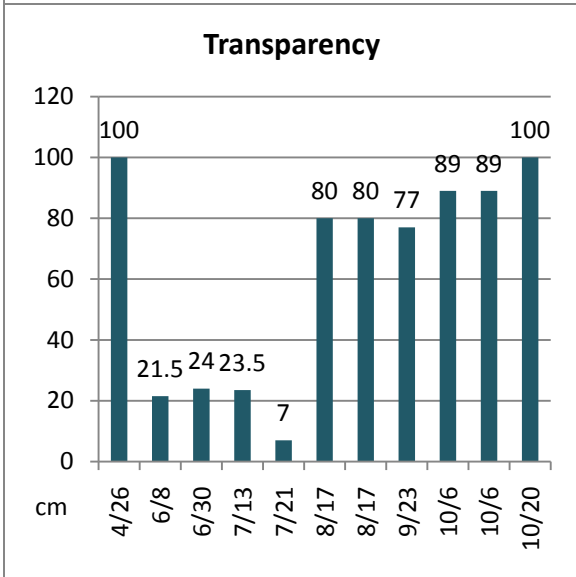
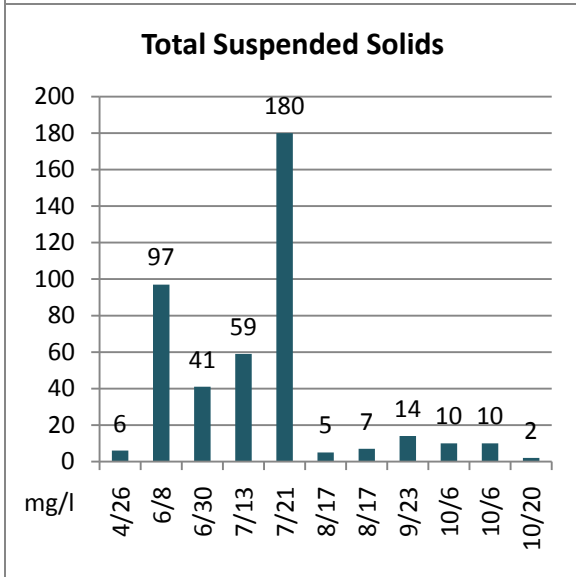
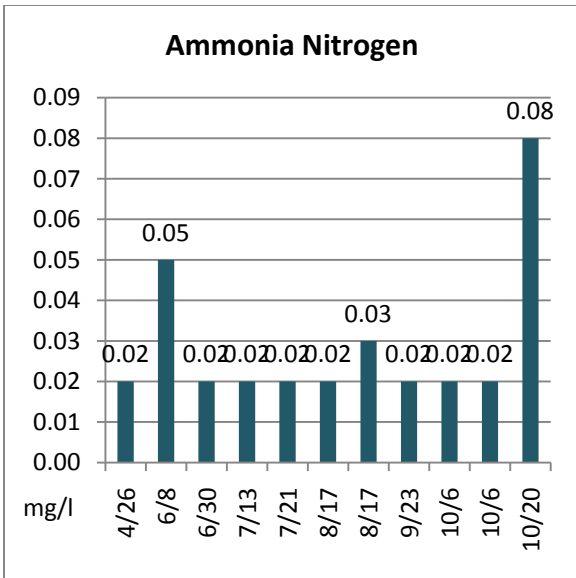
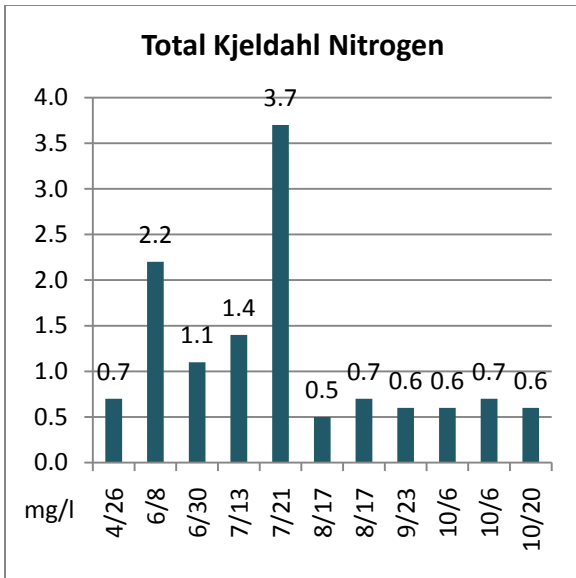


## GCW 15

S005-528 | UNNAMED STREAM AT 475<sup>TH</sup> STREET

GCW 15 comes from a small rural watershed. The majority of the watershed is wooded with many wetlands. Temperature, pH and Dissolved Oxygen levels are mostly within the typical ranges. A few samples for Total Kjeldahl Nitrogen, Ammonia Nitrogen, Total Phosphorus and Total Suspended Solids are high, while most of them fall within the expected ranges. All E. coli levels except one exceeded the MPCA standard and many of them FAR exceed the levels. This watershed has no livestock, new septic systems and no manure applied to fields. The cause of these high E. coli levels is unexplainable without major investigation.





---

## 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.

**Dissolved Oxygen:** The concentration of molecular oxygen ( $O_2$ ) dissolved in water, usually expressed in milligrams per liter (mg/l), parts per million, or percent of saturation. The DO level represents one of the most important measurements of water quality and is a critical indicator of a water body's ability to support healthy ecosystems. Levels above 5 mg/l are considered optimal, and most fish cannot survive for prolonged periods at levels below 3 mg/l. Microbial communities in water use oxygen to breakdown organic materials, such as manure, sewage and decomposing algae. Low levels of dissolved oxygen can be a sign that too much organic material is in a water body.

**Escherichia coli (E. coli):** Escherichia coli, a subgroup of fecal coliform bacteria that is present in the intestinal tracts and feces of warm-blooded animals. It is used as an indicator of the potential presence of pathogens. Although most strains of E. coli are harmless and live in the intestines of healthy humans and animals, the E. coli O157:H7 strain produces a powerful toxin and can cause severe illness.

**pH:** A measure of acidity, with 7 being neutral. Numbers under 7 are acidic and numbers over 7 are alkaline.

**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.



CHISAGO SOIL & WATER CONSERVATION DISTRICT  
38814 THIRD AVE | NORTH BRANCH, MN 55056  
[WWW.CHISAGOSWCD.ORG](http://WWW.CHISAGOSWCD.ORG) | 651/674-2333