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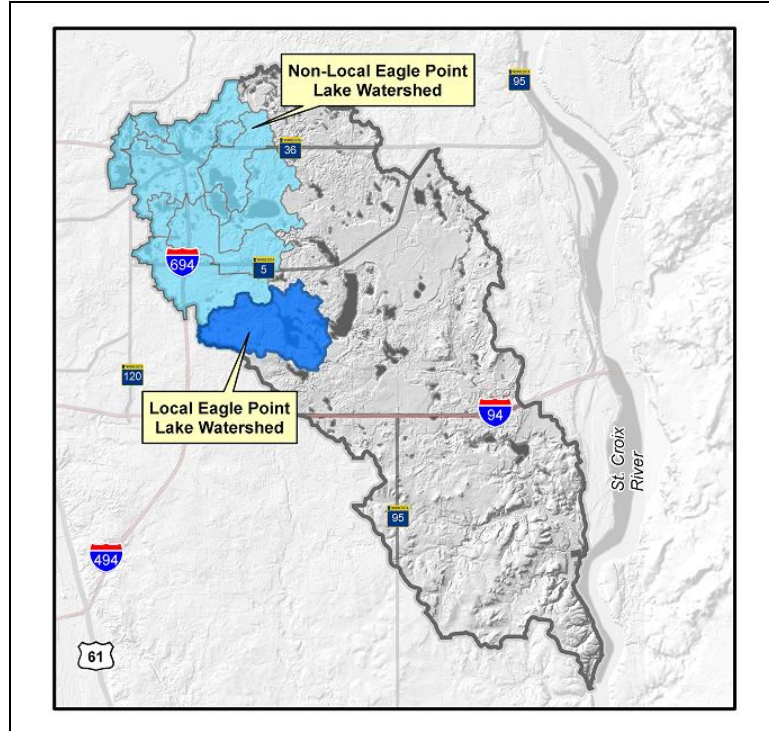
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## 5.12 Eagle Point Lake Watershed Management Plan

### 5.12.1 General Information



Eagle Point Lake is located in the south-central area of the City of Lake Elmo. The lake is shallow with a maximum depth of about six feet and an average depth of three feet. The local watershed of Eagle Point Lake includes Farney Creek, an intermittent stream that enters the lake’s west side, and several small, isolated wetlands. The local watershed is within the Cities of Oakdale and Lake Elmo, and is shown on Figure 5.12-1.

The overall watershed of Eagle Point Lake is much larger than its local watershed. Because Raleigh Creek enters the lake from the northwest side, the total watershed to Eagle Point Lake includes portions of eight communities.

All of Eagle Point Lake, and a large portion of its local watershed, are located within the Lake Elmo Park Reserve. Since 1995, residential housing has been developed in the western portions of the lake’s local watershed, although some agricultural and undeveloped land use remains. Future (2030) estimated land use includes residential development in all portions of the local watershed not within Lake Elmo Park Reserve. Figure 5.12-2 shows the current (2010) and estimated future (2030) land use of the Eagle Point Lake watershed.

Eagle Point Lake Local Watershed Information	
Tributary Area (acres)	2,180 (local; 11,502 total)
MDNR-Designated Basins within Watershed	82-0410W, 82-0411W (Brown’s Pond, 82-0419W, 82-0413W, 82-0416W, 82-0412W, 82-0109P (Eagle Point Lake)
Downstream Watershed <sup>1</sup>	Horseshoe Lake / Lake Elmo
Eagle Point Lake Information	
MDNR Designation	82-0109P
Surface Area (acres)	119.6 at El. 893.5
Mean Depth (feet)	3
Maximum Depth (feet)	6
Volume Below Discharge Elevation (acre-feet)	Not determined
Discharge Elevation	894.0
Outlet Type <sup>1</sup>	Primary: Stoplog Weir Overflow: Concrete Weir
MDNR Ordinary High Water Level (OHW) <sup>2</sup>	896.5
100-Year Flood Level <sup>2</sup>	901.0
VBWD “Allowable Fill” (cubic yards/lineal foot of shoreline - See Section 4.7.)	1.2
VBWD Water Quality Priority Category	Medium

<sup>1</sup> Primary outlet is tributary to Horseshoe Lake, overflow to Lake Elmo

<sup>2</sup> Elevation in NGVD29 vertical datum

Because the lake is located within the Lake Elmo Park Reserve, it is accessible to the public. The primary use of Eagle Point Lake is aesthetic viewing. There is a canoe launch in the park and the lake is also used for canoeing. The lake provides habitat for waterfowl and wildlife.

### **5.12.2 Water Quality Management Plan**

The VBWD classified and will manage Eagle Point Lake as a Medium Priority waterbody, due in part to its classification as a wetland by the Minnesota Pollution Control Agency (MPCA) and its location within public land (Lake Elmo Park Reserve). Eagle Point Lake was initially included in the draft 2014 impaired waters 303(d) list as not meeting shallow lake eutrophication standards for aquatic recreations, but was removed after the MPCA revised its classification from shallow lake to wetland. The VBWD classification as a low priority waterbody is below the medium priority assigned to Eagle Point Lake in the 2005 Plan, and similar to the Category V wetland classification assigned in the 1995 Plan.

The VBWD has a non-degradation water quality policy which sets “action triggers” for all of its major waterbodies. Section 4.1 – Water Quality discusses the action triggers in more detail. Action triggers for VBWD lakes consider the following water quality parameters (summer average) relative to MPCA water quality standards and prior water quality data (i.e., trend analysis):

- Secchi disc depth
- Total phosphorus
- Chlorophyll *a*

Eagle Point Lake is included among the waterbodies assessed in the VBWD Watershed Restoration and Protection Strategies (WRAPS) study performed from 2012 to 2015. The WRAPS study identified the primary source of phosphorus loading to Eagle Point Lake as internal loading, which accounted for about 60 percent of the total load during the growing season. The WRAPS study also identified possible implementation strategies applicable to Eagle Point Lake. The results of the WRAPS study are described in greater detail in Appendix A-5.12.

#### **5.12.2.1 Water Quality Implementation Plan**

Specific water quality implementation tasks for Eagle Point Lake are based on the WRAPS study and include the following:

1. The VBWD will monitor the water quality of Eagle Point Lake and perform the actions discussed in Section 4.1 – Water Quality for Medium Priority water bodies.

The VBWD will evaluate the average summertime water quality (total phosphorus, chlorophyll *a*, and Secchi disc transparency) and compare it to applicable action triggers

(described in Section 4.1.7.5 – note that MPCA water quality standards presented in Table 4.1-1 are not applicable to waterbodies classified as wetlands by the MPCA).

2. The VBWD will cooperate with the City of Lake Elmo, the City of Oakdale, MDNR, or other entities to manage macrophytes (aquatic plants) in Eagle Point Lake. Treatment of areas containing dense, monospecific growths of Eurasian watermilfoil with an aquatic herbicide (2,4-D, Triclopyr, or low concentrations of Aquathol® K) is recommended to protect Eagle Point Lake’s native plant community. VBWD efforts may include
  - point-intercept surveys of aquatic vegetation
  - preparation of lake vegetation management plans (LVMP)
  - completion of Invasive Aquatic Plant Management (IAPM) Permit applications
  - design of herbicide treatment programs
  - participation in meetings with MDNR staff
  - other technical analysis
3. The VBWD will evaluate the feasibility of small scale stormwater BMPs and buffers within the watershed tributary to Eagle Point Lake. The VBWD’s BMP cost-share program may provide opportunities for private landowners to implement water quality improvements. Collectively, many small residential BMPs may have a significant impact on the cumulative phosphorus loading to Eagle Point Lake.
4. The VBWD will work with the City of Lake Elmo and/or Washington County Parks to evaluate opportunities for enhanced filtration (e.g., iron-enhanced sand filtration or spent lime filtration) at locations within the Raleigh Creek watershed in subwatersheds RLE-3, RLE-1-1, and/or RLE-1-2 (see Figure 5.12-1).
5. If necessary, the VBWD will cooperate with the MDNR to evaluate the feasibility of, and consider implementing, projects to reduce internal loading in Eagle Point through an in-lake aluminum sulfate (alum) treatment, dredging, drawdowns to freeze macrophytes, or other methods.
6. The VBWD will consider working with Washington County Parks to install enhanced stormwater treatment or promote infiltration in subwatershed EPL-9 (see Figure 5.12-1).
7. The VBWD will assist Washington County Parks in implementing a project to redesign and reconstruct the Farney Creek Berm.
8. The VBWD will cooperate with Washington County Parks in their efforts to protect oak forest and upland buffers within the Eagle Point Lake watershed.

9. The VBWD will promote Washington County financial assistance programs for non-compliant or non-functioning subsurface sewage containment systems (SSTS).
10. The VBWD will continue to implement its Rules and Regulations (2013, as amended) in the Eagle Point Lake watershed. The VBWD Rules address water quality performance standards for development and redevelopment projects, as well as required vegetated buffers around VBWD lakes, streams, and wetlands. The VBWD Rules and Regulations are included in this Plan as Appendix A-4.5.

### **5.12.2.2 Water Quality Issues**

Historically, water quality in Eagle Point Lake has been poor. In 1999, the VBWD completed the report, *Hydrologic and Phosphorus Budgets for Eagle Point Lake, Lake Elmo, Minnesota* (Barr, December 1999). The report estimated that the water quality of Eagle Point Lake will likely degrade as a result of continued development in the watershed. Generally, phosphorus loading to a lake increases as a result of increased development (and imperviousness) in the watershed which causes the in-lake phosphorus concentrations to increase and the potential for internal loading to increase. Water quality has remained poor since the 1999 study, but no statistically significant trends (improving or degrading) are evident in the data (see Figure 5.12-3).

Additional water quality data was collected in 2007 and 2008 as part of the *Water Quality Assessment for DeMontreville, Eagle Point, and Horseshoe Lakes* (Barr, 2009). That effort included and assessment of loading sources and recommended actions to maintain nutrient concentrations below the impaired waters listing criteria. At that time, Eagle Point Lake was classified as a shallow lake by the MPCA, versus its current wetland designation.

The VBWD performed additional analysis of nutrient loading to Eagle Point Lake as part of the WRAPS study completed from 2012 to 2015. The results of the 2009 Water Quality Assessment and the WRAPS study are summarized in Appendix A-5.12.

### **5.12.2.3 Water Chemistry Data**

Water quality sampling has been conducted on Eagle Point Lake sporadically since 1972, and approximately every other year since 2003. Water quality samples are typically analyzed for total phosphorus and chlorophyll *a*, while Secchi disc transparency is measured in the field at the time of sampling (see Appendix A-4.1 – Water Quality Background Information).

The most recent 10-year average summer water quality data is presented relative to applicable MPCA and VBWD water quality standards in Table 5.12-1 and illustrated in Figure 5.12-3. Detailed water quality data are shown in Appendix A-5.1. The most recent 10-years of data identify no statistically significant trends in total phosphorus, chlorophyll *a*, or Secchi disc transparency.

