

## **PROCEDURE FOR MONITORING AN AQUATIC PLANT PROBLEM<sup>1</sup>**

The density, diversity, and growth patterns of aquatic plants are unique to each lake. Therefore, many of the details concerning sample site locations and other sampling aspects should be worked out on a lake specific basis.

Described below are general procedures for mapping the distribution of aquatic plants, collecting plant species, and determining the relative density of plant beds at select sites.

### **TASK 1: Confirm sampling day and weather conditions**

Sampling can be conducted at anytime during daylight hours when conditions are appropriate. Flexibility in both the day and time is allowable, especially in consideration of weather conditions.

Common sense and good judgment will dictate when it is appropriate to sample. Under no circumstances should you be on the water during electrical storms, high winds or other unsafe conditions. If such conditions exist, the trip should be postponed until the unsafe conditions subside.

#### Elements of Task 1

- ✓ Check the sampling date on your sampling schedule.
- ✓ Check the current and forecasted weather and decide if the conditions allow for safe sampling. [You should reconfirm this decision after personally inspecting lake conditions before launching the boat and beginning the sampling trip.]

### **TASK 2: Go through a boating safety equipment checklist**

Before leaving shore, confirm that all the needed safety equipment is on board the boat. Boating safety is a subject that everyone needs to take seriously. While on the water, you will be moving around the boat, leaning over the edge and working with equipment and anchors. It is recommended that a wearable type of life preserver (Type 1, 2 or 3 personal floatation device) be worn at all times. You should also understand boating law and the “rules of the road” before embarking on a sampling trip.

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<sup>1</sup> By Rick Mc Voy, MA DEP. The information on aquatic plant monitoring procedures is taken, with some modifications, from Simpson, J. T. 1991. Volunteer Lake Monitoring: A Methods Manual. EPA 440/4-91-002.

### Elements of Task 2

- ✓ Confirm that the following boating safety equipment is on board the sampling boat.
  - Personal floatation devices (PFDs) for each person on board. They should be Coast Guard approved, in serviceable condition, and of proper size.
  - First aid kit.
  - Other equipment that may be required by state and local laws. For example, some boats may be required to carry fire extinguishers and sound producing devices. Also, the boat should be registered according to state and local laws.

### **TASK 3: Go through the sampling equipment and supply checklist**

Before leaving shore, confirm that you have all the necessary sampling equipment.

### Elements of Task 3

- ✓ Confirm that the following sampling equipment is on board the sampling boat.
  - Anchor
  - Fathometer, leadline, or calibrated anchor line
  - Weighted rake with throwing line
  - Plastic bags for plant specimens labeled with a plant type number, the lake name, the date, and the site location.
  - Newspaper
  - Clipboard and pencils
  - Maps of the lake with sampling sites marked
  - Sampling job description
  - Data recording sheets

#### **TASK 4: Mapping the location of aquatic plants**

For this task you must take a tour of the lake shoreline and observe areas of the lake where aquatic vegetation is present; either below, near or at the surface. The elements listed below (and in Task 5) should be considered options for monitoring depending on project objectives or the observer's level of interest and/or training. One or all of them may be combined during a single trip or done on successive trips to the lake.

##### Elements of Task 4

- ✓ Slowly move the boat along the designated shoreline area and, using a clean copy of the lake map, draw a sketch showing the extent of the vegetation beds. Note whether plants are below or near the surface (submerged), at the surface (floating), or projecting above the surface (emergent).
- ✓ Using the scale on the map, estimate the length and width of significant plant beds. If available, a "rangefinder" device can be useful for this exercise.
- ✓ For any significant plant beds estimate the areal coverage of the plants as either sparse (0-25% cover), moderate (>25-50% cover), dense (>50-75% cover), or very dense (>75-100% cover). [NOTE: Cover is determined by imagining that all of the vegetation in the water column, at any given site, is projected to the surface and then approximating what percentage of the surface would be covered with vegetation.] Areas of differing coverage can be denoted on the map as follows: sparse areas with no markings, moderate areas with stippling, dense areas with hatched lines, and very dense areas with cross-hatched lines (see attached example).
- ✓ To keep a record of which species (or type) of plants occur most commonly within the lake (frequency of occurrence) first mark a series of planned observation sites on the map. This is best done before going out in the boat. Thirty (30) or more sites, depending on the size of the lake, should be marked at fairly uniform intervals throughout the lake (both shallow and deeper plant beds) to get a representative sampling. During the course of the shoreline survey, stop at each of these sites and record (sample form attached) which species (or type) are located at that site. Frequency of occurrence for each plant species can be calculated as a percentage of the total number of sites observed.
- ✓ A more specific mapping of the exact location of plant species (or types) can be performed during the shoreline survey by marking on a copy of the lake map. It is best to develop a code for each species or type in order to

fit them on the map. If the same type of mapping is planned for future dates make sure that the code is maintained or confusion will result.

