



## DEPARTMENT OF ENVIRONMENTAL QUALITY PROCEDURES FOR AQUATIC VEGETATION SURVEYS

These aquatic vegetation survey procedures have been designed to ensure easily replicable surveys of aquatic plant communities. The methods are easy to use, and they are flexible enough to be used on many different types of lakes, regardless of the extent of littoral zone and shoreline sinuosity. The individual(s) using these methods should be proficient in the identification of aquatic plants. For a listing of recommended aquatic plant identification reference materials, contact the Aquatic Nuisance Control and Remedial Action Unit.

A survey is carried out by sampling individual Aquatic Vegetation Assessment Sites (AVAS's) throughout a lake's littoral zone. The locations of AVAS's are determined by dividing up a lake's shoreline into segments approximately 100 to 300 feet in length. Each AVAS is sampled by using visual observations, dependent upon water clarity, and weighted rake tows. Each separate plant species found in each AVAS is recorded along with an estimate of each species' density. Plant species are identified by numbers designated on the survey map's plant species list, and densities are recorded by using the following code:

- (a) = **found**: one or two plants of a species found in an AVAS, equivalent to **less than 2%** of the total AVAS surface area.
- (b) = **sparse**: scattered distribution of a species in an AVAS, equivalent to **between 2% and 20%** of the total AVAS surface area.
- (c) = **common**: common distribution of a species where the species is easily found in an AVAS, equivalent to **between 21% and 60%** of the total AVAS surface area.
- (d) = **dense**: dense distribution of a species where the species is present in considerable quantities throughout an AVAS, equivalent to **greater than 60%** of the total AVAS surface area.

AVAS's should not be confined solely to a lake's shoreline. In cases where a lake possesses an extensive littoral zone, additional AVAS's should be drawn out near the extent of submergent vegetation growth. This can be done by drawing transect lines divided in proportion to the shoreline AVAS's or by inserting individually drawn boxes with their dimensions proportional to the shoreline AVAS's (see attached sample map). AVAS's should also be drawn around the shoreline of any islands if present.