**Table 5.12-1 Summary of Eagle Point Lake summer average water quality**

Parameter	Units	10-year Average (2004-2013)	Trend in Average	MPCA Standard <sup>1</sup>
Total Phosphorus	ug/L	309	None	NA
Chlorophyll <i>a</i>	ug/L	70.6	None	NA
Secchi Disc Depth	m	0.58	None	NA

<sup>1</sup> MPCA eutrophication water quality standards are not applicable to wetlands

#### 5.12.2.4 Habitat Assessment

In 2003, the VBWD conducted a wetland habitat assessment and management project on Eagle Point Lake and several wetlands within the Lake Elmo Regional Park. The assessment evaluated the current wetland and riparian plant communities, water quality and hydrology issues as they relate to wildlife habitat in Eagle Point Lake and other wetlands in Lake Elmo Park Reserve, and developed a work plan for habitat improvement projects. The VBWD completed a *Minnesota Routine Assessment Method for Evaluating Wetland Functions* (MnRAM) evaluation of the presence and abundance of hydrophytic and invasive vegetation to identify and appraise the plant community and habitat quality as part of this assessment. Eagle Point Lake was rated as predominantly low-moderate quality for wildlife habitat and aesthetics/recreation, and has been utilized for flood control and stormwater management. The MnRAM management classification is Manage 1, meaning that impacts to this wetland should be avoided and preservation should be the top priority when prudent and feasible.

The surrounding upland areas are predominantly oak forest and grasslands, including some areas of restored prairie grasses. Restoration of a native plant ecosystem is recommended for those areas that are currently dominated by non-natives, including grasslands (now dominated by smooth brome), wetland areas dominated by reed canary grass, and non-native deciduous forest (buckthorn). When ecosystem restoration is implemented, it should address the complete basin, both wetland and surrounding upland, preserving the desirable elements.

The 2005 Plan recommended vegetation management for the Eagle Point Lake Dam in order to improve the quality of the plant community, improve habitat, and prevent erosion. The recommended management strategies included mowing the dam, treating it with herbicides, and replanting with native plants. The first phase of re-vegetating the earthen dam began in the fall of 2008 with a mowing of the site, spraying with herbicide to kill weeds, and installation of temporary erosion control blanket to prevent erosion through the winter. VBWD reapplied herbicide in May 2009, seeded the site in June 2009 with a native prairie seed mix, and installed erosion control blanket following seeding. The site was monitored through the summer and vegetation growth was slowed due to lower-than-normal rainfall throughout the summer months. Maintenance mowing in 2010, 2011, 2012, and 2013 proceeded as planned.

### **5.12.2.5 Biological Data**

Several types of biological data have been compiled and evaluated for Eagle Point Lake, in addition to physical and chemical parameters. Macrophyte (large aquatic plant), phytoplankton (non-rooted floating plants – algae), zooplankton (microscopic aquatic animals), and fisheries data provide insight into the ecological quality of Eagle Point Lake. Section 4.2 (Water Quality Background Information) provides more information about the importance of fisheries and other biological data.

#### **5.12.2.5.1 Fisheries**

Eagle Point Lake is not currently managed by the MDNR for fishing; there have been no fisheries surveys on the lake in the past decade and no fish consumption advisories exist for fish caught in Eagle Point Lake. Eagle Point Lake does not currently have a fisheries-use classification.

Large numbers of carp and bullheads are the predominant fish species in the lake. Prior to the VBWD construction of the bypass pipe as part of Project 1007, the carp migrated from Lake Elmo and spawned in Eagle Point Lake. The MDNR applied rotenone to Eagle Point Lake in November 1988 to kill the large carp population. This was done in conjunction with a temporary lowering of the lake. The MDNR then stocked the lake with tiger muskie in an attempt to use the lake for rearing fish hatchery stock. The presence of rough fish in the lake (despite the rotenone treatment) caused the attempt to be unsuccessful. The MDNR has no plans to use the lake for rearing fish hatchery stock in the future.

The MDNR's Lakefinder website includes the most current data on Eagle Point Lake and is available at: <http://www.dnr.state.mn.us/lakefind/lake.html?id=82010900>

The MDNR classified Eagle Point Lake as a waterfowl lake in 1951 and will continue to manage Eagle Point Lake as a wildlife wetland.

#### **5.12.2.5.2 Macrophytes (Large Aquatic Plants)**

Macrophyte surveys were conducted in 1998, 2003, 2007, 2010, 2011, and 2012 at Eagle Point Lake. The VBWD performed point intercept surveys of macrophytes in Eagle Point Lake in 2013 and 2014. The VBWD collects macrophyte data to identify the conditions of plant growth throughout the lake. Macrophytes are the primary producers in the aquatic food chain, converting the basic chemical nutrients in water and soil into plant matter through photosynthesis, which becomes food for all other aquatic life. While macrophytes can negatively impact the recreational use of a water body, they are critical to the ecosystem as fish and wildlife habitat.

Appendix B-5.12 includes the 1998, 2003, 2007, 2010, 2011, and 2012 macrophyte survey information. Results of the 2013 and 2014 point intercept surveys of curlyleaf pondweed (*Potamogeton crispus*) are also presented in Appendix B-5.12. Point intercept results for other species are documented in the annual reports to the VBWD (Barr, 2013 and Barr, 2014).

Macrophytes were found throughout the entire water body in most surveys. The 13 to 20 individual species observed during each plant survey are common to Minnesota lakes.

The growth of the exotic (non-native) species, curlyleaf pondweed (CLP), in Eagle Point Lake is of concern. Although densities of this plant were light to moderate during 1998, density has increased over time. Problematic CLP growth was observed in 2012, 2013, and 2014 (Barr, 2014). Once a lake becomes infested with CLP, this plant typically replaces native vegetation, thereby increasing its coverage and density. CLP begins growing in late August, grows throughout the winter at a slow rate, grows rapidly in the spring, and dies in early summer. Native plants that grow from seed in the spring are unable to grow in areas already occupied by CLP, and are displaced by this plant. The proliferation of CLP may also be the reason for no aquatic vegetation being observed in large sections of the lake in the August 2010 and 2011 surveys. CLP die-off in early summer releases phosphorus to the lake, causing increased algal growth for the remainder of the summer.

In 2014, the overall density of CLP was significantly reduced, but the distribution was not. The reduction in density is presumably due to the thick snow cover and late ice-out during 2014. Continued management of CLP may be necessary to protect the lake's water quality and native plant community. This plant's turions (like seeds) can flow downstream and infest downstream lakes. Thus, management should begin in the most upstream lake and continue to the most downstream lake.

The 2014 survey of the lake revealed that reed canary grass, which is an invasive species, was abundant along the lakeshore and in surrounding wetland areas.

The VBWD will continue to provide technical assistance to entities seeking to manage aquatic invasive species.

#### **5.12.2.5.3 *Phytoplankton (Non-Rooted, Floating Plants - Algae) and Zooplankton (Microscopic Aquatic Animals)***

The VBWD collected phytoplankton and zooplankton samples from Eagle Point Lake in 1998 and 2003. Appendix C-5.12 and Appendix D-5.12 show the information from the 1998 samples (June 16, July 14, August 11, August 25, and September 9) and 2003 samples (June 9, July 19, August 5, August 18, and September 8).

Phytoplankton derive energy from sunlight and use nutrients dissolved in lake water. They provide food for several types of animals, including zooplankton, which in turn are eaten by fish. A phytoplankton population in balance with the lake's zooplankton population is ideal for fish production. An inadequate phytoplankton population reduces the lake's zooplankton population and adversely impacts the growth of the lake's fishery. However, excess phytoplankton, especially blue-green algae, can interfere with recreational use of a lake and is considered problematic.

Although diverse, Eagle Point Lake's phytoplankton community is dominated by blue-green algae during much of the summer. In 1998, blue-green algae comprised 87 to 97 percent of the algal

community during July and August and 38 percent during September. In 2003, blue-green algae comprised 32 to 51 percent of the algal community during the July through September period. Dominance by blue-green algae is undesirable because they are often inedible to zooplankton due to their large size. Furthermore, blue-green algae generally float on the waters' surface where they are particularly objectionable to lake users. Blue-green algae are best managed by reducing the lake's phosphorus concentration. Increases in the lake's phosphorus concentration could likely cause increased growth of blue-green algae. However, blue-green algae limit their own growth by shading when their growth levels are very high. High growth levels may adversely impact the lake's plant community by limiting growth through shading. Judicious management of the lake's phosphorus concentration is recommended to reduce objectionable algal blooms and to prevent adverse impacts to the lake's plant community.

Although nutrient levels in Eagle Point Lake were similar during 1998 and 2003, reduced algal growth was observed during 2003. The maximum number of algae observed in 1998 and 2003 were 77,611 units per milliliter and 34,312 units per milliliter, respectively. The decrease in algal numbers corresponds to the reduction in average summer chlorophyll concentration observed during 2003. The average summer chlorophyll concentrations during 1998 and 2003 were 90 µg/L and 38 µg/L, respectively. Nonetheless, the algal numbers and chlorophyll concentrations confirm that nuisance algal blooms occurred during both years.

The lake's zooplankton community is dominated by small-bodied forms. While these animals provide food for the lake's panfish community, they are unable to control the lake's phytoplankton community due to their small size. Because fish predation generally determines the numbers of large- and small-bodied zooplankters in a lake, increasing the numbers of large-bodied zooplankters is unrealistic. Because zooplankton grazing will not control the lake's phytoplankton community, phosphorus loading to the lake solely determines Eagle Point Lake's algae community. Hence, phosphorus management will provide the best management measures for the lake's phytoplankton community.

### **5.12.3 Water Quantity Management Plan**

The VBWD will perform the following management actions related to water quantity:

1. The VBWD will continue to inspect and maintain the Eagle Point Lake outlet structures. According to the VBWD's MDNR-approved operation, inspection and maintenance plan for the Eagle Point Lake dam and control structures, no operation of the dam or control structures is anticipated under normal conditions. Only the bypass control structure can be operated to alter water levels. The stop logs in the bypass control structure can be removed to temporarily raise and lower the water level of Eagle Point Lake. The water level may be raised to Elevation 896.0 (NGVD29) and lowered to Elevation 893.0 (NGVD29). At the time of construction of the Eagle Point Lake Dam and control structures, the MDNR planned to use Eagle Point Lake for fish rearing. VBWD installed the stop logs to allow MDNR staff to operate the bypass control structure to aid in fish rearing efforts. However, the MDNR no

longer plans to use Eagle Point Lake for fish rearing purposes. According to VBWD's operation plan (see Appendix E-5.12), the MDNR must notify VBWD five days in advance of any proposed water level alteration.

2. The VBWD will continue to conduct annual inspections of the Eagle Point Lake dam, in accordance with the operation, inspection and maintenance plan. The VBWD also inspects the Eagle Point Lake control structures as part of the Project 1007 annual inspection. The VBWD inspects more frequently during times of extended high water levels.
3. The VBWD will continue to measure Eagle Point Lake water levels on an approximately monthly basis and supply the information to the MDNR for their records. The VBWD will include the water level measurements in its annual report, which is posted to the VBWD website.

### **5.12.3.1 Water Levels, Drainage Patterns, and Outlet Information**

The VBWD currently monitors Eagle Point Lake water levels on an approximately monthly basis. VBWD's lake monitoring began in 1969. Figure 5.12-4 shows the historical water levels, beginning in 1969.

The highest water level in the lake was reported on June 30, 1976, when a major storm caused the lake to rise to Elevation 901. In May of 1986, the water level reached Elevation 899.4. Since the shoreline of the lake is undeveloped, the lake has historically been used as a water storage area. In 1980, an earthen dam was placed across the outlet stream, which raised the lake as high as Elevation 898 on a temporary basis. As part of VBWD's Project 1007, a dam was constructed in 1986 across the outlet stream from Eagle Point Lake, just upstream from Lake Elmo. The temporary dam was subsequently removed. Two control structures and outlet pipes were installed as part of the Project 1007 dam construction.

