Aquatic Vegetation Survey for
Lake Roaming Rock, Roaming Shores, OH

Prepared for:

The Roam Rock Association

Prepared by:

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July2, 2010

1.0 Introduction

Lake Roaming Rock is a 550-acre lake located in Ashtabula County in Northeast Ohio. It has a highly developed shoreline and is used intensively for recreation and fishing. An impoundment of a section of Rock Creek and portions of the associated Plum Creek and Sugar Creek tributaries form the lake and the continuous flow of water allows for nutrient input from up river and resultant sedimentation to occur. In addition, runoff from the lawns and other activities around the lake add to the lake's nutrient load. This allows for a more fertile lake substrate on which a variety of aquatic plants can establish. Most of these plants are native and provide habitat and resources for fish and waterfowl. However, non-native aquatic plants, such as the exotic Eurasian watermilfoil (*Myriophyllum spicatum*), can quickly out compete the native plants and interfere with recreation, decrease property values, and damage the ecology of the lake.

Without careful monitoring and management, beautiful lakes can become unsightly and unpleasant. An understanding of potential aquatic plant problems is one of the first steps in the process of effectively managing any water body. This can be achieved through regular lake-wide plant surveys. At the request of the Roam Rock Association, EnviroScience Inc. conducted a detailed aquatic vegetation survey on June 7 and 8, 2010, to assess the present conditions of the plant community within Lake Roaming Rock.

2.0 Project Objectives and Review of Available Information

The major objective of the aquatic plant survey is to determine the condition, density, and distribution of the native plant community in the reservoir. The survey also focuses on exotic and possibly invasive plants species suspected of being present in the lake. Collected data serves as a baseline for future surveys. Finally, the report generated outlines available treatment and control options and

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the collected data forms the basis for recommendations for future aquatic plant management efforts.

As a first step in the project, in the late Spring of 2010, EnviroScience met with members of the Lake Management Committee (LMC) to discuss prior year activities and conditions. EnviroScience also met with Aqua Doc Lake and Pond Management of Chardon, Ohio, the only herbicide applicator authorized by the LMC to work on Lake Roaming Rock.

These discussions revealed that the Summer of 2009 was characterized by very heavy nuisance plant growth in many of the coves and shallow areas of the lake. Nate Robinson, Aqua Doc's project manager stated that the major nuisance species being treated was Coontail, with localized populations of Eurasian watermilfoil also being present.

At the present time, nuisance aquatic plant treatment is primarily the responsibility of the individual property owner. The Association owns and operates a mechanical weed harvester and this has been used to augment efforts by individual lot owners to clear some of the coves of nuisance vegetation.

Notwithstanding the Association's limited harvesting efforts, each lot owner may also hire the LMC-selected contractor on an annual basis to treat nuisance aquatic plants around their dock and water front. This treatment has generally involved application of a contact herbicide such as Diquat which provides short-term, but fast treatment.

In the Fall of 2009, the Association drew down the lake level by approximately 8 feet to facilitate dock maintenance and sediment removal from several coves. Although this drawdown was expected to inhibit plant growth for much of the 2010 season, the LMC felt that conducting a plant survey in early summer was important for several reasons. The first of these was to establish a baseline for

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all aquatic plant management efforts and to determine the exact composition of the macrophyte community. An early summer survey was also deemed necessary because a number of homeowners had already contracted with Aqua Doc for 2010 treatments and there was a desire on the part of both the homeowners and the contractor to start any necessary treatments as early as possible.

3.0 Aquatic Vegetation Survey Methods

Aquatic vegetation survey procedures used by EnviroScience are patterned after those developed by the Michigan Department of Environmental Quality contained in the Standard Procedures for Surveying Aquatic Plants. The survey is designed to ensure easily replicable surveys of the existing aquatic plant communities.

The survey is carried out by sampling individual Aquatic Vegetation Assessment Sites (AVAS's) throughout out the lakes' littoral zone (i.e. areas where water depth is <20 feet). The locations of the AVAS's are determined by dividing up the lake's shoreline into segments approximately 100 to 300 feet in length. Each AVAS is sampled by using visual observation (depending on water clarity), and weighted rake tows. Each plant species observed as well as an estimate of density are recorded on a Standard Aquatic Vegetation Assessment Site Species Density Sheet (AVAS) developed by the State of Michigan (App. B). On the AVAS density sheets the approximate percent cover was reported rather than narrative ranges. On the summary sheet, however, these percentages were translated into cover codes A, B, C, and D to describe the approximate coverage of each plant within the AVAS area, as outlined in the following table.

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Cover Code	Approximate Cover Range
A	1-2%
B	3-20%
C	21-60%
D	61-100%

4.0 Survey Results

Due to the poor water clarity on June 7 and 8, visual surveys between rake tows could not be performed. Severe storms prior to those dates caused the water to be chalky and lake water levels were above normal. Rake tows were performed at specific sites around the lake, most within the littoral zone with some in the middle of large coves and the lake proper. Species to be classified were placed in a plastic bag, appropriately labeled, and identified using taxonomic keys at the completion of the survey. The location of each AVAS was determined using differential GPS technology. Lake Roaming Rock was divided into 190 AVAS sample locations as part of this survey (Figure 1).

The June survey identified 10 different aquatic plant species: 7 submersed and 3 floating-leaved species. The plants found at each location are listed in Appendix A. Only two exotic species were found during the survey. The first is Eurasian watermilfoil, which was found in 11 AVAS locations, making up 1.9 percent cumulative cover (CC). (App. B. Table 3). The second exotic species is Brittle naiad, which was found at 8 AVAS locations (4.4 CC) is considered noxious and invasive in some other states, therefore, future monitoring of the densities of this plant are warranted.

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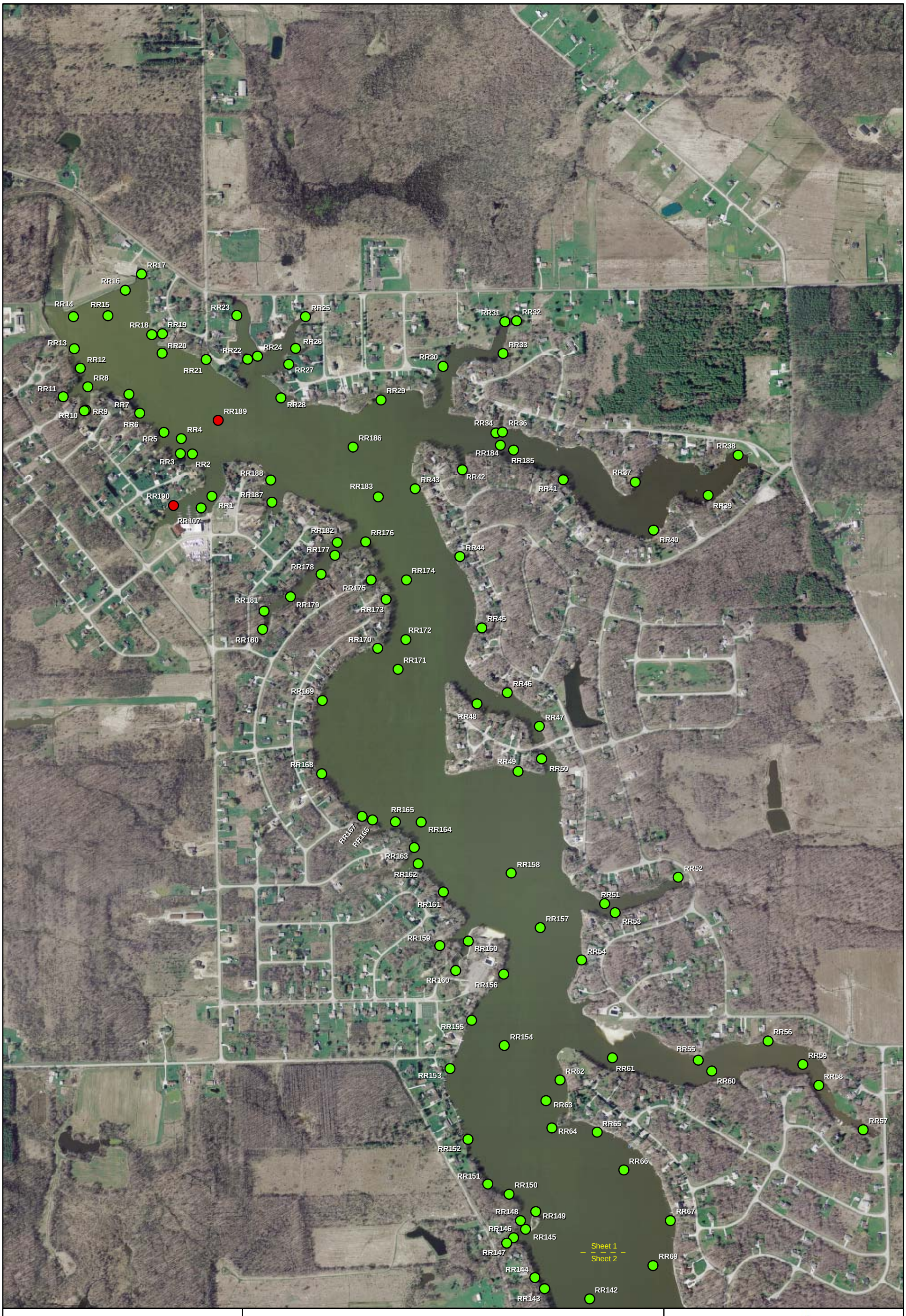

Figure 1. Transect Locations.
Lake Roaming Rock.
May 2010. Sheet 1 of 2.