### PRE-SURVEY PROCEDURES

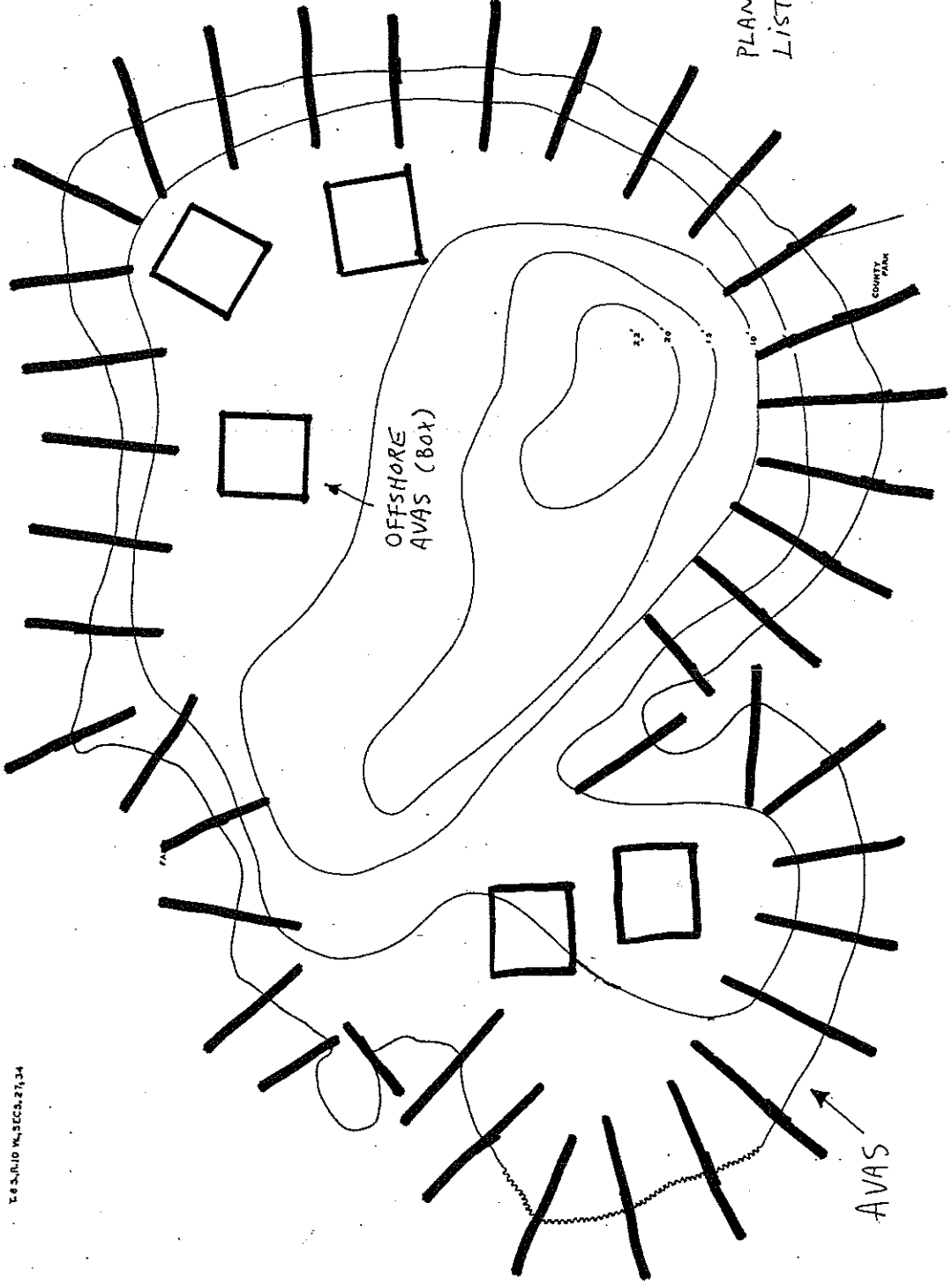
- A. Obtain a map of the lake to be surveyed. Bathymetric maps are preferred; however, if bathymetric maps cannot be located, enlarged copies of United States Geological Survey topographical maps may be used. If a pre-drawn map of the lake does not exist, hand-drawn maps will suffice, as long as they accurately depict the shape of the lake and are drawn to scale. Make a larger format (11" x 17") photocopy of the lake map for ease of editing and survey recording.
- B. Designate the location of the separate AVAS's by drawing lines perpendicular to the lake shoreline (see the attached sample map) every 100 to 300 feet. Keep the AVAS lengths consistent throughout the lake, and add any additional AVAS's where necessary, based upon lake bathymetry. If additional AVAS's are not added at this time, they may be added during the actual survey, based upon current lake conditions.
- C. Attach a copy of a plant species list identifying common species of aquatic plants directly to the survey map. This list should include either the common or scientific names of common aquatic plants corresponding to a specific number for each separate species. The corresponding numbers will be used to record the presence of a species in an AVAS.
- D. Make several copies of the completed lake map for future use, to maintain consistency, and in case multiple maps are necessary during the survey due to inclement weather.

## FIELD SURVEY PROCEDURES

- A. Initiate the survey by determining your exact location on the lake. It is helpful to take this time to familiarize yourself with the dominant plant species of the lake that you are surveying. Do this by making several rake tows and identify all of the species found. Morphological variations occur in several species of aquatic plants due to differing lake conditions and hybridization; therefore, identification to species can be difficult. If specific identification is unattainable, group similar species, such as thin leaf pondweeds (*Potamogeton spp.*) or native milfoils (*Myriophyllum spp.*).
- B. Begin the survey by recording the date, time, weather conditions, your name, names of assistants, and any other pertinent information directly on the survey map.
- C. Locate the beginning AVAS, and survey each successive AVAS by documenting the presence and density of both emergent and submergent aquatic plants. Drive the survey boat in a zig-zag pattern through each AVAS so that a majority of each AVAS can be effectively surveyed. It is important to make use of rake tows even in clear water, since many low-growing species of submergent plants are not readily noticeable by visual observation alone.
- D. Document each species found utilizing the corresponding plant species list number and the appropriate density code. Repeat this for each separate AVAS until all of the AVAS's have been surveyed. If an AVAS is found to be void of any vegetation, record "none" in the respective location on the survey map. Include these AVAS's in the final AVAS count when summarizing the survey data. If an AVAS is dominated by emergent vegetation to the point that boat access is impossible, document the plant species present and draw the extent of the edge of the emergent vegetation as it extends out into the lake.