- Primary Outlet Structure – the primary outlet structure contains a stop-log weir which controls the Eagle Point Lake water level at Elevation 894.0 (NGVD29 datum); above this elevation, water flows over the weir and into a 22-inch diameter pipe which carries water from Eagle Point Lake along the bottom of Lake Elmo (bypass pipe). This structure is shown in Figure 5.12-5.
- Overflow Structure – the secondary outlet structure is an overflow structure with a 20-foot long weir at Elevation 896.5 (NGVD29 datum). When the water level in Eagle Point Lake rises above Elevation 896.5, water flows into the overflow structure and into a 42-inch diameter pipe, which discharges directly to Lake Elmo. Figure 5.12-6 shows this overflow structure. Approximately 90 percent of the water from Eagle Point Lake is designed to be diverted through the bypass pipe (i.e., the primary outlet).

Since completion of Project 1007, water flowed into the overflow structure seven times:

1. July 1987, following a large rainfall event
2. August until October of 1993, following a period of above-average precipitation
3. Spring of 2001, following a spring melt and rainstorms
4. Early September 2002 after a period of above-average precipitation
5. August 2011, following a period of above-average precipitation
6. July 2013, following a period of above-average precipitation
7. June to July 2014, following a period of above-average precipitation

As a result of the Project 1007 construction, the 100-year flood elevation of Eagle Point Lake was raised 0.5 foot, to Elevation 901.0 (NGVD29 datum). In 2004, the VBWD re-analyzed the 100-year flood elevation of Eagle Point Lake as part of re-mapping the Raleigh Creek floodplain on Federal Emergency Management Agency (FEMA) floodplain maps. The 2004 FEMA study used existing land use conditions, instead of ultimate development conditions, and determined a 100-year flood level of Eagle Point Lake of Elevation 899.2 (NAVD88 datum). The VBWD will continue to manage Eagle Point Lake's 100-year flood level at Elevation 901.0.

In 2013, the National Oceanographic and Atmospheric Administration (NOAA) published Atlas 14, Volume 8 (see Section 4.7.6). Atlas 14 contains updated precipitation data for Minnesota and supersedes data sources used in the modeling and flood level determination of Eagle Point Lake. Over the next several years, the VBWD will update its hydrologic-hydraulic modeling of major subwatersheds, including Eagle Point Lake. Updated modeling will incorporate the most recent precipitation data (see Section 4.7.7) which may increase 100-year flood levels relative to the existing flood insurance rate maps (FIRMs).

During low-water conditions, a ditch upstream of a culvert under Kelvin Avenue (the park entrance road) controls the water levels of Eagle Point Lake. The invert of the ditch is Elevation 893.0 and the invert of the Kelvin Avenue culvert is Elevation 892.0. If the MDNR were to allow, the stop-log weir structure, located downstream of this culvert, could be lowered to a minimum level of Elevation 890.0 (NGVD29 datum).

#### **5.12.4 Groundwater**

The Eagle Point Lake local watershed lies within the Lake Elmo/Oakdale Special Well and Boring Construction Area (SWBCA). The Lake Elmo/Oakdale SWBCA was established due to volatile organic compound (VOC) and perfluorochemical (PFC) contamination at the Washington County Landfill and a disposal site in Oakdale. Established by the Minnesota Department of Health (MDH), the SWBCA (formerly known as a well advisory) puts limits on the construction of new wells, and

requires additional water testing of new wells. The SWBCA remains in effect as of the writing of this Plan.

More information regarding the Lake Elmo/Oakdale SWBCA is within Section 4.2.6.3 of this Plan. Current information about this site may be obtained from the MDH and the MPCA.

### **5.12.5 References**

Barr Engineering Company. September 1995. *Water Management Plan, Valley Branch Watershed District.*

Barr Engineering Company. December 1999. *Hydrologic and Phosphorus Budgets for Eagle Point Lake, Lake Elmo, Minnesota. Prepared for Valley Branch Watershed District.*

Barr Engineering Company and Washington Conservation District. September 2003. *Lake Elmo Park Reserve Wetland and Habitat Management Project.* Prepared for Valley Branch Watershed District and Washington County Parks.

Barr Engineering Company. December 2005. *Valley Branch Watershed District Watershed Management Plan.*

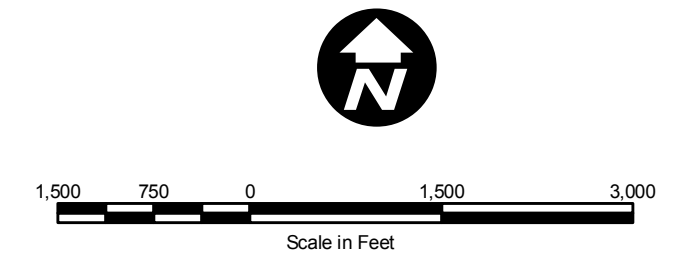
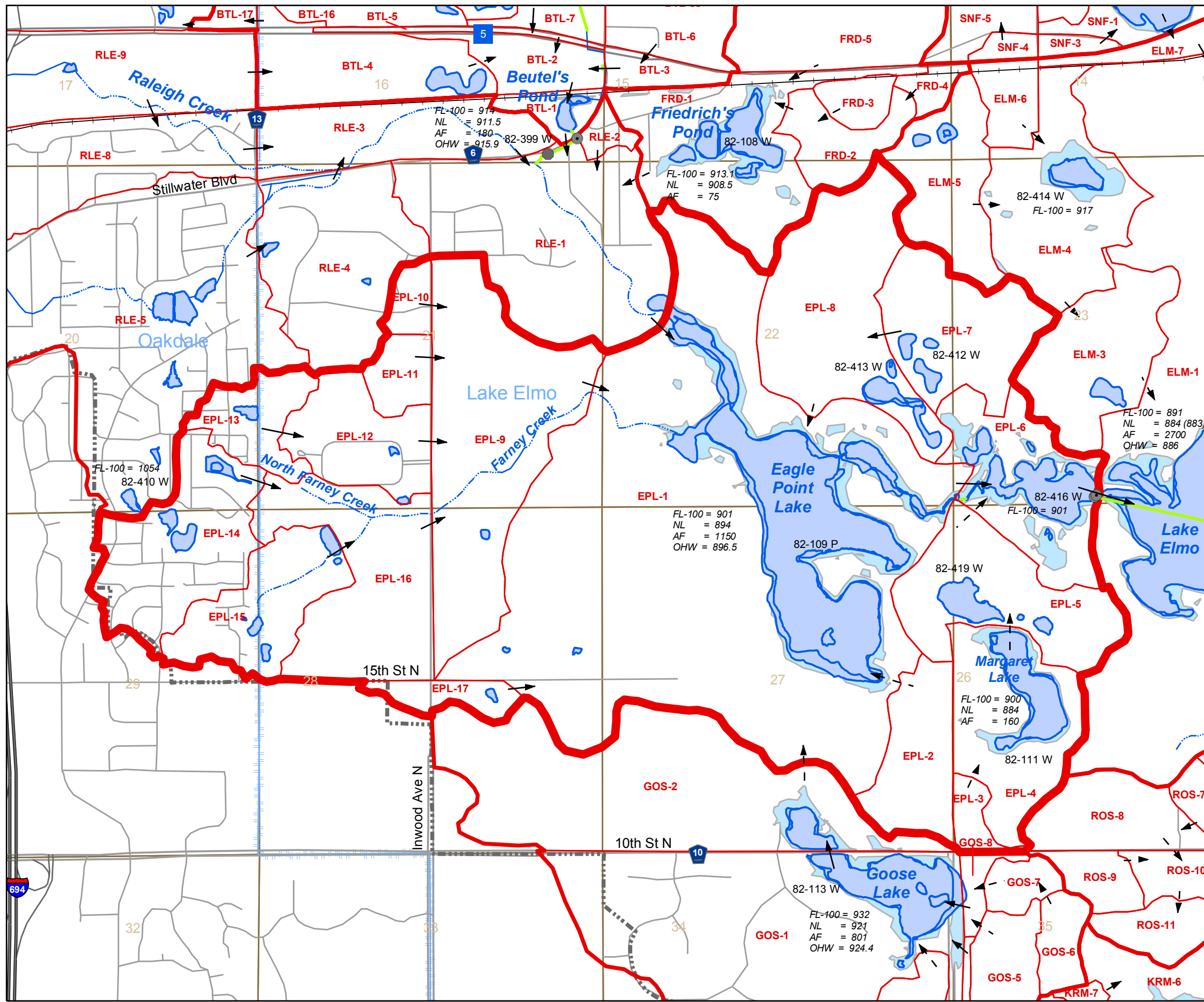
Barr Engineering Company. January 2009. *Water Quality Assessment of DeMontreville, Eagle Point, and Horseshoe Lakes.*

Barr Engineering Company. August 2013. *VBWD June 2013 Point Intercept Macrophyte Surveys.* Memorandum to the VBWD Managers.

Barr Engineering Company. October 2014. *VBWD June 2014 Point Intercept Macrophyte Surveys.* Memorandum to the VBWD Managers.

Minnesota Pollution Control Agency. January 2015. *Valley Branch Watershed District Watershed Restoration and Protection Strategies.* Prepared by Barr Engineering Company.

National Oceanographic and Atmospheric Administration (NOAA). 2013. *Atlas 14 Precipitation-Frequency Atlas of the United States – Volume 8.*