Transect Location

- EWM Absent
- EWM Present

500 250 0 500 Feet

150 75 0 150 Meters

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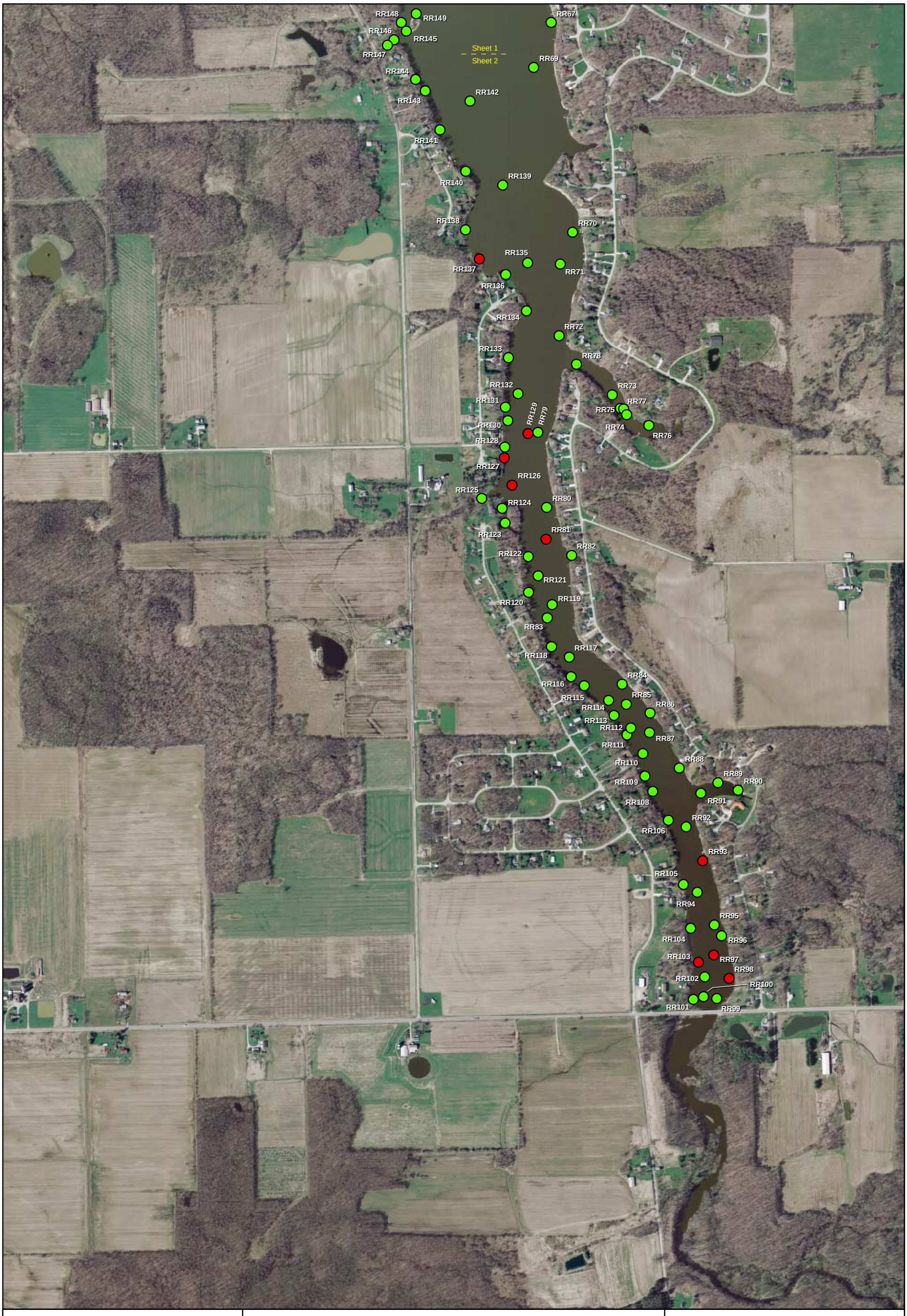

Figure 1. Transect Locations.
Lake Roaming Rock.
May 2010. Sheet 2 of 2.

Transect Location

- EWM Absent
- EWM Present

500 250 0 500 Feet

150 75 0 150 Meters

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According to the calculated cumulative cover (CC) value, the dominant native plant species in Lake Roaming Rock is Coontail (12.3 CC), found in 70 of the 190 AVAS. Other submersed native plants were found less frequently. These include species such as Small pondweed (2.7 CC), Long leaf pondweed (4.0 CC), Common waterweed or Elodea (1.0 CC).

Floating leaf native plants include White water lily (6.6 CC) and Spadderdock (1.0 CC), along with Small duckweed (1.0 CC).

Due to high water levels and the highly developed shoreline with many man-made seawalls, no emergent native plants were collected in rake tosses.

5.0 Discussion

As noted above, the survey was conducted relatively early in the growing season. This coupled with the heavy drawdown the previous winter makes it clear that the condition of the aquatic plant community at the time of the June 7-8 survey was not representative of the typical condition or the situation that concerned the LMC and many lake residents the previous summer. Despite this, meaningful conclusions can be drawn and recommendations for action can be made.

At the present time, Coontail is the dominant member of the plant community. Information from Aqua Doc indicates that this was also the major nuisance during the summer of 2009. Coontail is a completely submersed plant commonly seen in lakes with moderate to high nutrient levels. It is generally a dark, olive green color, and is often rather hard and crusty to the feel. This is especially true where it grows in hard water lakes (the calcium in the water becomes deposited on the leaf surface, making it seem crunchy). Coontail spreads to new areas either through germination of its seeds, or by regrowth of stem fragments. Coontail does not produce roots, instead it absorbs all the nutrients it requires from the

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surrounding water. If it is growing near the lake bottom, it will form modified leaves which it uses to anchor to the sediment. However, it can float free in the water column, and sometimes forms dense mats just below the surface. Because it gets nutrients from the water, it grows best where these nutrient levels are high. It will also tolerate a wide range of water hardness, cool temperatures, and low light conditions. Because Coontail overwinters as an evergreen plant, this species provides important habitat to many invertebrates and fish year- round. Waterfowl feed upon both foliage and fruits. Coontail is found throughout North America.

A major species of concern for the homeowners of Lake Roaming Rock is Eurasian watermilfoil (EWM) due to its invasive potential and tendency to dominate plant communities in northern lakes. At the time of the survey, the EWM was found in 11 / 190 locations and in a sparse density. The native aquatic plant community in Lake Roaming Rock at the time of the survey was dominated by Coontail. At high densities it can form surface mats that resemble EWM beds. That coupled with similarities in leaf structure and overall appearance can create the deception that a lake is infested with the exotic EWM when in fact it is not. This type of misidentification can lead to improper management choices, in particular, the application of herbicides at rates determined for EWM that will not help control some native plants. Expert plant identification is the key to determining the proper plant management strategy for any waterbody.

A healthy lake ecosystem will be the positive outcome of proper lake management. A variety of methods are currently available for controlling nuisance aquatic plants. These include physical, mechanical, chemical, and biological methods. All aquatic plant management techniques have positive and negative attributes. Selection of a method needs to be based on economic, environmental, technical, and sometimes regulatory constraints.

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5.1 Control Techniques

Control techniques of nuisance aquatic plants include biological, chemical, mechanical/physical and cultural methods. One important consideration in making management decisions is to recognize that the idea of complete eradication of nuisance aquatic plants is typically unrealistic except in exceptional circumstances. Once a species becomes established in a foreign place, the goal should be detection and management to levels that do not cause ecological, societal or economic impacts. Management plans should ultimately be chosen based on an individual lake's environmental conditions. EnviroScience's 2005 comprehensive report entitled "Lake Diagnostic Study and Management Plan Development for Lake Roaming Rock" provides a framework for basing future management decisions. An overview including advantages and disadvantages of control methods will be discussed below in order to guide management decisions at Lake Roaming Rock.