**TASK 5: Collection of plant species and estimation of plant density at a specific site**

Locate an appropriate sampling site (preferably with the aid of a monitoring program official) and establish an imaginary transect line perpendicular from the shore. Following along this line at specific intervals, cast a weighted rake to the lake bottom and pull up aquatic vegetation.

This vegetation will be sorted and you will make a qualitative estimation of the percentage and density of plant types found. Specimens of each type will be bagged for shipment to a botanist for identification.

Elements of Task 5

- ✓ Move to the designated sampling position and anchor.
- ✓ Measure the lake depth using a fathometer, leadline, or calibrated anchor line.
- ✓ Confirm that the throwing line is securely attached to the weighted rake at one end and to the boat at the other end.
- ✓ Facing the shore, pitch the weighted rake straight ahead (the 12:00 position) to a distance about six feet from the boat.
- ✓ Allow the rake to settle to the lake bottom and then pull the line so that the teeth of the rake drag along the bottom of the lake.
- ✓ Bring the rake back into the boat, remove all the vegetation trapped on the teeth, and sort the different plant types into separate piles so that they can be identified as Plant Type #1, #2, etc.
- ✓ Mark on the data sheet (example attached) the approximate percentage of each plant type found, making sure the percentages add to 100%.
- ✓ Repeat the raking procedure at the 3:00, 6:00, and 9:00 positions; each time sorting the vegetation types into separate piles arranged so that they can be identified as Plant Type #1, #2, etc. and marking the percentages for each haul on the data sheet.
- ✓ Mark on the data sheet the rate of recovery of each of the plant types. [See chart on the attached example data sheet. If a plant type is found in all four casts and each time the teeth of the rake are full, mark 5. If it is found moderately on all four casts, mark 4. If the plant type was found in only three of the four casts, mark 3, and so on.]

- ✓ Remove a few healthy specimens from each of the sorted piles of plant types, shake off excess water and place them in a properly labeled collection bag for processing on shore. Avoid collecting immature plants and, if possible, include the entire plant as the specimen (i.e., stems, leaves, roots, flowers and/or fruits). By doing the survey during the peak of the growing season the flowers and/or mature fruits can be collected. These are important for identification of the plants.
- ✓ Move the boat along the transect line to the next sampling point and repeat the above elements. The total number of sampling points should be predetermined, preferably with aid from a monitoring program official.
- ✓ If practical, keep all collected plant fragments in the boat for proper disposal on land; many nuisance species reproduce from fragments.

#### **TASK 6: Delivery of samples and forms**

This task requires packing and forwarding the plant type samples to a program botanist for identification. In addition, the data sheet with the density rating for each plant type and sampling observation must be sent to the coordinating organization for analysis.

##### Elements of Task 6

- ✓ Once you have returned to shore, remove each specimen from the collection bag and carefully wrap it in several layers of paper (newspaper should be satisfactory). Submerge the wrapped specimen in water and return it to the collection bag, ensure that the bag is properly marked, and seal the bag securely.
- ✓ Refrigerate bags in the interim before delivery to a program botanist. They may be kept for several days in this manner.
- ✓ Deliver the specimens as soon as possible to a program botanist for identification.
- ✓ Send copies of the sampling information data sheets to the program coordinator for analysis.





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### Aquatic Macrophyte Sampling Form

Lake Name: \_\_\_\_\_

Transect Line No. \_\_\_\_\_

Density Rating Chart

Sampling Date: \_\_\_\_\_

Position on Transect Line \_\_\_\_\_

<b>Rake Recovery of Aquatic Plant Type</b>	<b>Density Rating</b>	<b>Descriptive Term</b>
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Sampling Time: \_\_\_\_\_

Taken in all 4 Casts <i>(teeth of rake full)</i>	5	Dense
Taken in 4 casts	4	Heavy
Taken in 3 casts	3	Moderate
Taken in 2 casts	2	Scattered
Taken in 1 cast	1	Sparse