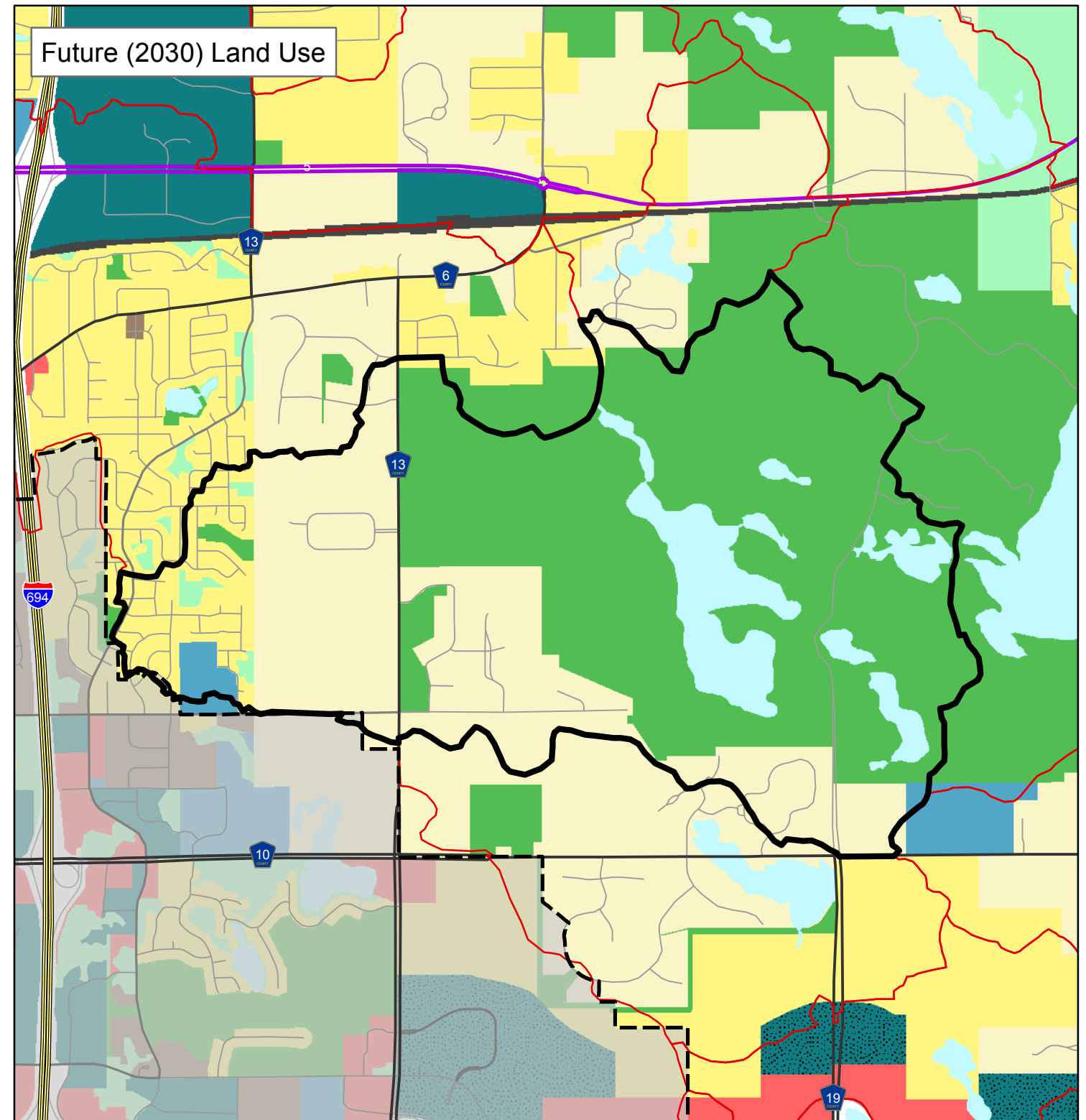
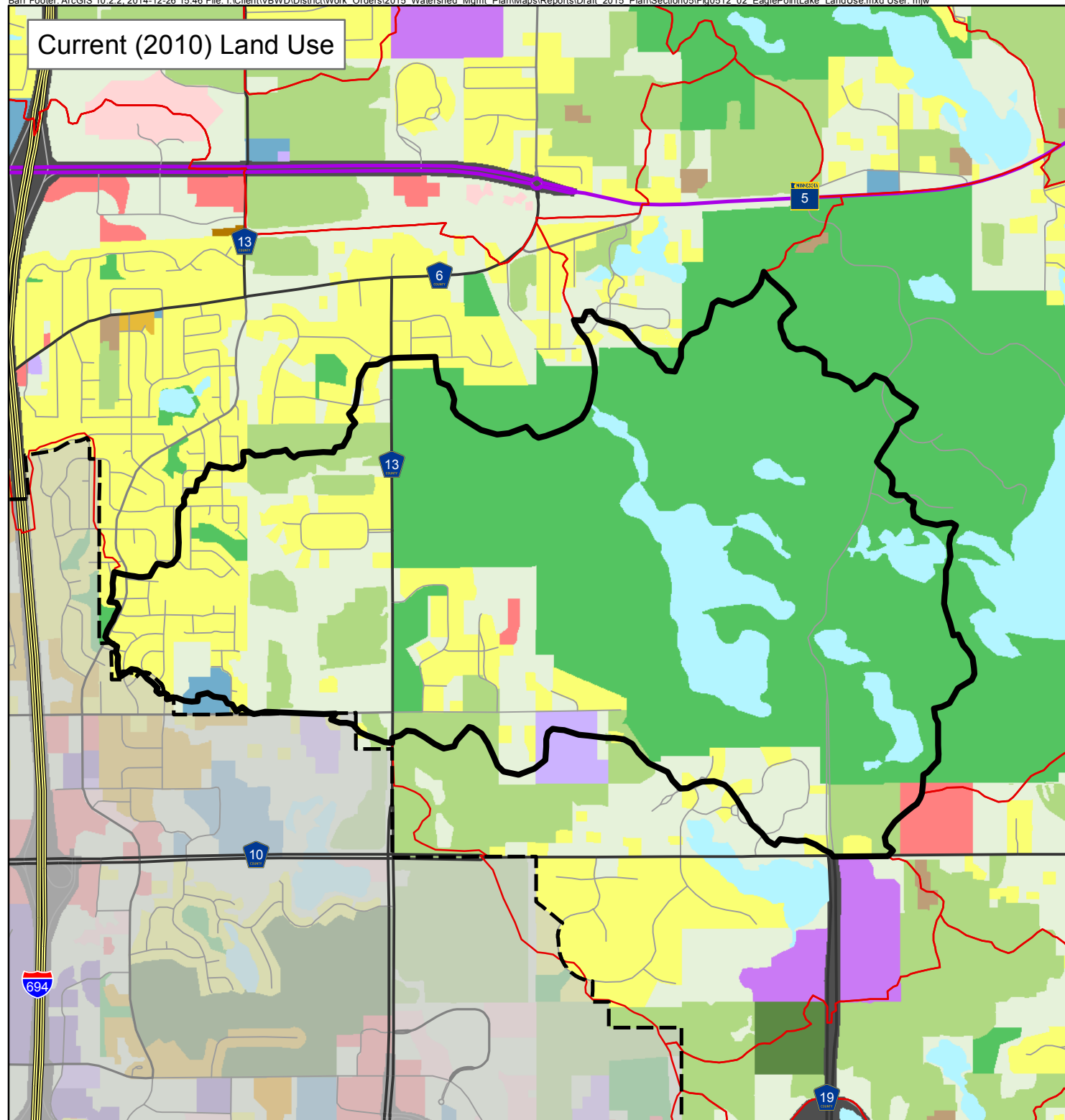
- LEGEND**
- ▭ Eagle Point Lake Watershed
  - ▭ Major Watershed Divide
  - ▭ Subwatershed Divide
  - EPL-1 Subwatershed Designation
  - 82-109P DNR Protected Waters Designation
  - Subwatershed Contributing Runoff
  - ▶ Overflow Path from Landlocked Watershed (Non-Contributing Subwatershed)
  - ▶- Overflow Path from Semi-Landlocked Watershed
  - ▭ Lakes, Ponds, Wetlands, Approximate Normal Water Surface Level
  - ▭ Lakes, Ponds, Wetlands, Approximate 100 Year Flood Surface Level
  - FL-100 100 Year Flood Level
  - NL Normal Level
  - AF Acre Feet of Storage at 100 Year Flood Level
  - OHW DNR Established Ordinary High Water Elevation
  - Project 1007
    - Catch Basin
    - Manhole Cover
    - Open Channel
    - Pipe
    - MN-DOT Pipe
    - ▭ Section Lines
    - ▭ VBWD Legal Boundary
    - ▭ Municipal Boundary

Landlocked: Basin does not overflow using VBWD simplified method for calculating its 100-year flood level or using a more detailed analysis, such as the 1% probability flood level.

Semi-Landlocked: Basin does not overflow in the 100-year 24-hour rainfall total or the 100-year 10-day snowmelt event, but does overflow when calculating its 100-year flood level based on the VBWD simplified method or the 1% probability flood level.

Figure 5.12-1

**EAGLE POINT LAKE WATERSHED**  
Valley Branch Watershed District



- |                                |                                |               |                               |
|--------------------------------|--------------------------------|---------------|-------------------------------|
| <b>Current (2010) Land Use</b> | Office                         | Golf Course   | Eagle Point Lake Subwatershed |
| Farmstead                      | Mixed Use Residential          | Major Highway | Major Subwatershed Boundary   |
| Seasonal/Vacation              | Mixed Use Industrial           | Railway       | VBWD Legal Boundary           |
| Single Family Detached         | Mixed Use Commercial and Other | Airport       |                               |
| Manufactured Housing Park      | Industrial and Utility         | Agricultural  |                               |
| Single Family Attached         | Extractive                     | Undeveloped   |                               |
| Multifamily                    | Institutional                  | Water         |                               |
| Retail and Other Commercial    | Park, Recreational or Preserve |               |                               |

- |                                |                               |                             |                               |
|--------------------------------|-------------------------------|-----------------------------|-------------------------------|
| <b>Future (2030) Land Use</b>  | Industrial                    | Rights-of-Way (i.e., Roads) | Eagle Point Lake Subwatershed |
| Agricultural                   | Institutional                 | Railway (inc. LRT)          | Major Subwatershed Boundary   |
| Rural or Large-Lot Residential | Mixed Use                     | Airport                     | VBWD Legal Boundary           |
| Single Family Residential      | Multi-Optional Development    | Vacant or Unknown           |                               |
| Multifamily Residential        | Park and Recreation           | Open Water                  |                               |
| Commercial                     | Open Space or Restrictive Use |                             |                               |



1 inch = 2,500 feet

Figure 5.12-2

**EAGLE POINT LAKE WATERSHED  
CURRENT (2010) AND FUTURE (2030) LANDUSE**  
2015-2025 Watershed Management Plan  
Valley Branch Watershed District