Biological Control

Biological control of aquatic weeds is typically associated with invertebrate herbivores. For example, Eurasian watermilfoil has been shown to be controlled through several different biological control agents. These include the milfoil weevil, an aquatic beetle (*Euhrychiopsis lecontei*); the naturalized milfoil moth, which has an aquatic larval stage (*Acentria ephemerella*); the milfoil midge (*Cricotopus myriophylli*); and a native caddisfly (*Oecetis* sp.). Thus far, the milfoil weevil has shown the most promising results of control of Eurasian watermilfoil, which is supported by both academic and private research. Other species of insects can be effective at controlling infestations of additional invasive species, such as purple loosestrife. The immediate benefit of a biocontrol program is that it reduces the amount of chemicals (an environmental pollutant) used to control the weed. Well-designed biocontrol programs can also be

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sustainable over the long term. As biocontrol agents grow in numbers, control may be more effective. However, that being said, fluctuations in the agent's effective population size are not predicable, so results can vary from lake to lake and year to year. Also the culturing of biocontrol agents is a labor intensive process, thereby making the implementation of such programs in the initial years seemingly more costly than other forms of aquatic macrophyte management.

Another form of biological control is the introduction of grass carp, an herbivorous fish. Although grass carp can be effective at reducing vegetation in some lakes, Eurasian watermilfoil is not the preferred food source for grass carp. Therefore, the beneficial native macrophyte community is generally completely consumed first, which ultimately increases turbidity in the lake. Additionally, because rooted aquatic macrophytes stabilize lake nutrients, the removal of such plants entirely can result in the increased suspension of sediment and nutrients, causing increasingly frequent algal blooms. Lake Roaming Rock has already employed the use of grass carp in the past, and it was not beneficial to the system. Therefore, this technique is not recommended.

Chemical Control

Many different aquatic herbicides are used to control nuisance aquatic vegetation. Chemical herbicides can have an immediate, observable effect in the reduction of biomass. However, many of these herbicides have one or more aquatic use restrictions that limit the availability of the waterbody for recreation, agriculture/gardening, and livestock watering for from 1 to 30 days. Although many herbicides are purported to be selective, over-use or inappropriate choice of herbicide can have non-target effects on native macrophytes as well as on aquatic invertebrate and fish populations. Therefore, judicious use of aquatic herbicides

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through targeted spot treatment, rather than lake-wide application, could be integrated into a management plan at Lake Roaming Rock, if and when other options are not available or feasible for one or more reasons.

"Contact herbicides" kill the portion of the plant that they come in contact with. Contact herbicides generally work quickly on the treated portions of the plant. However, these types of herbicides will leave the root system of the plant intact and therefore allow for future regrowth. "Systemic herbicides" are those chemicals that penetrate the plant tissue and are translocated throughout, therefore they are capable of killing the entire plant. In any case, herbicides cannot eradicate aquatic nuisance plants but only offer short-term control. The results are continued costly annual treatments. Seven herbicide compounds are registered for use in aquatic systems. The following paragraphs briefly summarize the use characteristics and restrictions association with the five most commonly used for Eurasian watermilfoil (EWM) control.

- **Diquat dibromide – i.e. Reward®** , **RedWing®-** is a non-selective contact herbicide that can act within a very short time, causing a rapid die-off of the plant shoots. It is restricted for use in some water bodies because it will bind to particulate and dissolved organic matter. *The label on the Reward® container states that it is toxic to invertebrates. Research has shown that it also is moderately toxic to practically nontoxic to birds and slightly toxic to fish.* The EPA requires a 14-day interval between treatment of water with diquat dibromide and use of treated waters for domestic, livestock, or irrigation purposes. Swimming, fishing, and watering of domestic animals should not be allowed for at least 14 days after application of the herbicide to water.
- **Fluridone – i.e. Sonar®** is a fairly-selective systemic herbicide used to treat dicot species like Eurasian watermilfoil. It is slow acting and must be in contact with plants at low concentrations for up t 60 days to

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be effective. This feature alone makes it very difficult to use in flowing water or in lakes and reservoirs having fast flushing rates. According to the manufacturer, lake water containing Sonar used at the maximum-labeled rate (150 ppb) may affect domestic plants, especially plants in the *Solanaceae* family (tomato, potato, eggplant, peppers etc.) and is therefore, unsuitable for irrigation.

- **Triclopyr – i.e. Renovate 3®** is a selective systemic herbicide with the ability to remove milfoil and allow non-invasive native monocots and tolerant dicots to survive. Use restrictions include that it should not be applied directly to un-impounded rivers or streams and treated water may not be used for irrigation for 120 days following application. In addition a 12-hour swimming restriction is recommended to minimize eye irritation. If a flooding event occurs within 120 days of application, there is a potential for triclopyr to damage upland sensitive species, particularly grapes, vegetable crops and flowers.
- **2,4-D – i.e. Aqua-Kleen®, Navigate®, and DMA*4IVM -** is a relatively fast-acting selective systemic herbicide used for control of Eurasian watermilfoil and other broad-leaved species. There are two formulations of 2,4-D approved for aquatic use. Both the granular and liquid formulations have been shown to be relatively selective to Eurasian watermilfoil when used at the labeled rate, leaving most native aquatic species relatively unaffected. Susceptible weeds include: Water milfoils, Water star grass. Slightly to moderately resistant weeds include: Bladderwort, White water lily, Yellow water lily or Spatterdock*, Water shield, Coontail* (* Repeat treatments may be needed)
- **Endothall – i.e. Aquathol®** is a fast-acting non-selective contact herbicide generally considered to be an effective herbicide for spot treatment. According to a Washington State DOE study, using low levels over a lake's littoral zone does cause adverse impacts in the

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short term, since many vascular plants are affected by the treatment. It may be applied in a granular or liquid form. Endothall is toxic to some species of fish.

There are several environmental impacts that must be considered when choosing the appropriate aquatic herbicide. Primary effects on organisms, including humans, from herbicides are usually the first level of concern when it comes to environmental impacts. Registration of a pesticide involves bioassays of the active ingredient across a few taxa of organisms. However, not all phyla are screened so questions remain as to the sensitivity of endangered and not-target species found in aquatic systems. The statements, “No laboratory work was conducted on the effects of triclopyr TEA against amphibians,” “It is anticipated that amphibians will be affected by triclopyr TEA both acutely and chronically at concentrations similar to fish,” and “Triclopyr is *slightly toxic* to birds when orally consumed in the diet,” leave considerable doubt as to the overall safety of some approved herbicides and their long-term effects on all trophic levels and organisms that may be present in a system.

However, even if an herbicide is determined to have no direct effect on a particular organism, a number of indirect effects remain that may impact the aquatic biota and environment. The most significant secondary effect is the reduction of dissolved oxygen (DO) in the water from the decomposition of dying and dead plants. This dramatic change can cause aquatic invertebrate and vertebrate mortality or a transformation from the dominant forms to ones that tolerate low DO levels. Warm water fish such as bass, carp, catfish, shiners, and sunfish can survive and reproduce with relatively low DO, but cold water fish will survive for only a short period and are unlikely to successfully complete a life cycle.

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Along with the change in DO, an abundance of decaying plants produce excess nutrients that are released in the form of phosphates and ammonia. Algal blooms often result from this nutrient overload. Of equal concern is the release of unionized ammonia (NH3), which has been reported as toxic to freshwater organisms. Also, when temperature and pH decrease, the toxicity of ammonia increases. Nitrite, produced during the oxidation of ammonia, has been proven to be toxic to fish.

Another area of concern is the use of surfactants in conjunction with aquatic herbicides. Surfactants or adjuvants are mixed with herbicides immediately prior to application to increase herbicide effectiveness by assisting in adherence of the chemical to plant surfaces. Surfactants do not directly cause plant mortality so they are not subjected to the same testing as the active ingredients.

Although EnviroScience did not observe any large algal blooms in Lake Roaming Rock at the time of the survey, the lake has had problems with algae in the past. There are several products available for algae control, although the most typically used are copper-containing compounds, such as copper sulfate and chelated copper. Unfortunately, copper containing compounds can have adverse effects on the invertebrate community. This in turn can affect the fish that feed on invertebrate species. Additionally, copper from these treatments accumulates in the sediment and can build up to levels where the sediment is considered a hazardous waste under Ohio law when it is disposed of following dredging. If a copper algaecide must be used, chelated copper is a safer option than copper sulfate, as it does not release as much free copper into the water column. An alternative algaecide is sodium carbonate peroxyhydrate otherwise known as percarbonate. One trade name for this product is GreenCleanPro®. This is a contact algaecide that appears to have less environmental impacts than copper compounds.

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Mechanical/ Physical Control

Mechanical and physical methods for the control of aquatic weeds include mechanical-harvesting, bottom barriers, hand-pulling and suction-harvesting. All methods can be quite expensive over large areas and may need to be repeated several times in one season. However, even so, they do provide instantaneous relief from nuisance infestations of aquatic weeds that interfere with recreational activities.