## SURVEY SUMMARY PROCEDURES

- A. Number each AVAS sequentially from beginning to end on the survey map. Record the density codes for each species found on the attached Standard Aquatic Vegetation Assessment Site Species Density Sheets. Each AVAS number corresponds to the column numbers found on the attached Standard Aquatic Vegetation Assessment Site Species Density Sheets.
- B. Sum the numbers of each of the separate density codes for each of the plant species found on the Standard Aquatic Vegetation Assessment Site Species Density Sheets and transfer these totals to the appropriate columns 1 through 4 (A, B, C, and D) on the attached Standard Aquatic Vegetation Summary Sheet.
- C. Multiply these totals by the appropriate constants (A = 1, B = 10, C = 40, and D = 80) and transfer the calculations to the calculations columns 5 through 8.
- D. Add the results of these calculated columns (5, 6, 7, and 8) for each species and transfer the totals to column 9.
- E. Divide the values of column 9 by the total number of AVAS's surveyed (column 10), and transfer these values to column 11. These values represent the cumulative cover percentages for each of the plant species found in the survey. Make sure that you use the total number of AVAS's surveyed on the lake for column 10 and not the total number of AVAS's where each individual plant species was found.
- F. Write a summary of the notes recorded during the field survey and attach it to the completed species density and summary sheets, along with the survey map and any other survey documentation.



- 1 Eurasian milfoil
- 2 Cury leaf pondweed
- 3 Chara
- 4 Hornwort
- 5 Field pondweed
- 6 Floating leaf pondweed
- 7 Prostrate pondweed
- 8 Variable pondweed
- 9 Ruckers pondweed
- 10 Lemna pondweed
- 11 Arisaema pondweed
- 12 Papyrus pondweed
- 13 Papyrus pondweed
- 14 Water stargrass
- 15 Wild celery
- 16 Sparganium
- 17 Northern milfoil
- 18 M. verticillatum (Gray)
- 19 M. verticillatum (Gray)
- 20 Coon tail
- 21 Eelgrass
- 22 Brodiaea vulgaris
- 23 Brodiaea vulgaris
- 24 Brodiaea vulgaris
- 25 Southern reed
- 26 Southern reed
- 27 Sparganium
- 28 Sparganium
- 29 Sparganium
- 30 Nymphaea
- 31 Nymphaea
- 32 Nymphaea
- 33 Nymphaea
- 34 Nymphaea
- 35 Nymphaea
- 36 Nymphaea
- 37 Nymphaea
- 38 Nymphaea
- 39 Nymphaea
- 40 Nymphaea
- 41 Nymphaea
- 42 Nymphaea

Survey personnel:  
 Survey date:  
 Survey time:  
 Conditions:  
 Transparency:  
 Water color:

A = Found - < 2% coverage per AVAS  
 B = Sparse - 2-20% coverage per AVAS  
 C = Moderate - 21-100% coverage per AVAS  
 D = Dense - 61-100% coverage per AVAS  
 AVAS = Aquatic Vegetation Assessment Site

- 1 Eurasian milfoil
- 2 Cury leaf pondweed
- 3 Chara
- 4 Hornwort
- 5 Field pondweed
- 6 Floating leaf pondweed
- 7 Prostrate pondweed
- 8 Variable pondweed
- 9 Ruckers pondweed
- 10 Lemna pondweed
- 11 Arisaema pondweed
- 12 Papyrus pondweed
- 13 Papyrus pondweed
- 14 Water stargrass
- 15 Wild celery
- 16 Sparganium
- 17 Northern milfoil
- 18 M. verticillatum (Gray)
- 19 M. verticillatum (Gray)
- 20 Coon tail
- 21 Eelgrass
- 22 Brodiaea vulgaris
- 23 Brodiaea vulgaris
- 24 Brodiaea vulgaris
- 25 Southern reed
- 26 Southern reed
- 27 Sparganium
- 28 Sparganium
- 29 Sparganium
- 30 Nymphaea
- 31 Nymphaea
- 32 Nymphaea
- 33 Nymphaea
- 34 Nymphaea
- 35 Nymphaea
- 36 Nymphaea
- 37 Nymphaea
- 38 Nymphaea
- 39 Nymphaea
- 40 Nymphaea
- 41 Nymphaea
- 42 Nymphaea
- 43 Nymphaea

PLANT SPECIES LIST