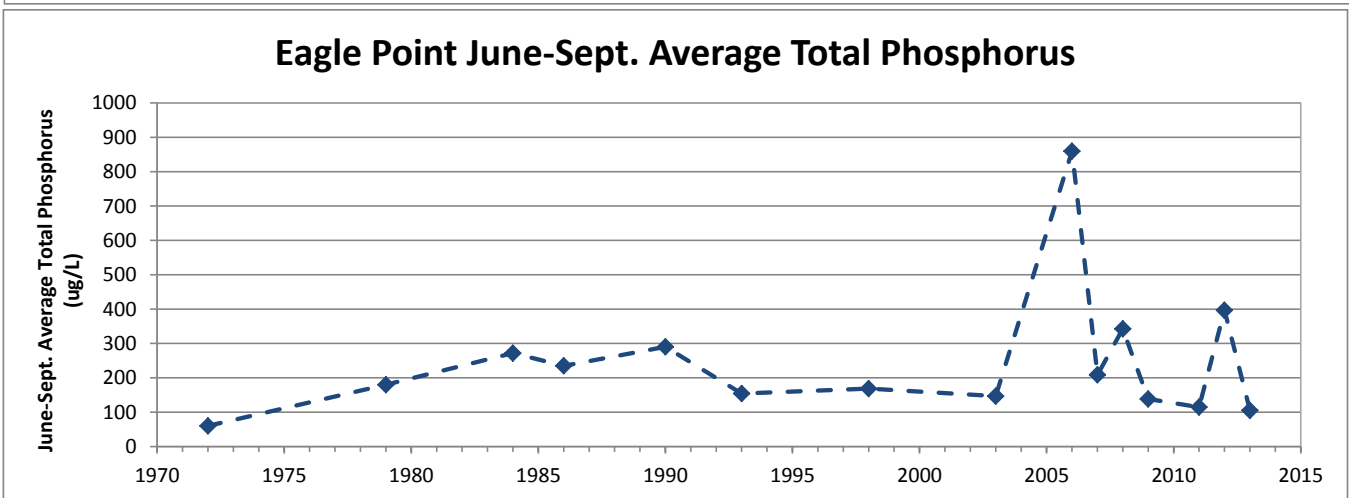
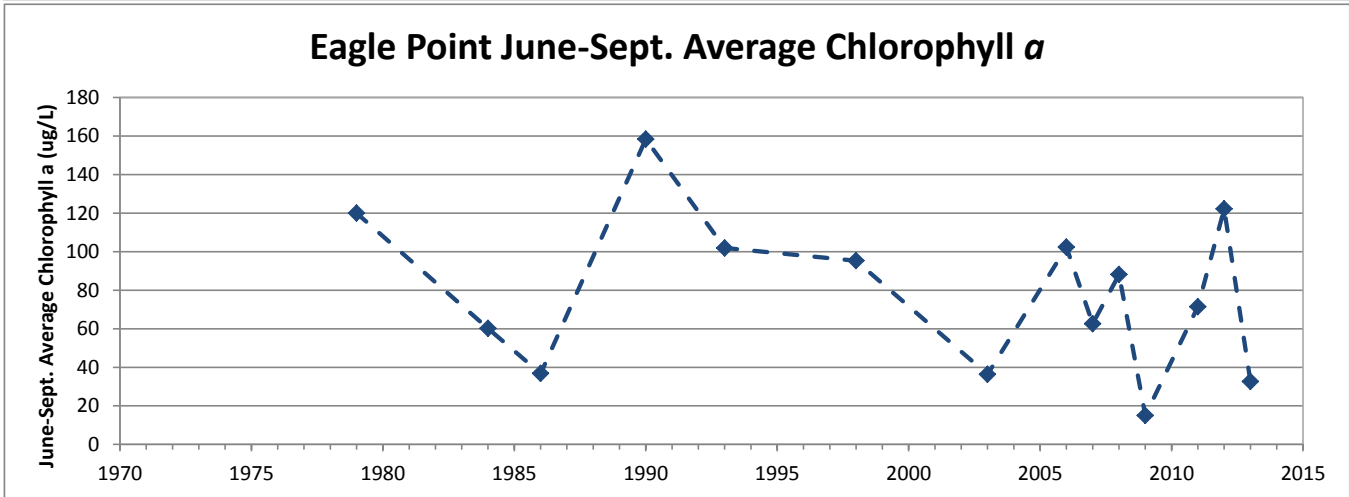
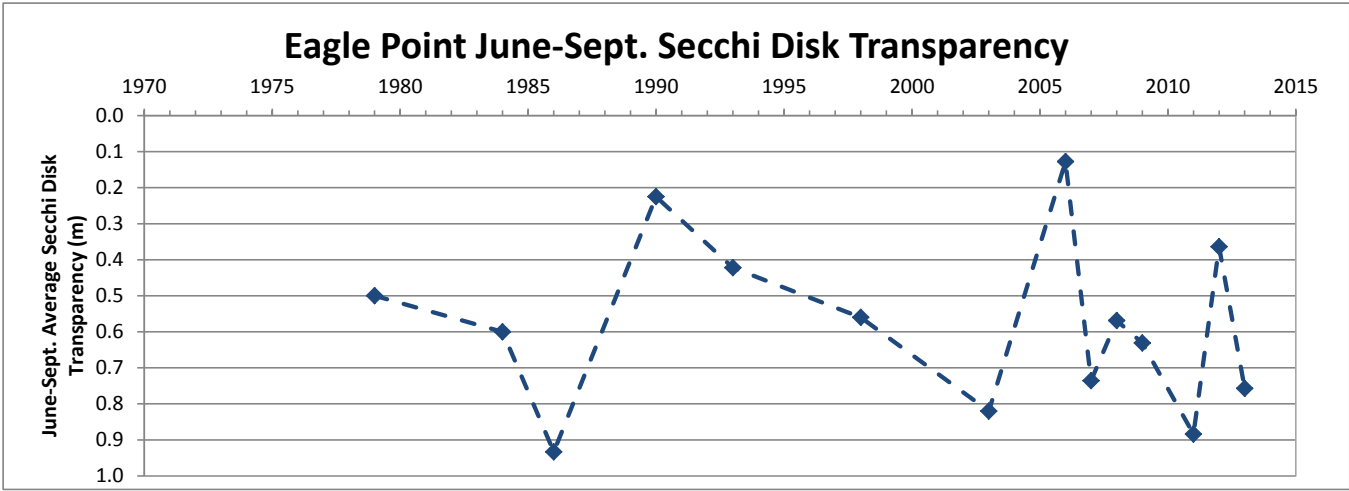
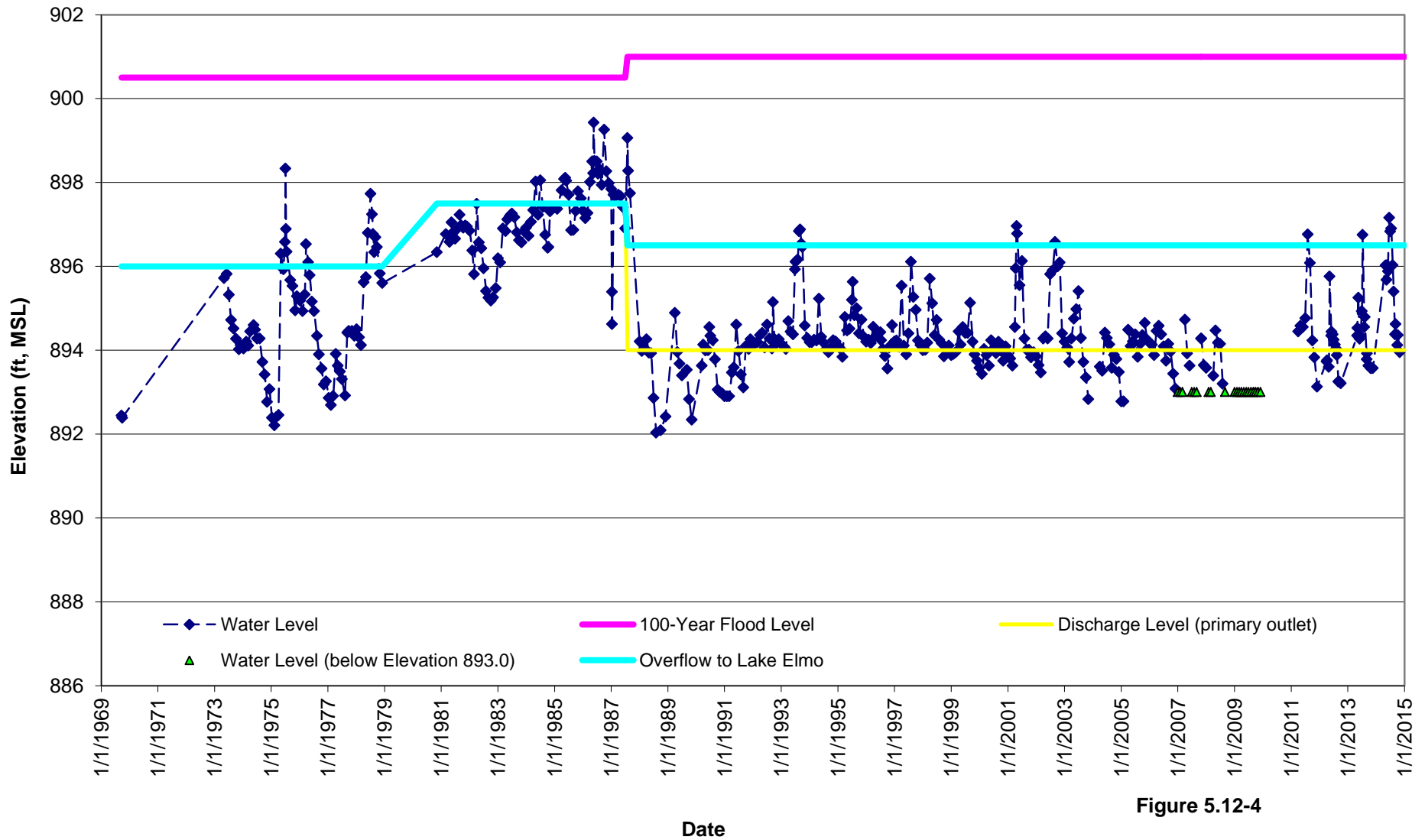


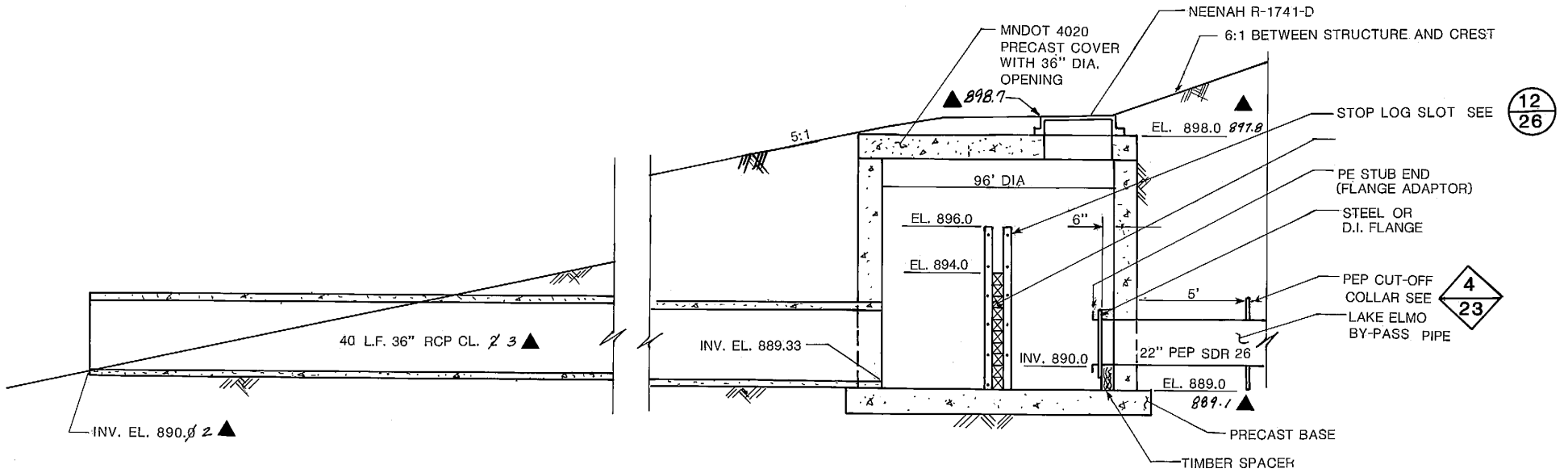
Figure 5.12-3

Eagle Point Lake Water Quality  
 2015 - 2025 Watershed Management Plan  
 Valley Branch Watershed District



Elevations in NGVD29 datum  
 Discharge elevations prior to 1987 are approximate

**Figure 5.12-4**  
**EAGLE POINT LAKE WATER LEVELS**  
**2015 - 2025 Watershed Management Plan**  
**Valley Branch Watershed District**