Mechanical harvesting with the 'lawn-mower' boat is a technique currently employed at Lake Roaming Rock. While providing immediate relief from nuisance growth over relatively large areas, this technique has some limitations and drawbacks. These include being generally non-selective, a tendency to remove significant numbers of small fish,, invertebrates and amphibians, and the inability to operate in shallow areas and close to docks. Additionally, this process can actually facilitate the spread of plants such as Eurasian watermilfoil and Coontail since it produces fragments that escape the collection process and can float to other portions of the lake and start new colonies. Bottom barriers and hand-pulling can be effective but usually are restricted to small areas. Bottom barriers are effective at preventing growth of any aquatic vegetation in the area in which it is placed, but can prevent the growth of native macrophytes important for fish populations and water quality as well as interfere with benthic macroinvertebrates. Hand-pulling a small area around individual docks may suit private property owners on Lake Roaming Rock. However, care must be taken to collect all fragments and to properly dispose of the plant material. Based on the limited water clarity of Lake Roaming Rock, it is likely that this method would be both time-consuming and relatively inefficient. Hand-pulling by certified, trained

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scuba divers is one of the highest cost control methods because of the time, labor and equipment needed to accomplish adequate control.

Suction harvesting has had promising results in the ability to selectively and effectively remove the entire plant by sucking it, roots and all, into a hose attached on a specially designed boat. It is most useful for small, dense infestations, or widely-spaced, moderately-sparse infestations. However, it does result in increased sedimentation into the water column temporarily and can be a costly alternative when used in large areas. Additionally, algal blooms from nutrient release can result from the disturbance of bottom sediments. Algal blooms can reduce oxygen in the upper stratified layers of the lake, thereby affecting fish and insect species. Suction harvesting is an expensive method due to the need for specialized scuba divers and equipment, however, the ability to target nuisance plant populations with high specificity in both plant species and location may make this a viable option for Lake Roaming Rock.

Cultural Control

Cultural methods can also be important in slowing or stopping the spread of invasive aquatic plant species. The most successful and simple cultural method of slowing the spread of plants such as Eurasian watermilfoil, would be to limit traffic through or avoid beds of milfoil where present. Additionally, it is important to implement systematic cleaning and disinfection of aquatic gear (especially boats and trailers), as these are likely vectors of introduction. This is evidenced by the presence of Eurasian watermilfoil in the boat launch area of Lake Roaming Rock and past infestations of zebra mussels and the exotic plant Azola. Since Eurasian watermilfoil and Coontail spread effectively through small fragments that can be produced through the action of propellers and can easily become attached to boats and trailers and then spread from lake to

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lake, it is imperative that people become aware of the role that they play in transporting invasive plants. Furthermore, lake residents should be informed as to water quality benefits of shoreline buffers and erosion control through vegetated buffers. This will decrease sediment load into the lake. However, care should be taken to ensure that the plants chosen for the buffers do not include other invasive, fast-spreading plants such as yellow flag iris (which was observed in low densities on the shore near the boat launch) and purple loosestrife.

Cultural methods are a low-cost and safe preventative way of slowing the spread of invasive plants. The challenge is educating the public about the issues. An effective education campaign can be a successful tool, if implemented correctly and lake-wide. Most people will be convinced to play a role in plant management through demonstration of utilitarian benefits (improved boat mobility, better fishing habitat, better swimming/recreational attributes). Lake Roaming Rock is at an advantage in that there are many public facilities where educational material about aquatic invasive plants can be posted and distributed.

6.0 Recommendations

EnviroScience is committed to providing lake-wide sustainable and long-term management options that are environmentally and scientifically sound. It should be noted that some of these techniques may require prior approval by certain state agencies before implantation. In order to achieve this goal in Lake Roaming Rock, EnviroScience recommends an integrated approach, as outlined below.

1. An important initial step in controlling the spread of aquatic invasive plants is prevention. Therefore, EnviroScience recommends that the Roam Rock Association launch an educational campaign by disseminating educational

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materials regarding the importance of cultural methods of aquatic invasive species management. This can be accomplished in a couple of ways. One is to add comprehensive information and photographs of aquatic plants, healthy buffer practices, etc. through the existing Web site (www.roamingshores.org). Another method is to produce posters or fliers that could be read by property owners and visitors of Lake Roaming Rock at key locations. Rock Point Marina, West Beach and East Beach would be ideal areas for posting educational information regarding the spread of invasive aquatic plants and the benefits of native aquatic plants for water quality, invertebrates, fish and waterfowl.

2. Because the vegetation survey was conducted early in the growing season following a winter drawdown, it is first recommended that EnviroScience reassess problem areas (i.e. where Eurasian watermilfoil was recorded in the June 2010 vegetation survey) prior to the implementation of management activities. These areas include: the marina; the southern portion of the lake, just north of SR 6; and along the eastern shore of the lake, near RL 16 and RL 18 Nature Trails. This reassessment will allow EnviroScience to identify the plants present and recommend the best management technique for each particular targeted area in the lake.
3. Following reassessment of these areas, and in broad open areas where the nuisance plants other than Eurasian watermilfoil are moderately dense, mechanical harvesting could be used as a management tool. However, we do not believe that this should be the primary management tool because its use for Coontail and Eurasian watermilfoil will result in these species continuing to spread to other areas of the lake. Harvesting should never be employed in areas where Eurasian watermilfoil is the dominant species or in areas where it comprises a major part of the overall plant community.

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4. In areas where nuisance aquatic plant growth is not widespread and occurs closer to shore and around obstructions where mechanical harvesting is not feasible, diver operated suction harvesting may an effective means of removing both vegetative and root biomass. This technique is particularly useful where treatment is desired on a lot by lot basis. This technique is also suitable for use during the growing season, because it is more selective than general herbicide applications. However, selectivity is based on the diver's ability to locate and identify the target plants under water, therefore, consideration must be given to water quality conditions (i.e. water levels and turbidity) during this treatment option.
5. In areas with extensive, dense infestations of Eurasian watermilfoil (should this occur later in the growing season or in the future), and if sufficient water clarity and oxygenation is available, milfoil weevils (*Euhrychiopsis lecontei*) are a viable biocontrol option in those low-traffic areas of the lake. This option is considered a long-term sustainable and environmentally-friendly approach. However, the success of the program will depend on water quality considerations, as well as suitable off-shore over-wintering habitats for the weevils. EnviroScience recommends a multi-year weevil stocking plan for lakes in which there is a need, as well as sufficient habitat, for the weevils.
6. Herbicide spot treatment with systemic herbicides may be a viable option in those areas with nuisance weeds where suction harvesting or biocontrol options are not available. However, it should be noted that some non-target effects may be realized. Non-target effects can be minimized if herbicides are applied earlier in the growing season, before many native plants have begun to grow.
7. Benthic barriers may be effective at controlling growth of nuisance weeds in limited areas around individual docks. This will allow for easy egress from private docks to the lake proper and help quell the complaints of lakefront property owners that often occur when plants reach their peak.

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However, these barriers can be difficult to deploy and they also prevent the growth of native macrophytes and can therefore indirectly affect the invertebrate and fish community in the areas where they are employed.

8. If algae becomes a problem later in the season, it is recommended that a non-copper containing compound, such as sodium carbonate peroxyhydrate (percarbonate) be used to control the algal blooms. Using non-copper based products is an especially important consideration if milfoil weevils are used to control Eurasian watermilfoil in the lake, as copper compounds can affect the success of a stocking project by reducing effective population sizes of the weevil.