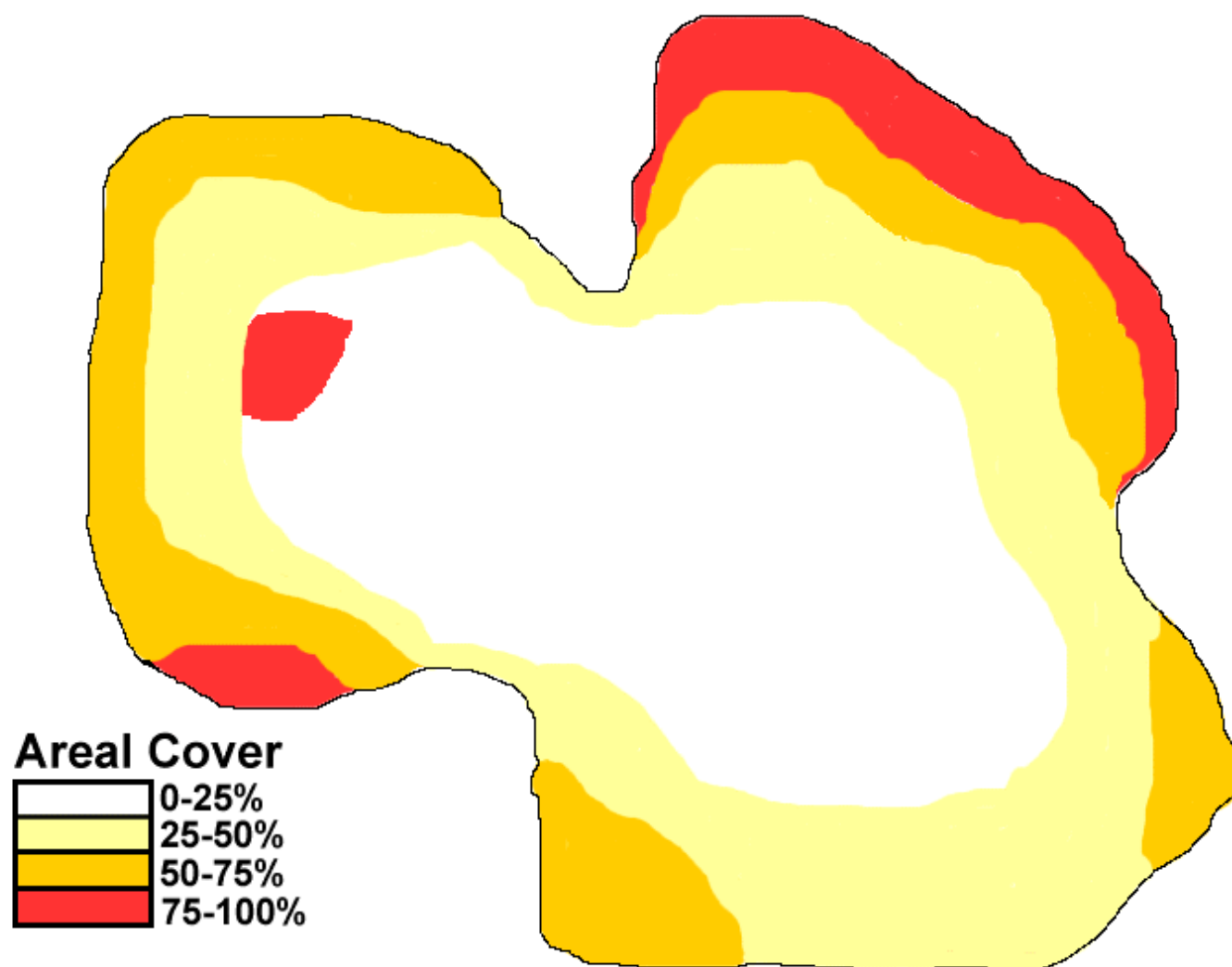
Names of Volunteers: \_\_\_\_\_

Lake Depth \_\_\_\_\_



	12 o'clock position % of Recovery	3 o'clock position % of Recovery	6 o'clock position % of Recovery	9 o'clock position % of Recovery	Density Rating (1-5)
Plant Type #1					
Plant Type #					
Plant Type #					
Plant Type #					
Plant Type #					
Plant Type #					
Plant Type #					
<b>TOTAL</b>	100%	100%	100%	100%	

## Aquatic Macrophyte Areal Coverage



## **AQUATIC PLANT IDENTIFICATION TEXTS**

Fassett, N.C. 1957. A Manual of Aquatic Plants. University of Wisconsin Press. Madison. [Currently out of print, but may be available at some libraries.]

Hellquist, C.B. and Crow, G.E. 1980-85. Aquatic Vascular Plants of New England: Parts 1-8. New Hampshire Agricultural Experiment Station. University of New Hampshire. Durham. [Best bet for New England identifications. Each volume covers from one to five families of aquatic plants. Unfortunately, not all families of aquatic plants are covered, but it does include most common ones.]

Hotchkiss, N. 1972. Common Marsh, Underwater, and Floating-leaved Plants of the United States and Canada. Dover Publications, Inc. New York.

## **AQUATIC PLANT IDENTIFICATION AND MONITORING ASSISTANCE**

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