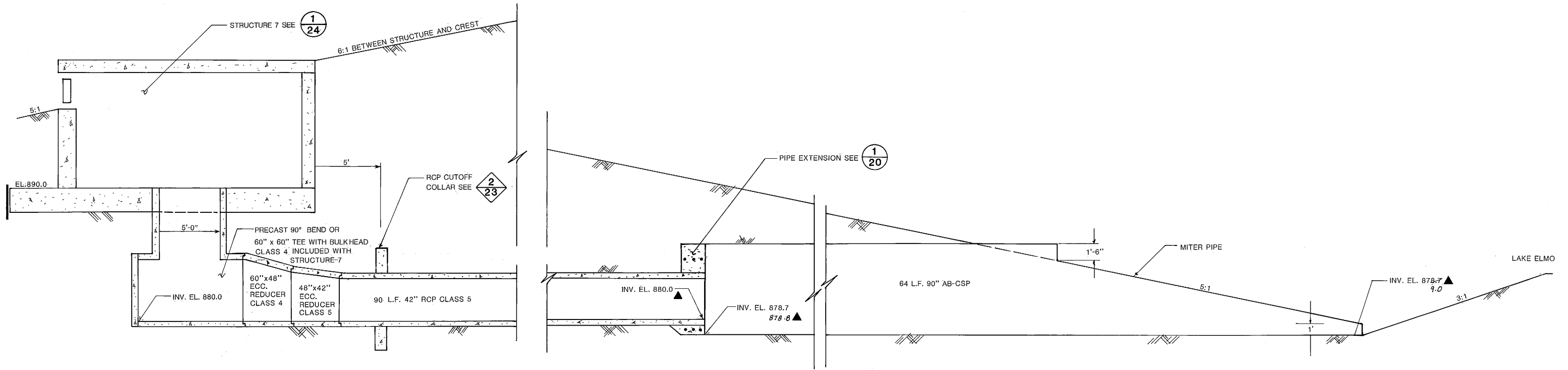


**SECTION: STRUCTURE 6 (EAGLE POINT LAKE OUTLET)**

SCALE: 1/4"=1'-0"

Figure 5.12-5

EAGLE POINT LAKE OUTLET  
Valley Branch Watershed District



SECTION: EAGLE POINT LAKE DAM SPILLWAY

SCALE: 1/4" = 1'-0"

Figure 5.12-6

EAGLE POINT LAKE OVERFLOW  
Valley Branch Watershed District

## **Appendix A-5.12 Additional Water Quality Information**

## **Appendix A-5.12 Additional Water Quality Information**

### **MINLEAP Modeling**

The Minnesota Lake Eutrophication Analysis Procedure (MINLEAP) is intended to be used as a screening tool for estimating lake conditions and for identifying “problem” lakes. MINLEAP is particularly useful for identifying lakes requiring “protection” versus those requiring “restoration” (Heiskary and Wilson, 1990). In addition, MINLEAP modeling has been done in the past to identify Minnesota lakes which may be in better or worse condition than they “should be” based on their location, watershed area and lake basin morphometry (Heiskary and Wilson, 1990).

Results of MINLEAP modeling done by the VBWD in 2014 for the direct, contributing watershed to Eagle Point Lake suggests that the lake should experience “better” water quality than is currently observed. For Eagle Point Lake MINLEAP predicts a growing season mean total phosphorus concentration of 104 µg/L versus 309 µg/L (observed from 2004 to 2013); a chlorophyll *a* concentration of 58 µg/L versus 70 µg/L (observed from 2004 to 2013); and summer average transparency of 0.7 meters versus 0.6 meters (observed from 2004 to 2013). The predicted phosphorus concentration has a standard error of 24 µg/L. The results of this analysis suggest that the water quality of Eagle Point Lake can be significantly improved.

### **Vighi and Chiaudani Method**

Vighi and Chiaudani (1985) developed another method to determine the phosphorus concentration in lakes that are not affected by anthropogenic (human) inputs. As a result the phosphorus concentration in a lake resulting from natural, background phosphorus loadings can be calculated from information about the lake’s mean depth and alkalinity or conductivity. Alkalinity is considered more useful for this analysis because it is less influenced by the modifying effect of anthropogenic inputs.

Based on the Vighi and Chiaudani method, the predicted phosphorus concentration from natural, background loadings should be about 36 µg/L. This predicted phosphorus concentration is much lower than to the average observed phosphorus concentration from 2004 through 2013 and suggest that better water quality can be attained in Eagle Point Lake.

### **2009 Water Quality Assessment**

The VBWD performed a detailed water quality assessment of Eagle Point Lake from 2007 to 2008 (Barr, 2007). The study found that the internal loading rate in Eagle Point Lake is high, and there is a gradient of phosphorus in the sediment, with the highest concentrations near the inflows from Raleigh Creek and Farney Creek. Despite frequent mixing (due to the lake’s shallow depth) dissolved oxygen levels and pH near the sediment both contribute to high internal loading rates. High concentrations of curlyleaf pondweed (CLP) in Eagle Point Lake further contribute to internal phosphorus loading.

As part of the study, a water quality model was developed for Eagle Point Lake to evaluate the effect of various best management practices on water quality. The model determined that management

actions to reduce internal loading would have more impact than those addressing external loads. Due to the expected cost and complexity involved with reducing phosphorus in Eagle Point Lake, the 2009 study recommended a phased approach. The recommended options below are listed in order, with an approximate implementation timeline (as proposed in the 2009 study) included as well.

- Conduct a comprehensive study of watershed infiltration opportunities and implement an infiltration program (e.g., rainwater gardens) to reduce phosphorus input to the lake over the long term (2009-2020)
- Manage the invasive macrophyte Curlyleaf pondweed by drawing down the lake water to improve the aquatic plant community and reduce mid-summer increases in phosphorus (2010). Additional spot treatment may be necessary in the following years if seeds remain active.
- Reduce internal phosphorus loading from the sediment by adding PAC to bind available phosphorus and inactivate it (2010, 2013)
- Reduce external loading coming from Raleigh Creek by installing a sedimentation basin and Enhanced Sand Filter (2015)
- Continue in-lake monitoring to assess the implementation of the recommended options on water quality and the macrophyte community in the lake (ongoing)

It is expected that the implementation of these management measures will significantly lower phosphorus levels and increase the health of the macrophyte community, helping to improve water quality in Eagle Point Lake and protect downstream Lake Elmo and Horseshoe Lake.

### **Watershed Restoration and Protection Strategy (WRAPS)**

Eagle Point Lake is included in the VBWD WRAPS study, which addressed several VBWD waterbodies. One of the key components of the WRAPS study is to understand the sources of phosphorus contributing to the existing nutrient loading. Sources evaluated for Eagle Point Lake in the WRAPS study (and the associated percentage of phosphorus loading during the growing season) include:

- internal loading from sediment due to anoxic release, wind, fish, or boat activity (59 percent)
- direct watershed runoff (24 percent)
- aquatic vegetation (14 percent)
- subsurface sewage treatment systems (SSTS) (2 percent)
- atmospheric deposition (1 percent)
- inflow from Lake Jane and Lake Olson (0 percent)

### ***Modeling Methods***

The P8 (Program for Predicting Polluting Particle Passage through Pits, Puddles and Ponds) Urban Catchment (computer) Model (Version 3.4) was used to estimate watershed runoff and total phosphorus loads from the Eagle Point Lake watershed. Noncontributing areas of the watershed, as identified by the VBWD, were not included in the P8 model. In-lake modeling for Eagle Point Lake was accomplished through the creation of a mass balance model that tracks the flow of both water and phosphorus through the lake for the critical water quality growing season as well as the year prior (to establish a steady-state initial condition)

The key input parameters for the in-lake mass balance model included direct precipitation data, evaporation data, runoff loads from the lake's watershed (as predicted by the P8 model), the lake storage and outlet rating curve, estimated groundwater exchange, and in-lake water quality monitoring data. Additional data, including sediment core data and macrophyte survey information, were used to verify that model estimates of internal phosphorus loading were reasonable.

### ***Implementation Plan***

Although the majority of nutrient loading to Eagle Point Lake comes from internal sources, direct watershed runoff is not inconsequential. This is reflected in the management strategies recommended in the WRAPS study, which include:

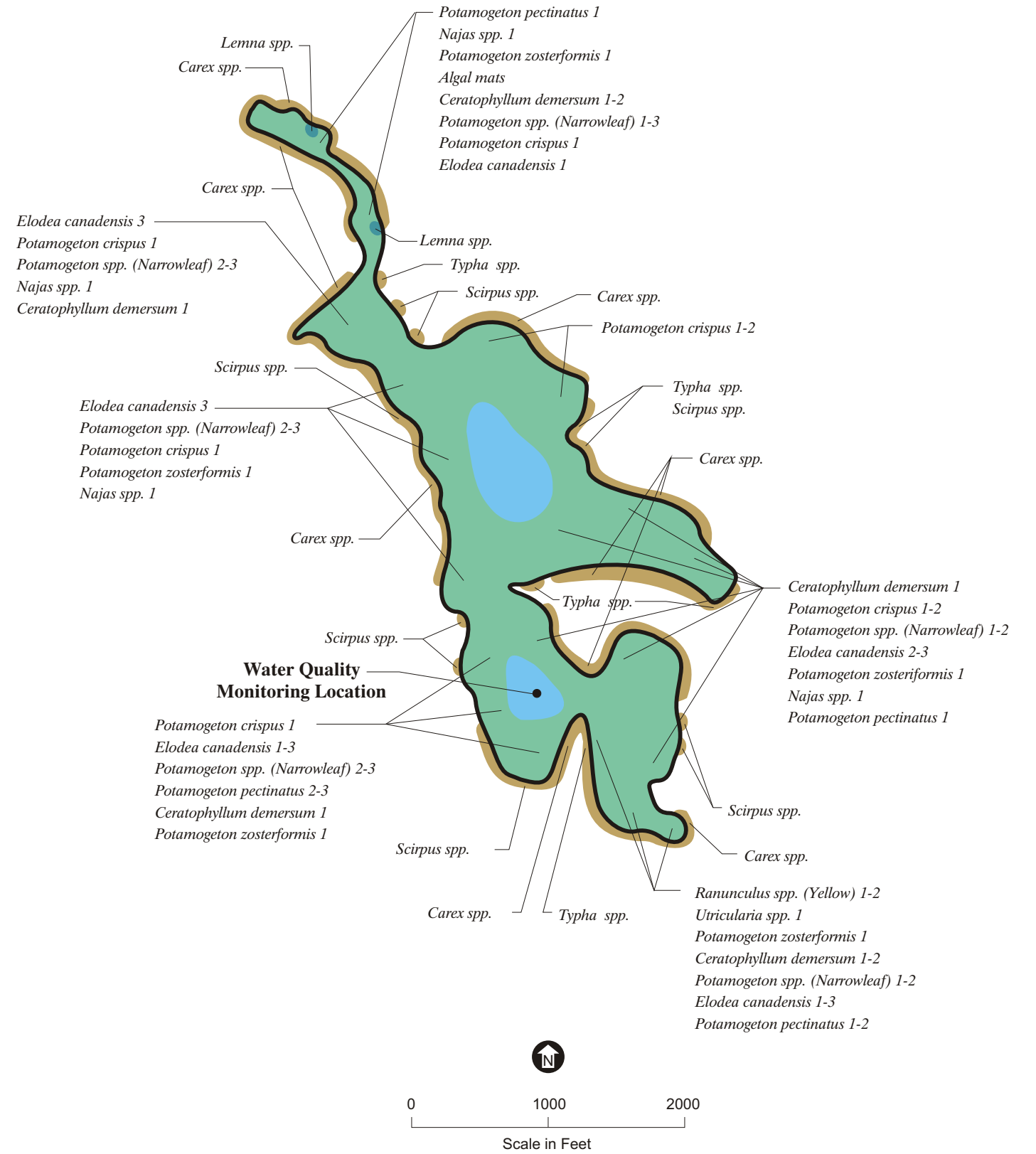
- Evaluate opportunities for enhanced treatment and/or infiltration in subwatersheds tributary to Raleigh Creek watershed
- Continue to target small scale BMPs throughout the tributary watershed through the VBWD's cost-share program
- Promote Washington County's financial assistance programs for non-complaint/non-functioning SSTS
- Continue routine monitoring of water quality and macrophytes

Strategies implement in the Eagle Point Lake will affect downstream waterbodies, including Horseshoe Lake.