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Appendix A

Standard Aquatic Vegetation Assessment Site Species Density Sheet,
Summary Sheet and Table

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Table 3. Aquatic Plant Species Encountered in Lake Roaming Rock		
Common Name	**Scientific Name**	**Cumulative Cover**
Submersed Plants		
Eurasian watermilfoil	***Myriophyllum spicatum***	**1.9**
Coontail	***Ceratophyllum demersum***	**12.3**
Brittle naiad	***Najas minor***	**4.4**
Small pondweed	***Potamogeton pusillus***	**2.7**
American/long-leaf pondweed	***Potamogeton nodosus***	**4.0**
Elodea/common waterweed	***Elodea Canadensis***	**1.0**
Floating-leaved Plants		
Spatterdock	***Nuphar variegate***	**1.0**
White water lily	***Nymphaea odorata***	**6.6**
Small duckweed	***Lemna minor***	**1.0**

LAKE Lake Roaming Rock COUNTY- Astabula SURVEY DATI June 7 & 8, 2010

Standard Aquatic Vegetation Summary Sheet SURVEY BY: Nancy Cushing &Lara Roketenetz

		Total number of AVAS's for each Density Catagory					Calculations				Sum of Previous Four Columns	Total Number of AVAS's	Quotient of Column 9 divided by Column 10		
							Catagory	Catagory	Catagory	Catagory					
		A	B	C	D		A x 1	B x10	C x 40	D x 80					
Code No	Plant Name	1	2	3	4		5	6	7	8	9	10	11	Code No	Plant Name
1	Eurasian milfoil	10	1				10	10			21	11	1.9	1	Eurasian milfoil
2	Curly leaf pondweed													2	Curly leaf pondweed
3	Chara													3	Chara
4	Thinleaf pondweed													4	Thinleaf pondweed
5	Flatstem pondweed													5	Flatstem pondweed
6	Robbins pondweed													6	Robbins pondweed
7	Variable pondweed													7	Variable pondweed
8	Whitestem pondweed													8	Whitestem pondweed
9	Richardsons pondweed													9	Richardsons pondweed
10	Illinois pondweed													10	Illinois pondweed
11	American pondweed	2	1				2	10			12	3	4.0	11	American pondweed
12	Floating leaf pondweed													12	Floating leaf pondweed
13	Water stargrass													13	Water stargrass
14	Wild Celery													14	Wild Celery
15	Small pondweed	31	2	1			31	20	40		91	34	2.7	15	Small pondweed
16	Leafy pondweed													16	Sagitteria
17	Northern milfoil													17	Northern milfoil
18	M. verticillatum													18	M. verticillatum
19	M. herterophyllum													19	M. herterophyllum
20	Coontail	33	22	8	3		33	220	320	240	813	66	12.3	20	Coontail
21	Elodea	4					4				4	4	1.0	21	Elodea
22	Bladderwort													22	Bladderwort
23	Bladderwort-mini													23	Bladderwort-mini
24	Buttercup													24	Buttercup
25	Najas spp.													25	Najas spp.
26	Brittle naiad	5	3				5	30			35	8	4.4	26	Brittle naiad
27	Sago pondweed													27	Sago pondweed
28	Water Merigold													28	Water Merigold
29	Spadderdock	2					2				2	2	1.0	29	Spadderdock
30	White water lily	6		1			6		40		46	7	6.6	30	White water lily
31	Yellow water lily													31	Yellow water lily
32	Nuphar sp.													32	Nuphar sp.
33	Watershield													33	Watershield
34	Equisitum													34	Equisitum
35	Spirodella													35	Spirodella
36	Small Duckweed	4					4				4	4	1.0	36	Watermeal
37	Arrowhead													37	Arrowhead
38	Smartweed													38	Smartweed
39	Quillwort													39	Quillwort
40	Cattails													40	Cattails
41	Three square bulrush													41	Bulrushes
42	Iris													42	Iris
43	Swamp Loosestrife													43	Swamp Loosestrife
44	Carex spp.													44	Purple Loosestrife
45	Rush spp.													45	Rush spp.

Appendix B

Standard Aquatic Vegetation Assessment Site Species Density Sheets

Standard Aquatic Vegetation Assessment Site Species Density Sheet																			
		Aquatic Vegetation Assessment Site Number										Aquatic Vegetation Assessment Site Number							
Code No.	Plant Name	NO. 1	NO. 2	NO. 3	NO. 4	NO. 5	NO. 6	NO. 7	NO. 8	Code No.	Plant Name	NO. 9	NO. 10	NO. 11	NO. 12	NO. 13	NO. 14	NO. 15	NO. 16
1	Eurasian watermilfoil									1	Eurasian watermilfoil								
2	Curly leaf pondweed									2	Curly leaf pondweed								
3	Chara									3	Chara								
4	Thin leaf pondweed									4	Thin leaf pondweed								
5	Robbins pondweed									5	Robbins pondweed								
6	White stem pondweed									6	White stem pondweed								
7	Richardsons pondweed									7	Richardsons pondweed								
8	Flatstem pondweed									8	flatstem pondweed								
9	Large leaf pondweed									9	Large leaf pondweed								
10	Variable pondweed									10	Variable pondweed								
11	Leafy pondweed									11	Leafy pondweed								
12	Water stargrass									12	Water stargrass								
13	Mare tail									13	Mare Tail								
14	Arrowhead									14	Arrowhead								
15	Northen watermilfoil									15	Northern watermilfoil								
16	Whorled watermilfoil									16	Whorled watermilfoil								
17	Coontail									17	Coontail	A						B	A
18	Spatterdock									18	Spatterdock	A							
19	Elodea									19	Elodea								
20	Bladderwort									20	Bladderwort								
21	Bladderwort (mini)									21	Bladderwort (mini)								
22	Buttercup									22	Buttercup								
23	Najas spp.									23	Najas spp.								
24	Brittle naiad									24	Brittle naiad								B
25	Sago pondweed									25	Sago pondweed								
26	Water merigold									26	water merigold								
27	Small pondweed									27	small pondweed								
28	White waterlily									28	White waterlily								
29	Yellow waterlily									29	Yellow waterlily								
30	Watershield									30	Watershield								
31	Small duckweed									31	Small duckweed								
32	Great duckweed									32	Great duckweed								
33	Watermeal									33	Watermeal								
34	Arrowhead									34	Arrowhead								
35	Pickerelweed									35	Pickerelweed								
36	Arrow arum									36	Arrow arum								
37	Cattail									37	Cattail								
38	Bulrush									38	Bulrush								
39	Iris									39	Iris								
40	Swamp Loosestrife									40	Swamp Loosestrife								
41	Carex spp									41	Carex spp								
42	Rush spp									42	Rush								
43	Burr Reed									43	Burr Reed								
44	American Pondweed									44	American Pondweed								

Standard Aquatic Vegetation Assessment Site Species Density Sheet																			
		Aquatic Vegetation Assessment Site Number										Aquatic Vegetation Assessment Site Number							
Code No.	Plant Name	NO. 17	NO. 18	NO. 19	NO. 20	NO. 21	NO. 22	NO. 23	NO. 24	Code No.	Plant Name	NO. 25	NO. 26	NO. 27	NO. 28	NO. 29	NO. 30	NO. 31	NO. 32
1	Eurasian watermilfoil									1	Eurasian watermilfoil								
2	Curly leaf pondweed									2	Curly leaf pondweed								
3	Chara									3	Chara								
4	Thin leaf pondweed									4	Thin leaf pondweed								
5	Robbins pondweed									5	Robbins pondweed								
6	White stem pondweed									6	White stem pondweed								
7	Richardsons pondweed									7	Richardsons pondweed								
8	flatstem pondweed									8	flatstem pondweed								
9	Large leaf pondweed									9	Large leaf pondweed								
10	Variable pondweed									10	Variable pondweed								
11	Leafy pondweed									11	Leafy pondweed								
12	Water stargrass									12	Water stargrass								
13	Mare tail									13	Mare Tail								
14	Arrowhead									14	Arrowhead								
15	Northen watermilfoil									15	Northern watermilfoil								
16	Whorled watermilfoil									16	Whorled watermilfoil								
17	Coontail		A				B	A	B	17	Coontail	B				A	C	A	B
18	Spatterdock							A		18	Spatterdock								
19	Elodea									19	Elodea								
20	Bladderwort									20	Bladderwort								
21	Bladderwort (mini)									21	Bladderwort (mini)								
22	Buttercup									22	Buttercup								
23	Najas spp.									23	Najas spp.								
24	Brittle naiad									24	Brittle naiad	B							A
25	Sago pondweed									25	Sago pondweed								
26	water merigold									26	water merigold								
27	small pondweed						A			27	small pondweed								
28	White waterlily									28	White waterlily	A							A
29	Yellow waterlily									29	Yellow waterlily								
30	Watershield									30	Watershield								
31	Small duckweed						A			31	Small duckweed								
32	Great duckweed									32	Great duckweed								
33	Watermeal									33	Watermeal								
34	Arrowhead									34	Arrowhead								
35	Pickerelweed									35	Pickerelweed								
36	Arrow arum									36	Arrow arum								
37	Cattail									37	Cattail								
38	Bulrush									38	Bulrush								
39	Iris									39	Iris								
40	Swamp Loosestrife									40	Swamp Loosestrife								
41	Carex spp									41	Carex spp								
42	Rush spp									42	Rush								
43	Burr Reed									43	Burr Reed								
44	American Pondweed									44	American Pondweed					A			A

