Appendix B2

Invasive Species Detection Survey Method for Ponds

This document describes the method used by WI DNR to survey ponds <5 acres in size for aquatic invasive plants. during the summer of 2012, as part of the GLRI Live Organisms in Trade Grant. Some modifications to the proposed method were made during implementation, and are incorporated here. This was created by Kelly Wagner and some alterations were made by Anna Moyer to make it more appropriate for the Milwaukee County Parks DNR invasive species grant

Description of method

Water bodies were surveyed with both a visual search and spot sampling with a double-headed rake sampler or dip net. The search areas were oriented in equidistant concentric rings from shore 3m apart. Three meters was our estimated effective search width (1m on each side of the boat, 1m obscured by the boat) for a visual detection of a submerged aquatic plant and animals in the substrate. Surveys completed using waders had both observers able to search a 3m wide swath. The first navigation ring was placed right along the edge of the pond, and we searched the water to one side and 1m of shoreline to the other side (see Appendix A). Both observers visually searched for invasive aquatic species submerged, floating, or immersed: the front observer searched a 3 meter strip perpendicular to the front of the boat, while the rear observer searched 1 meter on both sides of the boat. Subsequent rings to the center of the pond were placed 3m apart until no more rings could be made. In larger ponds, where more than 6 rings were required, the monitoring stopped after the 6th ring. Slow travel is preferred as it increases the visual coverage of the area.

In addition, random rake and dip net samples were taken on the water body to supplement the visual search. A rake sample consisted of placing the double-headed rake on the pond bottom and dragging it for approximately one meter. A dip net sample consists of dragging a dip net for a meter shallowly through the substrate. For drier/dry ponds rings were placed as usual at the edge of the pond (not at the edge of the water) and surveyed visually on foot, with rake tows only in the survey rings with water.

The size of the pond determined the minimum number of rake tows needed: for every 0.1 acre at least 1 rake tow will be taken and searched for NR40 and watch species. Additional rake tows were taken in each search ring under conditions of low visibility, as follows:

Clear visibility (bottom visible) – 1 rake tow/0.1 acre
Medium visibility (some plants visible, bottom not visible) – 3 rake tows/0.1 acre
Zero visibility (no plants visible, bottom not visible) – 5 rake tows/0.1 acre

Note that because the visibility depends both on the ability to see to the bottom and the ability to see plants, a zero visibility situation can arise in turbid water or in deep water where you cannot see plants or the bottom (since plants may be growing out of view).

Rake and net samples/visual search were not continued beyond a survey ring where no plants were found on the entire ring. See Appendix B for examples on how to calculate the number of points needed for a waterbody.

This survey methodology yields a probability of detection (POD) of:

	Clear Vis – 1x	Med Vis – 5x	Zero Vis – 5x
Individual Plant	87.2%	55.2%	0.3%
Small Patch (12 sq m)	88.6%	80.2%	55.9%
Large Patch (120 sq m)	100.0%	100.0%	100.0%

The probability of detection (POD) was calculated for the visual surveys using the inverse cube function (Koopman 1946 and 1980 cited in Cacho et al. 2006) because we navigated search areas along equidistant, parallel lines. The POD for the rake surveys was based upon the proportion of the water body raked.

We labeled each survey ring A (shoreline ring), B, C, etc. towards the center of the water body. In each survey ring we recorded in what ring each population was found in, and the density of the population at that spot. At the end of the survey we recorded how many rings each species was found in, and the mean density of the species for the pond.