## **Appendix B-5.12 Additional Macrophyte Information**

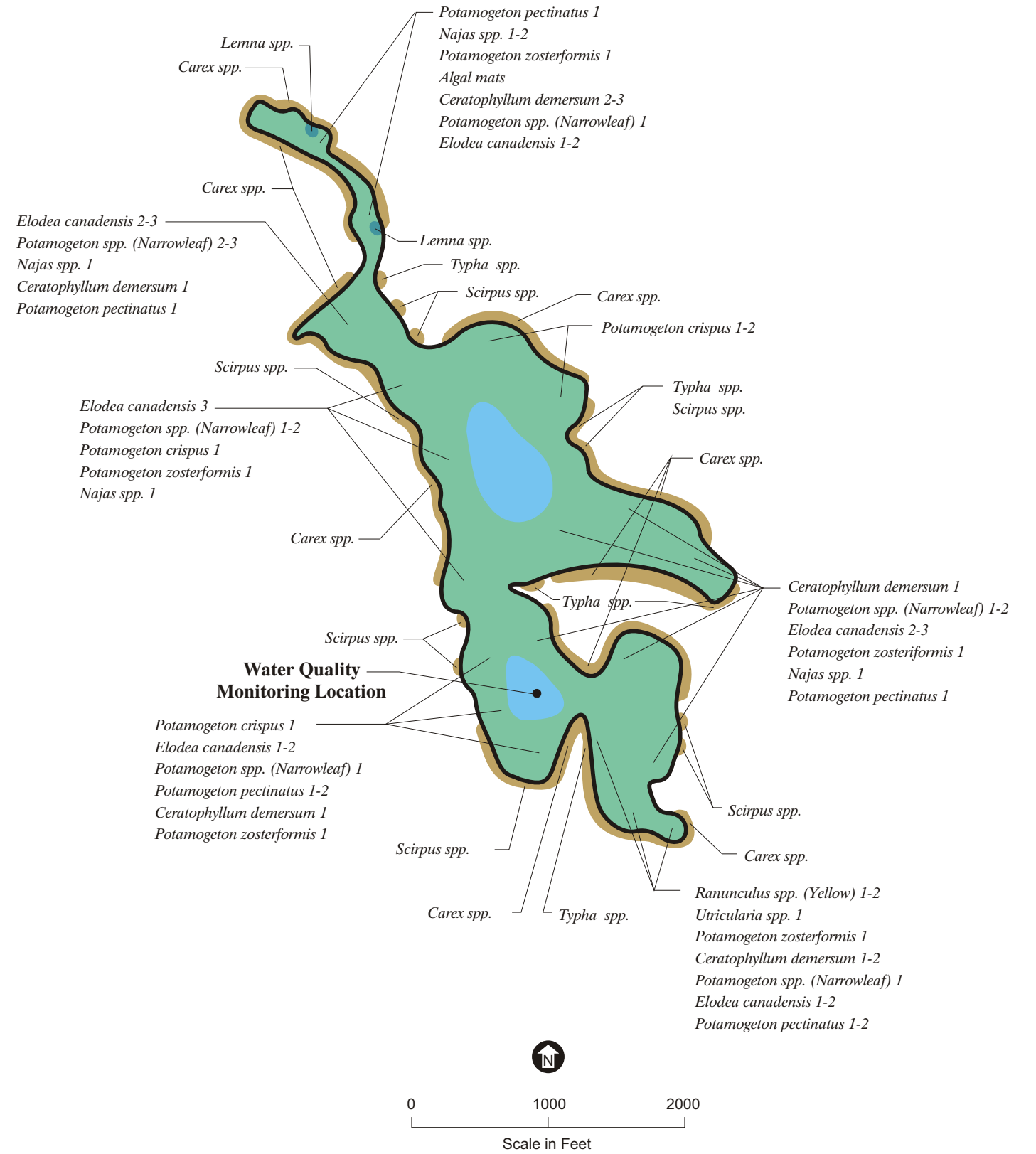
- No macrophytes found in water > 5-6.5 feet
- Macrophyte growth is heaviest along shoreline
- Macrophyte densities estimated as follows: 1 = light; 2 = moderate; 3 = heavy

	Common Name	Scientific Name
Submerged Aquatic Plants:	Curlyleaf pondweed	<i>Potamogeton crispus</i>
	Flatstem pondweed	<i>Potamogeton zosteriformis</i>
	Sago Pondweed	<i>Potamogeton pectinatus</i>
	Leafy/Narrowleaf pondweed	<i>Potamogeton spp.</i>
	Coontail	<i>Ceratophyllum demersum</i>
	Bushy pondweed and naiad	<i>Najas spp.</i>
	Yellow water buttercup	<i>Ranunculus spp.</i>
	Bladderwort	<i>Utricularia spp.</i>
	Elodea	<i>Elodea canadensis</i>
	Floating Leaf:	Duckweed (may include <i>Lemna major</i> , <i>Lemna minor</i> , Greater duck- weed and Watermeal)
Emergent:	Cattail	<i>Typha spp.</i>
	Sedge	<i>Carex spp.</i>
	Bulrush	<i>Scirpus spp.</i>
No Aquatic Vegetation Found:		



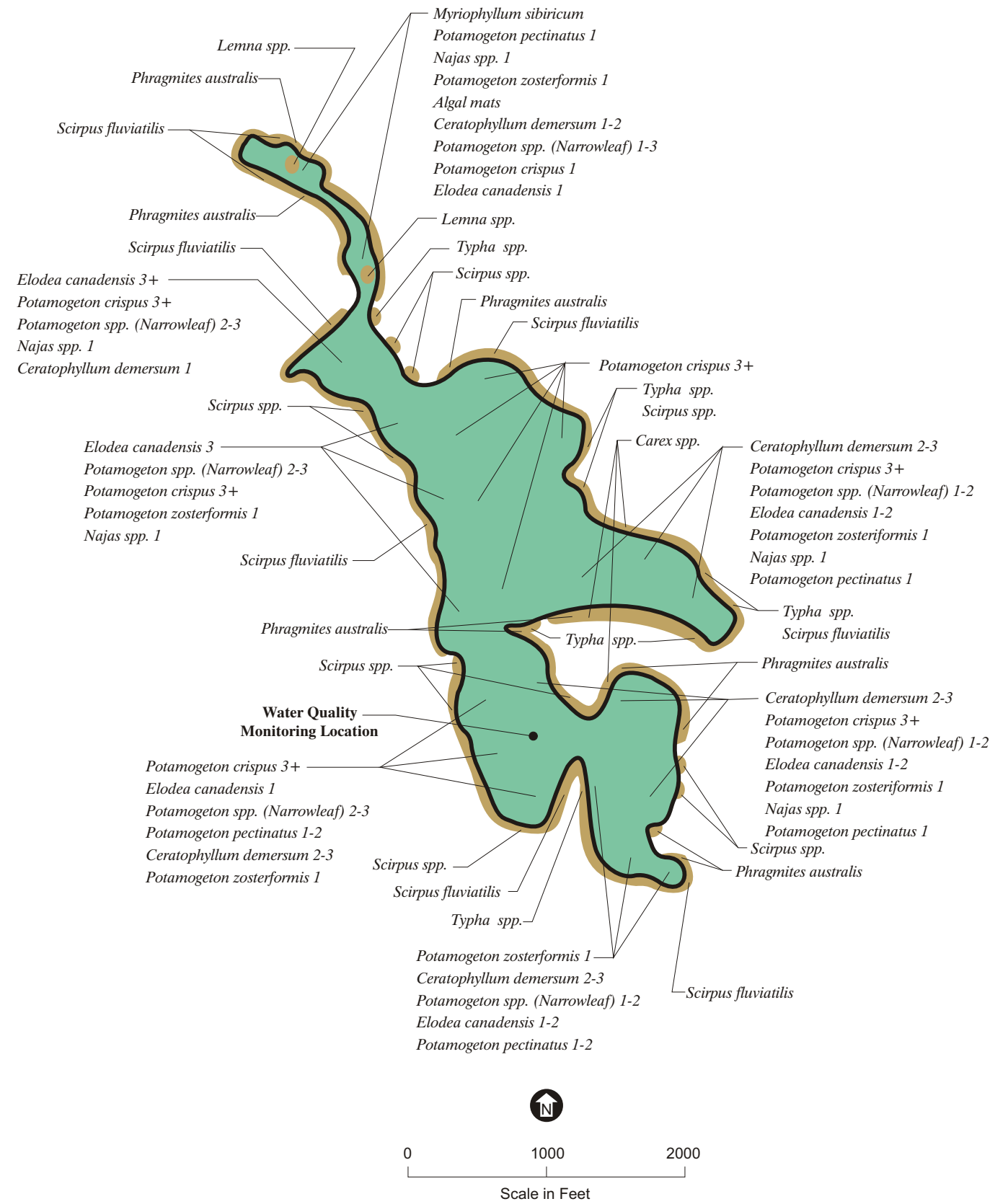
- No macrophytes found in water > 3-4 feet
- Macrophyte growth is heaviest along shoreline
- Macrophyte densities estimated as follows: 1 = light; 2 = moderate; 3 = heavy

	Common Name	Scientific Name
Submerged Aquatic Plants:	Curlyleaf pondweed	<i>Potamogeton crispus</i>
	Flatstem pondweed	<i>Potamogeton zosteriformis</i>
	Sago Pondweed	<i>Potamogeton pectinatus</i>
	Leafy/Narrowleaf pondweed	<i>Potamogeton spp.</i>
	Coontail	<i>Ceratophyllum demersum</i>
	Bushy pondweed and naiad	<i>Najas spp.</i>
	Yellow water buttercup	<i>Ranunculus spp.</i>
	Bladderwort	<i>Utricularia spp.</i>
	Elodea	<i>Elodea canadensis</i>
	Floating Leaf:	Duckweed (may include <i>Lemna major</i> , <i>Lemna minor</i> , Greater duck- weed and Watermeal)
Emergent:	Cattail	<i>Typha spp.</i>
	Sedge	<i>Carex spp.</i>
	Bulrush	<i>Scirpus spp.</i>
No Aquatic Vegetation Found:		



- Macrophytes found in throughout entire water body
- Macrophyte growth is heaviest along shoreline
- Macrophyte densities estimated as follows: 1 = light; 2 = moderate; 3 = heavy

	Common Name	Scientific Name
Submerged Aquatic Plants:	Curlyleaf pondweed	<i>Potamogeton crispus</i>
	Flatstem pondweed	<i>Potamogeton zosteriformis</i>
	Sago Pondweed	<i>Potamogeton pectinatus</i>
	Leafy/Narrowleaf pondweed	<i>Potamogeton spp.</i>
	Coontail	<i>Ceratophyllum demersum</i>
	Bushy pondweed and naiad	<i>Najas spp.</i>
	Elodea	<i>Elodea canadensis</i>
	Northern milfoil	<i>Myriophyllum sibiricum</i>
Floating Leaf:	Water meal	<i>Wolffia columbiana</i>
	Lesser duckweed	<i>Lemna minor</i>
	Greater duckweed	<i>Spirodela polyrhiza</i>
	Duckweed	<i>Lemna spp.</i>
	(May include Lemna major, Lemna minor, Greater duckweed and Watermeal)	
Emergent:	Cattail	<i>Typha spp.</i>
	River bulrush	<i>Scirpus fluviatilis</i>
	Bulrush	<i>Scirpus spp.</i>
	Giant reed grass	<i>Phragmites australis</i>
No Aquatic Vegetation Found:		