Standard Aquatic Vegetation Assessment Site Species Density Sheet																			
		Aquatic Vegetation Assessment Site Number										Aquatic Vegetation Assessment Site Number							
Code No.	Plant Name	NO. 33	NO. 34	NO. 35	NO. 36	NO. 37	NO. 38	NO. 39	NO. 40	Code No.	Plant Name	NO. 41	NO. 42	NO. 43	NO. 44	NO. 45	NO. 46	NO. 47	NO. 48
1	Eurasian watermilfoil									1	Eurasian watermilfoil								
2	Curly leaf pondweed									2	Curly leaf pondweed								
3	Chara									3	Chara								
4	Thin leaf pondweed									4	Thin leaf pondweed								
5	Robbins pondweed									5	Robbins pondweed								
6	White stem pondweed									6	White stem pondweed								
7	Richardsons pondweed									7	Richardsons pondweed								
8	flatstem pondweed									8	flatstem pondweed								
9	Large leaf pondweed									9	Large leaf pondweed								
10	Variable pondweed									10	Variable pondweed								
11	Leafy pondweed									11	Leafy pondweed								
12	Water stargrass									12	Water stargrass								
13	Mare tail									13	Mare Tail								
14	Arrowhead									14	Arrowhead								
15	Northen watermilfoil									15	Northern watermilfoil								
16	Whorled watermilfoil									16	Whorled watermilfoil								
17	Coontail				B	C	B	B		17	Coontail				A	A	A		
18	Spatterdock									18	Spatterdock								
19	Elodea									19	Elodea								
20	Bladderwort									20	Bladderwort								
21	Bladderwort (mini)									21	Bladderwort (mini)								
22	Buttercup									22	Buttercup								
23	Najas spp.									23	Najas spp.								
24	Brittle naiad				A					24	Brittle naiad								
25	Sago pondweed									25	Sago pondweed								
26	water merigold									26	water merigold								
27	small pondweed				A					27	small pondweed								
28	White waterlily				A					28	White waterlily						A		
29	Yellow waterlily									29	Yellow waterlily								
30	Watershield									30	Watershield								
31	Small duckweed				A					31	Small duckweed								
32	Great duckweed									32	Great duckweed								
33	Watermeal									33	Watermeal								
34	Arrowhead									34	Arrowhead								
35	Pickerelweed									35	Pickerelweed								
36	Arrow arum									36	Arrow arum								
37	Cattail									37	Cattail								
38	Bulrush									38	Bulrush								
39	Iris									39	Iris								
40	Swamp Loosestrife									40	Swamp Loosestrife								
41	Carex spp									41	Carex spp								
42	Rush spp									42	Rush								
43	Burr Reed									43	Burr Reed								
44	American Pondweed									44	American Pondweed								

Standard Aquatic Vegetation Assessment Site Species Density Sheet																			
		Aquatic Vegetation Assessment Site Number										Aquatic Vegetation Assessment Site Number							
Code No.	Plant Name	NO. 49	NO. 50	NO. 51	NO. 52	NO. 53	NO. 54	NO. 55	NO. 56	Code No.	Plant Name	NO. 57	NO. 58	NO. 59	NO. 60	NO. 61	NO. 62	NO. 63	NO. 64
1	Eurasian watermilfoil									1	Eurasian watermilfoil								
2	Curly leaf pondweed									2	Curly leaf pondweed								
3	Chara									3	Chara								
4	Thin leaf pondweed									4	Thin leaf pondweed								
5	Robbins pondweed									5	Robbins pondweed								
6	White stem pondweed									6	White stem pondweed								
7	Richardsons pondweed									7	Richardsons pondweed								
8	flatstem pondweed									8	flatstem pondweed								
9	Large leaf pondweed									9	Large leaf pondweed								
10	Variable pondweed									10	Variable pondweed								
11	Leafy pondweed									11	Leafy pondweed								
12	Water stargrass									12	Water stargrass								
13	Mare tail									13	Mare Tail								
14	Arrowhead									14	Arrowhead								
15	Northen watermilfoil									15	Northern watermilfoil								
16	Whorled watermilfoil									16	Whorled watermilfoil								
17	Coontail	A		A			A	A	A	17	Coontail	A	D						
18	Spatterdock									18	Spatterdock								
19	Elodea								A	19	Elodea								
20	Bladderwort									20	Bladderwort								
21	Bladderwort (mini)									21	Bladderwort (mini)								
22	Buttercup									22	Buttercup								
23	Najas spp.									23	Najas spp.								
24	Brittle naiad									24	Brittle naiad								
25	Sago pondweed									25	Sago pondweed								
26	water merigold									26	water merigold								
27	small pondweed			A			A		A	27	small pondweed	A							
28	White waterlily									28	White waterlily								
29	Yellow waterlily									29	Yellow waterlily								
30	Watershield									30	Watershield								
31	Small duckweed									31	Small duckweed								
32	Great duckweed									32	Great duckweed								
33	Watermeal									33	Watermeal								
34	Arrowhead									34	Arrowhead								
35	Pickerelweed									35	Pickerelweed								
36	Arrow arum									36	Arrow arum								
37	Cattail									37	Cattail								
38	Bulrush									38	Bulrush								
39	Iris									39	Iris								
40	Swamp Loosestrife									40	Swamp Loosestrife								
41	Carex spp									41	Carex spp								
42	Rush spp									42	Rush								
43	Burr Reed									43	Burr Reed								
44	American Pondweed									44	American Pondweed								

Standard Aquatic Vegetation Assessment Site Species Density Sheet																			
		Aquatic Vegetation Assessment Site Number										Aquatic Vegetation Assessment Site Number							
Code No.	Plant Name	NO. 65	NO. 66	NO. 67	NO. 68	NO. 69	NO. 70	NO. 71	NO. 72	Code No.	Plant Name	NO. 73	NO. 74	NO. 75	NO. 76	NO. 77	NO. 78	NO. 79	NO. 80
1	Eurasian watermilfoil									1	Eurasian watermilfoil								
2	Curly leaf pondweed									2	Curly leaf pondweed								
3	Chara									3	Chara								
4	Thin leaf pondweed									4	Thin leaf pondweed								
5	Robbins pondweed									5	Robbins pondweed								
6	White stem pondweed									6	White stem pondweed								
7	Richardsons pondweed									7	Richardsons pondweed								
8	flatstem pondweed									8	flatstem pondweed								
9	Large leaf pondweed									9	Large leaf pondweed								
10	Variable pondweed									10	Variable pondweed								
11	Leafy pondweed									11	Leafy pondweed								
12	Water stargrass									12	Water stargrass								
13	Mare tail									13	Mare Tail								
14	Arrowhead									14	Arrowhead								
15	Northen watermilfoil									15	Northern watermilfoil								
16	Whorled watermilfoil									16	Whorled watermilfoil								
17	Coontail			A	C			A		17	Coontail	A	A	B		B			
18	Spatterdock									18	Spatterdock								
19	Elodea									19	Elodea								
20	Bladderwort									20	Bladderwort								
21	Bladderwort (mini)									21	Bladderwort (mini)								
22	Buttercup									22	Buttercup								
23	Najas spp.									23	Najas spp.								
24	Brittle naiad									24	Brittle naiad								
25	Sago pondweed									25	Sago pondweed								
26	water merigold									26	water merigold								
27	small pondweed									27	small pondweed			A					
28	White waterlily				A					28	White waterlily			C					
29	Yellow waterlily									29	Yellow waterlily			A					
30	Watershield									30	Watershield								
31	Small duckweed									31	Small duckweed								
32	Great duckweed									32	Great duckweed								
33	Watermeal									33	Watermeal								
34	Arrowhead									34	Arrowhead								
35	Pickerelweed									35	Pickerelweed								
36	Arrow arum									36	Arrow arum								
37	Cattail									37	Cattail								
38	Bulrush									38	Bulrush								
39	Iris									39	Iris								
40	Swamp Loosestrife									40	Swamp Loosestrife								
41	Carex spp									41	Carex spp								
42	Rush spp									42	Rush								
43	Burr Reed									43	Burr Reed								
44	American Pondweed									44	American Pondweed								

