

Appendix A

Data Collection Methods

The Holiday-Wing-Rose UAA included the collection and analysis of data from the lake and its watershed. The methods discussion includes:

- Lake water quality data collection
- Ecosystem data collection

A.1 Lake Water Quality Data Collection

In 2008, a representative sampling station was selected (i.e., located at the deepest location in the lake basin) in Lake Holiday, Wing Lake, and Lake Rose. Samples were collected in Holiday Lake, Wing Lake, and Lake Rose approximately monthly between the end of April and middle of September. During August samples were collected biweekly. Table A-1 lists the water quality parameters that were sampled and specifies at what depths samples or measurements were collected. For each lake, dissolved oxygen, temperature, specific conductance, turbidity, pH, and Secchi disc were measured in the field. Water samples from each lake were analyzed in the laboratory for total phosphorus, and chlorophyll *a*. Water samples from Wing Lake were also analyzed in the laboratory for orthophosphate, total Kjeldahl nitrogen, and nitrate + nitrite nitrogen. The procedures for chemical analyses of the water samples are shown in Table A-2. Generally, the methods can be found in Standard Methods for Water and Wastewater Analysis.

For the analyses described in this UAA, the data collected by the Nine Mile Creek Watershed District (NMCWD) was combined with data collected in Wing Lake and Lake Rose in 2008 as part of the Minnesota Pollution Control Agency's (MPCA) Citizen-Assisted Lake Monitoring Program (CLMP). CLMP data was collected from late April through early October at approximately biweekly intervals. Parameters measured included Secchi depth, temperature, total phosphorus, pheophytin, total Kjeldahl nitrogen, and chlorophyll *a*. CLMP data can be obtained through the MPCA's Environmental Data Access (EDA) website: <http://www.pca.state.mn.us/data/eda/>

Table A-1a Lake Holiday Water Quality Parameters (2008)

Parameters	Depth (Meters)	Sampled or Measured During Each Sample Event
Dissolved Oxygen	0, 1.0, 1.5	X
Temperature	0, 1.0, 1.5	X
Specific Conductance	0, 1.0, 1.5	X
pH	0, 1.0, 1.5	X
Secchi Disc	—	X
Total Phosphorus	0 – 1.5 (Composite Sample) ¹	X
Turbidity	0 – 1.5 (Composite Sample)	X
Chlorophyll <i>a</i>	0 – 1.5 (Composite Sample)	X

¹ Second total phosphorus sample taken at depth of 1.0 m on 8/19/08

Table A-1b Wing Lake Water Quality Parameters (2008)

Parameters	Depth (Meters)	Sampled or Measured During Each Sample Event
Dissolved Oxygen	0, 1.0, 1.5	X
Temperature	0, 1.0, 1.5	X
Specific Conductance	0, 1.0, 1.5	X
Oxidation Reduction Potential	0, 1.0, 1.5	X
pH	0, 1.0, 1.5	X
Secchi Disc	—	X
Total Phosphorus	0 – 1.5 (Composite Sample) ¹	X
Orthophosphate	0 – 1.5 (Composite Sample)	X
Total Kjeldahl Nitrogen	0 – 1.5 (Composite Sample)	X
Nitrate + Nitrite Nitrogen	0 – 1.5 (Composite Sample)	X
Turbidity	0 – 1.5 (Composite Sample)	X
Chlorophyll <i>a</i>	0 – 1.5 (Composite Sample)	X

¹ Second total phosphorus sample taken at depth of 1.5 m on 8/5/08

Table A-1c Lake Rose Water Quality Parameters (2008)

Parameters	Depth (Meters)	Sampled or Measured During Each Sample Event
Dissolved Oxygen	0, 1.0, 2.0, 3.0, 3.7	X
Temperature	0, 1.0, 2.0, 3.0, 3.7	X
Specific Conductance	0, 1.0, 2.0, 3.0, 3.7	X
pH	0, 1.0, 2.0, 3.0, 3.7	X
Secchi Disc	—	X
Total Phosphorus	0 – 2 (Composite Sample), 3.0, 3.7	X
Turbidity	0 – 2 (Composite Sample), 3.0, 3.7	X
Chlorophyll <i>a</i>	0 – 2 (Composite Sample), 3.0, 3.7	X

Table A-2. Procedures for Chemical Analyses Performed on Water Samples

Analysis	Procedure	Reference
Total Phosphorus	Persulfate digestion, manual ascorbic acid	Standard Methods, 18th Edition (1992) modified per Eisenreich, et al., Environmental Letters 9(1), 43-53 (1975)
Soluble Reactive Phosphorus	Manual ascorbic acid	Standard Methods, 18th Edition modified per Eisenreich, et al., Environmental Letters 9(1), 43-53 (1975)
Total Dissolved Phosphours		
Total Nitrogen	Persulfate digestion, scanning spectrophotometric	Bachman, Roger W. and Daniel E. Canfield, Jr., 1991. A Comparability Study of a New Method for Measuring Total Nitrogen in Florida Waters. Report submitted to the Florida Department of Environmental Regulation.
Total Kjeldahl Nitrogen		
Nitrate + Nitrite Nitrogen		
Chlorophyll <i>a</i>	Spectrophotometric	Standard Methods, 18th Edition, 1992, 10200 H
pH	Potentiometric measurement, glass electrode	Standard Methods, 16th Edition, 1985, 423
Specific Conductance	Wheatstone bridge	Standard Methods, 16th Edition, 1985, 205
Temperature	Thermometric	Standard Methods, 16th Edition, 1985, 212
Dissolved Oxygen	Electrode	Standard Methods, 16th Edition, 1985, 421F
Turbidity		
Alkalinity		
Phytoplankton Identification and Enumeration	Inverted Microscope	Standard Methods, 16th Edition, 1985, 1002F (2-d), 1002H (2)
Zooplankton Identification and Enumeration	Sedgewick Rafter	Standard Methods, 16th Edition, 1985, 1002F (2-d), 1002H
Transparency	Secchi disc	

A.2 Ecosystem Data Collection

Ecosystem describes the community of living things within Lake Cornelia and their interaction with the environment in which they live and with each other. During June through September 2004, and again in June through September 2008, ecosystem data collection included:

- Phytoplankton – A composite 0-2 meter sample was collected during each water quality sampling event described in the previous section.
- Zooplankton – A zooplankton sample was collected (i.e., bottom to surface) during each water quality sampling event described in the previous section.
- Macrophytes – Macrophyte surveys were collected during June and August 2008.

Phytoplankton and zooplankton samples were identified and enumerated to provide information on species diversity and abundance. The macrophyte community was surveyed to determine species location, composition, and abundance.