

**Protocols for the collection of pre-treatment data accepted by the Minnesota Department of Natural Resources (MnDNR) for the MnDNR grant program “Pilot projects to control curly-leaf pondweed or Eurasian watermilfoil on a lake-wide basis for ecological benefits” in 2007**

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**Protocols for pre-treatment aquatic plant data collection**

**Point-intercept sampling:**

Timing of surveys

One survey should be done in mid-June when curly-leaf pondweed is near its maximum biomass. If early-season large-scale curly-leaf pondweed treatments are done on the lake then the first survey should be done no later than a week after the treatment, which would likely be in mid – May. An additional survey should be done in August when native plants and Eurasian watermilfoil are growing abundantly.

Point- intercept sampling method

This method requires the creation of a regular grid of sample points over an orthorectified map or aerial photo of the lake. Number each sample point and download the locations of these points into a GPS unit to allow for navigation to each sample point in the field. **The MN DNR will create the sample grid to use for the survey and provide it as an electronic file to the surveyor.** These sample points should be used for each sample date. The number of sample points and sampling grid spacing will vary depending upon the size of the lake. In general a minimum 125 sample points will be located in the actual, as opposed to legally defined, littoral zone of the lake and the maximum distance between adjacent points in the sample grid will be 300 feet.

At each of these points, measure water depth (using an electronic depth finder for depths greater than 8 feet, or depth stick for depths less than 8 feet) and record all plant taxa retrieved on a plant hook or observed within a one square meter sample site. The plant hook should be constructed from a double-headed garden rake tied onto the end of a rope at least 25 feet long. Identify taxa to species level if possible with the sample recovered on the rake or observed in the water.

At each sample point record: the sample point number, the sample depth, the plant taxa observed, and the estimated abundance of each taxon.

Estimate the abundance of each species using the following ranking system:

1 =  $\leq$  1/3 of the rake head, 2 =  $1/3 <$  Plants filling  $\leq$  2/3 of the rake head, 3 = Plants filling  $>$  2/3 of the rake head, 4 = Plants over the top of the rake (Figure 1).

The observed maximum depth of vegetation growth will likely vary between the sample dates. Surveyors do not have to survey sample points that are more than one inter-point distance deeper than the deepest observed vegetation, but they must survey at least one interval deeper than where vegetation was found (Figure 2). In addition, when surveying on the second sample date surveyors must sample all points at least as deep as the depth sampled on the first sample date.

Collect voucher specimens for each taxon identified. Press these samples and label pressed samples with a standard herbarium label. Instructions on how to press an aquatic plant are available from the MN DNR.

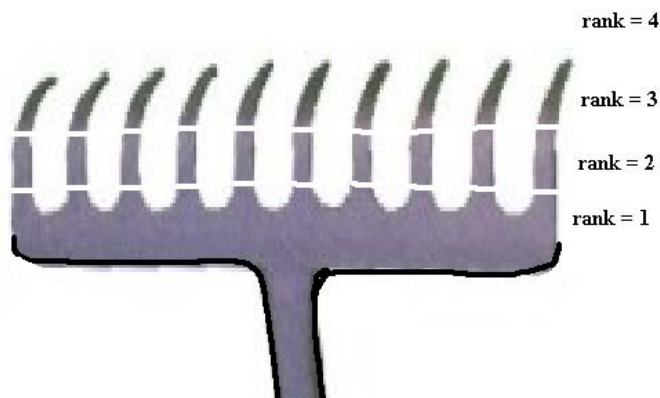


Figure 1. Abundance estimates based on plants recovered on the sampling rake.

### Data analysis and reporting

Report the frequency of occurrence of each species found in the survey and the combined frequency of: native submersed aquatic plants, all submersed aquatic plants, and all species found. Frequency of occurrence is calculated as the number of points in which a taxon (or combined taxa) occurred divided by the total number of points sampled. Do not include sample points that were deeper than the maximum depth where plants were found.

Report the average number of submersed native species at each sample point, and the average number of all submersed species at each sample point. Report a standard error with these averages.

Report the observed maximum depth of vegetation growth.

### Electronic data

Provide electronic copies of all original data to include the GPS coordinates of the sample points, including those at which no plants were found. This can be in a database or spreadsheet format.