Standard Aquatic Vegetation Assessment Site Species Density Sheet																			
		Aquatic Vegetation Assessment Site Number									Aquatic Vegetation Assessment Site Number								
Code No.	Plant Name	NO. 81	NO. 82	NO. 83	NO. 84	NO. 85	NO. 86	NO. 87	NO. 88	Code No.	Plant Name	NO. 89	NO. 90	NO. 91	NO. 92	NO. 93	NO. 94	NO. 95	NO. 96
1	Eurasian watermilfoil	A								1	Eurasian watermilfoil					A			
2	Curly leaf pondweed									2	Curly leaf pondweed								
3	Chara									3	Chara								
4	Thin leaf pondweed									4	Thin leaf pondweed								
5	Robbins pondweed									5	Robbins pondweed								
6	White stem pondweed									6	White stem pondweed								
7	Richardsons pondweed									7	Richardsons pondweed								
8	flatstem pondweed									8	flatstem pondweed								
9	Large leaf pondweed									9	Large leaf pondweed								
10	Variable pondweed									10	Variable pondweed								
11	Leafy pondweed									11	Leafy pondweed								
12	Water stargrass									12	Water stargrass								
13	Mare tail									13	Mare Tail								
14	Arrowhead									14	Arrowhead								
15	Northen watermilfoil									15	Northern watermilfoil								
16	Whorled watermilfoil									16	Whorled watermilfoil								
17	Coontail	A		A		B	B	C		17	Coontail	B	A	B	B	C	B		A
18	Spatterdock									18	Spatterdock								
19	Elodea									19	Elodea								
20	Bladderwort									20	Bladderwort								
21	Bladderwort (mini)									21	Bladderwort (mini)								
22	Buttercup									22	Buttercup								
23	Najas spp.									23	Najas spp.								
24	Brittle naiad									24	Brittle naiad								
25	Sago pondweed									25	Sago pondweed								
26	water merigold									26	water merigold								
27	small pondweed								A	27	small pondweed		A		A	A			
28	White waterlily									28	White waterlily								
29	Yellow waterlily									29	Yellow waterlily								
30	Watershield									30	Watershield								
31	Small duckweed									31	Small duckweed								
32	Great duckweed									32	Great duckweed								
33	Watermeal									33	Watermeal								
34	Arrowhead									34	Arrowhead								
35	Pickerelweed									35	Pickerelweed								
36	Arrow arum									36	Arrow arum								
37	Cattail									37	Cattail								
38	Bulrush									38	Bulrush								
39	Iris									39	Iris								
40	Swamp Loosestrife									40	Swamp Loosestrife								
41	Carex spp									41	Carex spp								
42	Rush spp									42	Rush								
43	Burr Reed									43	Burr Reed								
44	American Pondweed									44	American Pondweed								

Standard Aquatic Vegetation Assessment Site Species Density Sheet																			
		Aquatic Vegetation Assessment Site Number										Aquatic Vegetation Assessment Site Number							
Code No.	Plant Name	NO. 97	NO. 98	NO. 99	NO. 100	NO. 101	NO. 102	NO. 103	NO. 104	Code No.	Plant Name	NO. 105	NO. 106	NO. 107	NO. 108	NO. 109	NO. 110	NO. 111	NO. 112
1	Eurasian watermilfoil	A	A					A		1	Eurasian watermilfoil								
2	Curly leaf pondweed									2	Curly leaf pondweed								
3	Chara									3	Chara								
4	Thin leaf pondweed									4	Thin leaf pondweed								
5	Robbins pondweed									5	Robbins pondweed								
6	White stem pondweed									6	White stem pondweed								
7	Richardsons pondweed									7	Richardsons pondweed								
8	flatstem pondweed									8	flatstem pondweed								
9	Large leaf pondweed									9	Large leaf pondweed								
10	Variable pondweed									10	Variable pondweed								
11	Leafy pondweed									11	Leafy pondweed								
12	Water stargrass									12	Water stargrass								
13	Mare tail									13	Mare Tail								
14	Arrowhead									14	Arrowhead								
15	Northen watermilfoil									15	Northern watermilfoil								
16	Whorled watermilfoil									16	Whorled watermilfoil								
17	Coontail	C	B	B	D	B	C	C	B	17	Coontail	B		A			A		A
18	Spatterdock									18	Spatterdock								
19	Elodea									19	Elodea	A							
20	Bladderwort									20	Bladderwort								
21	Bladderwort (mini)									21	Bladderwort (mini)								
22	Buttercup									22	Buttercup								
23	Najas spp.									23	Najas spp.								
24	Brittle naiad									24	Brittle naiad								
25	Sago pondweed									25	Sago pondweed								
26	water merigold									26	water merigold								
27	small pondweed	A	A		A			A		27	small pondweed								
28	White waterlily									28	White waterlily								
29	Yellow waterlily									29	Yellow waterlily								
30	Watershield									30	Watershield								
31	Small duckweed									31	Small duckweed								
32	Great duckweed									32	Great duckweed								
33	Watermeal									33	Watermeal								
34	Arrowhead									34	Arrowhead								
35	Pickerelweed									35	Pickerelweed								
36	Arrow arum									36	Arrow arum								
37	Cattail									37	Cattail								
38	Bulrush									38	Bulrush								
39	Iris									39	Iris								
40	Swamp Loosestrife									40	Swamp Loosestrife								
41	Carex spp									41	Carex spp								
42	Rush spp									42	Rush								
43	Burr Reed									43	Burr Reed								
44	American Pondweed									44	American Pondweed								

Standard Aquatic Vegetation Assessment Site Species Density Sheet																			
		Aquatic Vegetation Assessment Site Number										Aquatic Vegetation Assessment Site Number							
Code No.	Plant Name	NO. 113	NO. 114	NO. 115	NO. 116	NO. 117	NO. 118	NO. 119	NO. 120	Code No.	Plant Name	NO. 121	NO. 122	NO. 123	NO. 124	NO. 125	NO. 126	NO. 127	NO. 128
1	Eurasian watermilfoil									1	Eurasian watermilfoil						A	B	
2	Curly leaf pondweed									2	Curly leaf pondweed								
3	Chara									3	Chara								
4	Thin leaf pondweed									4	Thin leaf pondweed								
5	Robbins pondweed									5	Robbins pondweed								
6	White stem pondweed									6	White stem pondweed								
7	Richardsons pondweed									7	Richardsons pondweed								
8	flatstem pondweed									8	flatstem pondweed								
9	Large leaf pondweed									9	Large leaf pondweed								
10	Variable pondweed									10	Variable pondweed								
11	Leafy pondweed									11	Leafy pondweed								
12	Water stargrass									12	Water stargrass								
13	Mare tail									13	Mare Tail								
14	Arrowhead									14	Arrowhead								
15	Northen watermilfoil									15	Northern watermilfoil								
16	Whorled watermilfoil									16	Whorled watermilfoil								
17	Coontail		A	A	A	B				17	Coontail		D	C	A	A	B	B	
18	Spatterdock									18	Spatterdock								
19	Elodea			A						19	Elodea								
20	Bladderwort									20	Bladderwort								
21	Bladderwort (mini)									21	Bladderwort (mini)								
22	Buttercup									22	Buttercup								
23	Najas spp.									23	Najas spp.								
24	Brittle naiad									24	Brittle naiad								
25	Sago pondweed									25	Sago pondweed								
26	water merigold									26	water merigold								
27	small pondweed		A	A	A					27	small pondweed			A	A		A	A	
28	White waterlily									28	White waterlily								
29	Yellow waterlily									29	Yellow waterlily								
30	Watershield									30	Watershield								
31	Small duckweed		A	A						31	Small duckweed		A		A				
32	Great duckweed									32	Great duckweed								
33	Watermeal									33	Watermeal								
34	Arrowhead									34	Arrowhead								
35	Pickerelweed									35	Pickerelweed								
36	Arrow arum									36	Arrow arum								
37	Cattail									37	Cattail								
38	Bulrush									38	Bulrush								
39	Iris									39	Iris								
40	Swamp Loosestrife									40	Swamp Loosestrife								
41	Carex spp									41	Carex spp								
42	Rush spp									42	Rush								
43	Burr Reed									43	Burr Reed								
44	American Pondweed									44	American Pondweed								

Standard Aquatic Vegetation Assessment Site Species Density Sheet																			
		Aquatic Vegetation Assessment Site Number										Aquatic Vegetation Assessment Site Number							
Code No.	Plant Name	NO. 129	NO. 130	NO. 131	NO. 132	NO. 133	NO. 134	NO. 135	NO. 136	Code No.	Plant Name	NO. 137	NO. 138	NO. 139	NO. 140	NO. 141	NO. 142	NO. 143	NO. 144
1	Eurasian watermilfoil	A								1	Eurasian watermilfoil	A							
2	Curly leaf pondweed									2	Curly leaf pondweed								
3	Chara									3	Chara								
4	Thin leaf pondweed									4	Thin leaf pondweed								
5	Robbins pondweed									5	Robbins pondweed								
6	White stem pondweed									6	White stem pondweed								
7	Richardsons pondweed									7	Richardsons pondweed								
8	flatstem pondweed									8	flatstem pondweed								
9	Large leaf pondweed									9	Large leaf pondweed								
10	Variable pondweed									10	Variable pondweed								
11	Leafy pondweed									11	Leafy pondweed								
12	Water stargrass									12	Water stargrass								
13	Mare tail									13	Mare Tail								
14	Arrowhead									14	Arrowhead								
15	Northen watermilfoil									15	Northern watermilfoil								
16	Whorled watermilfoil									16	Whorled watermilfoil								
17	Coontail	A								17	Coontail	B							
18	Spatterdock									18	Spatterdock								
19	Elodea		A							19	Elodea								
20	Bladderwort									20	Bladderwort								
21	Bladderwort (mini)									21	Bladderwort (mini)								
22	Buttercup									22	Buttercup								
23	Najas spp.									23	Najas spp.								
24	Brittle naiad								A	24	Brittle naiad								
25	Sago pondweed									25	Sago pondweed								
26	water merigold									26	water merigold								
27	small pondweed		A					A	A	27	small pondweed	A							
28	White waterlily									28	White waterlily								
29	Yellow waterlily									29	Yellow waterlily								
30	Watershield									30	Watershield								
31	Small duckweed									31	Small duckweed								
32	Great duckweed									32	Great duckweed								
33	Watermeal									33	Watermeal								
34	Arrowhead									34	Arrowhead								
35	Pickerelweed									35	Pickerelweed								
36	Arrow arum									36	Arrow arum								
37	Cattail									37	Cattail								
38	Bulrush									38	Bulrush								
39	Iris									39	Iris								
40	Swamp Loosestrife									40	Swamp Loosestrife								
41	Carex spp									41	Carex spp								
42	Rush spp									42	Rush								
43	Burr Reed									43	Burr Reed								
44	American Pondweed									44	American Pondweed								