Implementation Notes

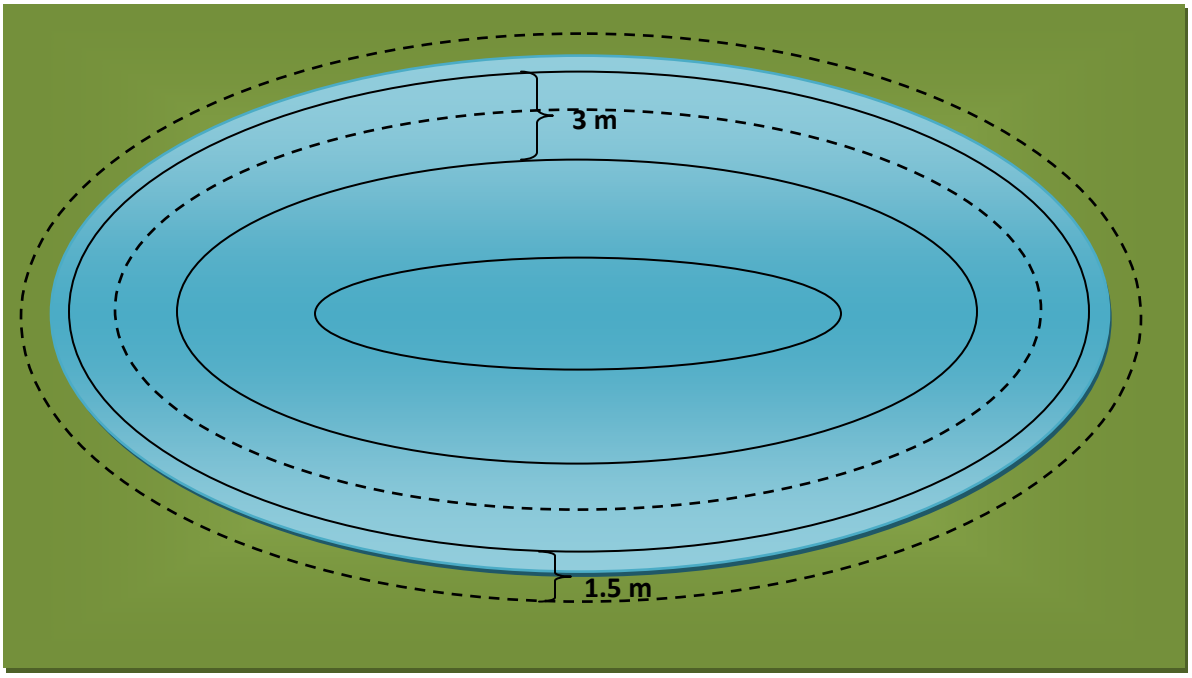
1) We attempted to pre-set search rings and random sample points using GIS but found it was difficult to carry GPS equipment (plus rake and clipboard) while trying to wade through deep muck. Additionally, a very sensitive GPS unit such as a Trimble would need to be used, even when traversing in a canoe, due to the slow rate of movement and precision needed. Estimate location of rings visually or using a map, for odd shaped ponds use the measurement of the widest width of the pond to estimate the number of rings.

2) It is enormously easier to survey with the canoe than by waders. Launch a canoe whenever possible, even on tiny ponds.

References

Cacho, O.J., D. Spring, P. Pheloung, and S. Hester, 2006. Evaluating the feasibility of eradicating an invasion. Biological Invasions 8:903-917.

(Appendix A)



Search track (path of observers)

Survey Ring A

(Appendix B)

(Examples use the 1,5,5x rake tow resolution)

Example 1: 2 acre water body, decent visibility.

1) Estimate the number of rings you will need (can be done with GIS or on the water). Ex: 3 rings
2) Divide total acreage by 0.1 acre: 2/0.1 = 20 points minimum
3) Divide the total number of points by the estimated number of rings to get the minimum number of points per ring: 20/3=6.6 (7) rake tows each ring
4) While doing the survey rings determine your water clarity for each ring and use the multiplier to determine the actual number of rake tows to take per ring
    a. Ring A, clear, 7*1=7 rake tows
    b. Ring B, medium vis, 7*5=35 rake tows
    c. Ring C, medium vis, 7*5=35 rake tows

    Total number of rake tows = 77

Example 2: 3 acre water body, poor visibility.

1) Estimate the number of rings you will need (can be done with GIS or at the pond). Ex: 5 rings
2) Divide total acreage by 0.1 acre: 3/0.1 = 30 points minimum
3) Divide the total number of points by the estimated number of rings to get the minimum number of points per ring: 30/5=6 rake tows each ring
4) While doing the survey rings determine your water clarity for each ring and use the multiplier to determine the actual number of rake tows to take per ring
    a. Ring A, zero vis, 6*10=60 rake tows, but no plants found
    b. Ring B, zero vis, no survey needed
    c. Ring C, zero vis, no survey needed
    d. Ring D, zero vis, no survey needed
    e. Ring E, zero vis, no survey needed

    Total number of rake tows = 60