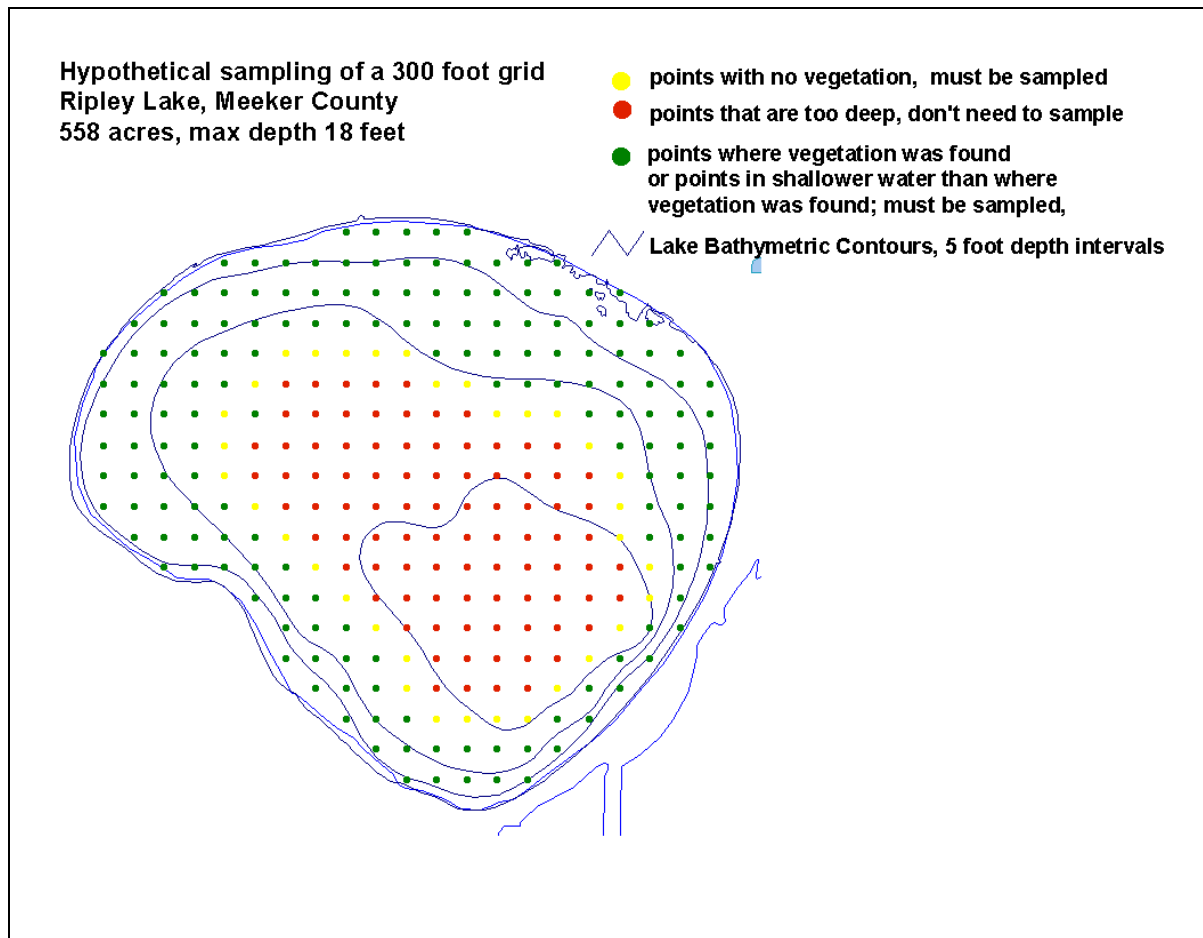


Figure 2. Map showing those points that must be sampled and those points that do not have to be sampled for a hypothetical survey of Ripley Lake.

### **Reference**

Madsen, J. D. 1999. "Point intercept and line intercept methods for aquatic plant management." *APCRP Technical Notes Collection* (TN APCRP-M1-02). U.S. Army Engineer Research and Development Center, Vicksburg, MS.  
[www.wes.army.mil/el/aqua](http://www.wes.army.mil/el/aqua)