Standard Aquatic Vegetation Assessment Site Species Density Sheet																				
		Aquatic Vegetation Assessment Site Number										Aquatic Vegetation Assessment Site Number								
Code No.	Plant Name	NO. 145	NO. 146	NO. 147	NO. 148	NO. 149	NO. 150	NO. 151	NO. 152	Code No.	Plant Name	NO. 153	NO. 154	NO. 155	NO. 156	NO. 157	NO. 158	NO. 159	NO. 160
1	Eurasian watermilfoil									1	Eurasian watermilfoil								
2	Curly leaf pondweed									2	Curly leaf pondweed								
3	Chara									3	Chara								
4	Thin leaf pondweed									4	Thin leaf pondweed								
5	Robbins pondweed									5	Robbins pondweed								
6	White stem pondweed									6	White stem pondweed								
7	Richardsons pondweed									7	Richardsons pondweed								
8	flatstem pondweed									8	flatstem pondweed								
9	Large leaf pondweed									9	Large leaf pondweed								
10	Variable pondweed									10	Variable pondweed								
11	Leafy pondweed									11	Leafy pondweed								
12	Water stargrass									12	Water stargrass								
13	Mare tail									13	Mare Tail								
14	Arrowhead									14	Arrowhead								
15	Northen watermilfoil									15	Northern watermilfoil								
16	Whorled watermilfoil									16	Whorled watermilfoil								
17	Coontail							A		17	Coontail						A		
18	Spatterdock									18	Spatterdock								
19	Elodea									19	Elodea								
20	Bladderwort									20	Bladderwort								
21	Bladderwort (mini)									21	Bladderwort (mini)								
22	Buttercup									22	Buttercup								
23	Najas spp.									23	Najas spp.								
24	Brittle naiad								A	24	Brittle naiad								B
25	Sago pondweed									25	Sago pondweed								
26	water merigold									26	water merigold								
27	small pondweed				B		B		A	27	small pondweed						A	A	C
28	White waterlily									28	White waterlily						A		
29	Yellow waterlily									29	Yellow waterlily								
30	Watershield									30	Watershield								
31	Small duckweed									31	Small duckweed								
32	Great duckweed									32	Great duckweed								
33	Watermeal									33	Watermeal								
34	Arrowhead									34	Arrowhead								
35	Pickerelweed									35	Pickerelweed								
36	Arrow arum									36	Arrow arum								
37	Cattail									37	Cattail								
38	Bulrush									38	Bulrush								
39	Iris									39	Iris								
40	Swamp Loosestrife									40	Swamp Loosestrife								
41	Carex spp									41	Carex spp								
42	Rush spp									42	Rush								
43	Burr Reed									43	Burr Reed								
44	American Pondweed									44	American Pondweed								

Standard Aquatic Vegetation Assessment Site Species Density Sheet																			
		Aquatic Vegetation Assessment Site Number										Aquatic Vegetation Assessment Site Number							
Code No.	Plant Name	NO. 161	NO. 162	NO. 163	NO. 164	NO. 165	NO. 166	NO. 167	NO. 168	Code No.	Plant Name	NO. 169	NO. 170	NO. 171	NO. 172	NO. 173	NO. 174	NO. 175	NO. 176
1	Eurasian watermilfoil									1	Eurasian watermilfoil								
2	Curly leaf pondweed									2	Curly leaf pondweed								
3	Chara									3	Chara								
4	Thin leaf pondweed									4	Thin leaf pondweed								
5	Robbins pondweed									5	Robbins pondweed								
6	White stem pondweed									6	White stem pondweed								
7	Richardsons pondweed									7	Richardsons pondweed								
8	flatstem pondweed									8	flatstem pondweed								
9	Large leaf pondweed									9	Large leaf pondweed								
10	Variable pondweed									10	Variable pondweed								
11	Leafy pondweed									11	Leafy pondweed								
12	Water stargrass									12	Water stargrass								
13	Mare tail									13	Mare Tail								
14	Arrowhead									14	Arrowhead								
15	Northen watermilfoil									15	Northern watermilfoil								
16	Whorled watermilfoil									16	Whorled watermilfoil								
17	Coontail		A							17	Coontail								
18	Spatterdock									18	Spatterdock								
19	Elodea									19	Elodea								
20	Bladderwort									20	Bladderwort								
21	Bladderwort (mini)									21	Bladderwort (mini)								
22	Buttercup									22	Buttercup								
23	Najas spp.									23	Najas spp.								
24	Brittle naiad									24	Brittle naiad								
25	Sago pondweed									25	Sago pondweed								
26	water merigold									26	water merigold								
27	small pondweed	A								27	small pondweed								
28	White waterlily									28	White waterlily								
29	Yellow waterlily									29	Yellow waterlily								
30	Watershield									30	Watershield								
31	Small duckweed									31	Small duckweed								
32	Great duckweed									32	Great duckweed								
33	Watermeal									33	Watermeal								
34	Arrowhead									34	Arrowhead								
35	Pickerelweed									35	Pickerelweed								
36	Arrow arum									36	Arrow arum								
37	Cattail									37	Cattail								
38	Bulrush									38	Bulrush								
39	Iris									39	Iris								
40	Swamp Loosestrife									40	Swamp Loosestrife								
41	Carex spp									41	Carex spp								
42	Rush spp									42	Rush								
43	Burr Reed									43	Burr Reed								
44	American Pondweed		B							44	American Pondweed								

Standard Aquatic Vegetation Assessment Site Species Density Sheet																			
		Aquatic Vegetation Assessment Site Number										Aquatic Vegetation Assessment Site Number							
Code No.	Plant Name	NO. 177	NO. 178	NO. 179	NO. 180	NO. 181	NO. 182	NO. 183	NO. 184	Code No.	Plant Name	NO. 185	NO. 186	NO. 187	NO. 188	NO. 189	NO. 190		
1	Eurasian watermilfoil									1	Eurasian watermilfoil					A	A		
2	Curly leaf pondweed									2	Curly leaf pondweed								
3	Chara									3	Chara								
4	Thin leaf pondweed									4	Thin leaf pondweed								
5	Robbins pondweed									5	Robbins pondweed								
6	White stem pondweed									6	White stem pondweed								
7	Richardsons pondweed									7	Richardsons pondweed								
8	flatstem pondweed									8	flatstem pondweed								
9	Large leaf pondweed									9	Large leaf pondweed								
10	Variable pondweed									10	Variable pondweed								
11	Leafy pondweed									11	Leafy pondweed								
12	Water stargrass									12	Water stargrass								
13	Mare tail									13	Mare Tail								
14	Arrowhead									14	Arrowhead								
15	Northen watermilfoil									15	Northern watermilfoil								
16	Whorled watermilfoil									16	Whorled watermilfoil								
17	Coontail									17	Coontail		B	A			A		
18	Spatterdock									18	Spatterdock								
19	Elodea									19	Elodea								
20	Bladderwort									20	Bladderwort								
21	Bladderwort (mini)									21	Bladderwort (mini)								
22	Buttercup									22	Buttercup								
23	Najas spp.									23	Najas spp.								
24	Brittle naiad									24	Brittle naiad		A						
25	Sago pondweed									25	Sago pondweed								
26	water merigold									26	water merigold								
27	Small pondweed									27	small pondweed		A	A					
28	White waterlily									28	White waterlily								
29	Yellow waterlily									29	Yellow waterlily								
30	Watershield									30	Watershield								
31	Small duckweed									31	Small duckweed								
32	Great duckweed									32	Great duckweed								
33	Watermeal									33	Watermeal								
34	Arrowhead									34	Arrowhead								
35	Pickerelweed									35	Pickerelweed								
36	Arrow arum									36	Arrow arum								
37	Cattail									37	Cattail								
38	Bulrush									38	Bulrush								
39	Iris									39	Iris								
40	Swamp Loosestrife									40	Swamp Loosestrife								
41	Carex spp									41	Carex spp								
42	Rush spp									42	Rush								
43	Burr Reed									43	Burr Reed								
44	American Pondweed									44	American Pondweed								