EAGLE POINT LAKE  
MACROPHYTE SURVEY  
JUNE 12, 2003

- Macrophytes found in throughout entire water body, P. crispus bloom which was dense throughout entire lake has dissipated
- Macrophyte growth is heaviest along shoreline
- Macrophyte densities estimated as follows: 1 = light; 2 = moderate; 3 = heavy
- Filamentous algal mats growing on Ceratophyllum demersum

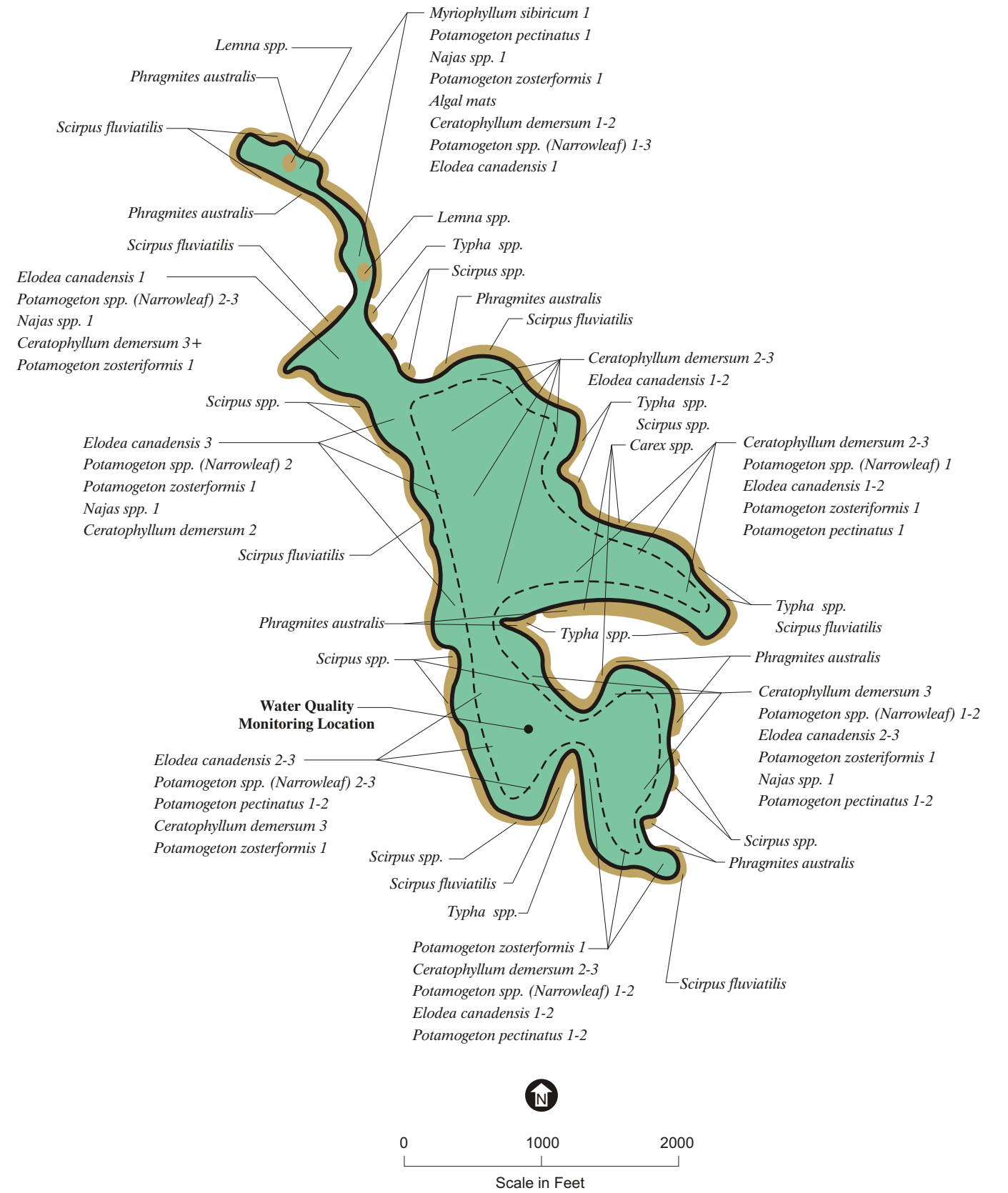
	Common Name	Scientific Name
Submerged Aquatic Plants:	Flatstem pondweed	<i>Potamogeton zosteriformis</i>
	Sago Pondweed	<i>Potamogeton pectinatus</i>
	Leafy/Narrowleaf pondweed	<i>Potamogeton spp.</i>
	Coontail	<i>Ceratophyllum demersum</i>
	Bushy pondweed and naiad	<i>Najas spp.</i>
	Elodea	<i>Elodea canadensis</i>
	Northern milfoil	<i>Myriophyllum sibiricum</i>
Floating Leaf:	Watermeal	<i>Wolffia columbiana</i>
	Lesser duckweed	<i>Lemna minor</i>
	Greater duckweed	<i>Spirodela polyrhiza</i>
	Duckweed	<i>Lemna spp.</i>
	(May include Lemna major, Lemna minor, Greater duckweed and Watermeal)	
Emergent:	Cattail	<i>Typha spp.</i>
	River bulrush	<i>Scirpus fluviatilis</i>
	Bulrush	<i>Scirpus spp.</i>
	Giant reed grass	<i>Phragmites australis</i>

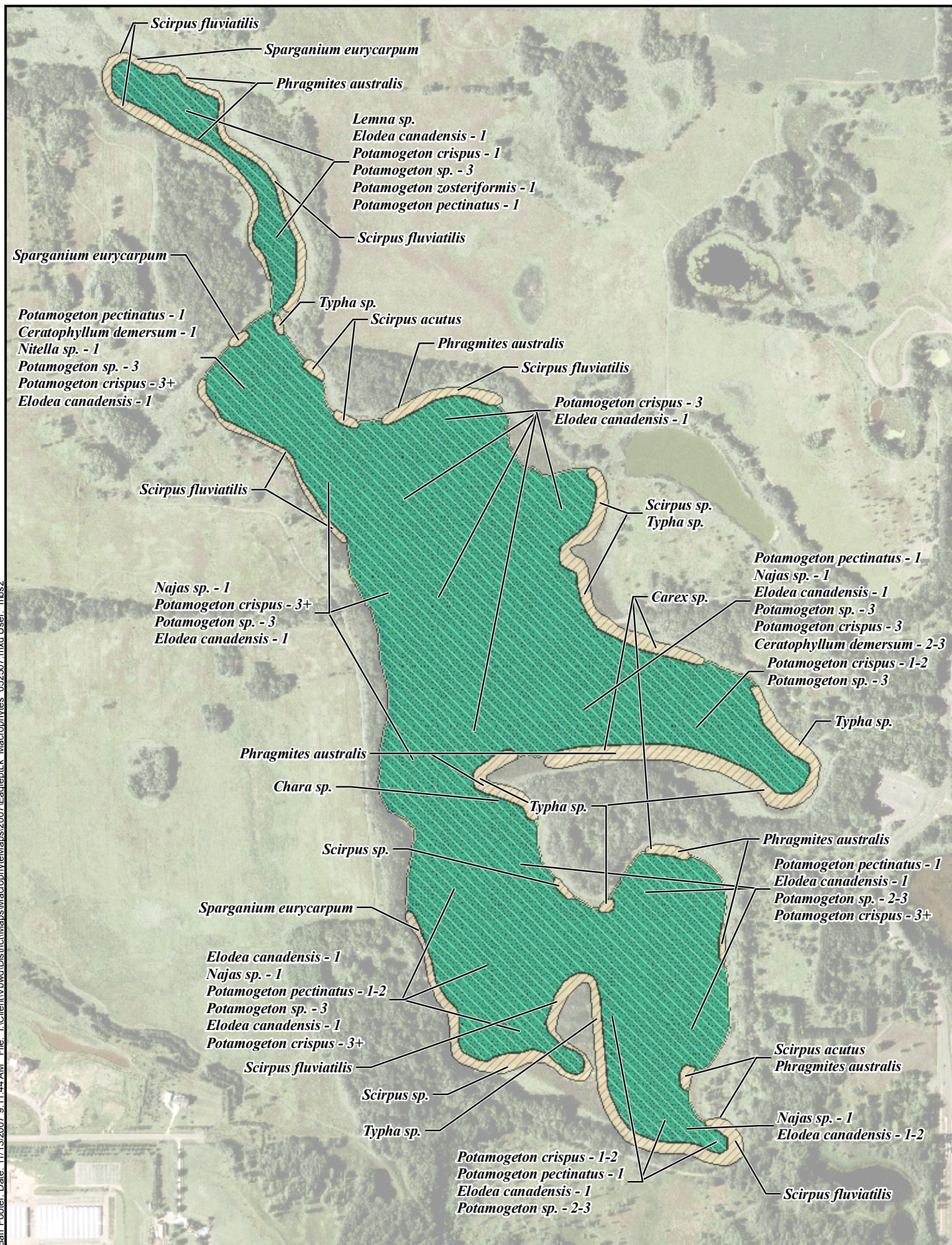
Found Throughout Lake

No Aquatic Vegetation Found:

Comments:

Area inside dashed line macrophyte growth is less dense beneath surface  
 1. *Ceratophyllum demersum*  
 2. *Elodea canadensis*





**Submerged Aquatic Plants**

Common Name	Scientific Name
bushy pondweed and naiads	<i>Najas sp.</i>
coontail	<i>Ceratophyllum demersum</i>
curlyleaf pondweed	<i>Potamogeton crispus</i>
flatstem pondweed	<i>Potamogeton zosteriformis</i>
muskgrass	<i>Chara sp.</i>
pondweed	<i>Potamogeton sp.</i>
sago pondweed	<i>Potamogeton pectinatus</i>
stonewort	<i>Nitella sp.</i>
Canada waterweed	<i>Elodea canadensis</i>

**Floating Leaf Plants**

Common Name	Scientific Name
water meal	<i>Wolffia columbiana</i>
duckweed	<i>Lemna sp.</i>
greater duckweed	<i>Spirodela polyrhiza</i>

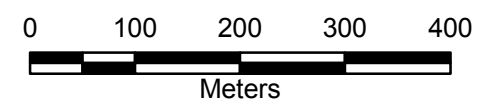
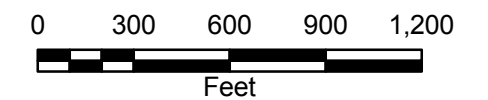
**Emergent Plants**

Common Name	Scientific Name
bulrush	<i>Scirpus sp.</i>
cattail	<i>Typha sp.</i>
common bur-reed	<i>Sparganium eurycarpum</i>
giant reed grass	<i>Phragmites australis</i>
hardstem bulrush	<i>Scirpus acutus</i>
river bulrush	<i>Scirpus fluviatilis</i>
sedge	<i>Carex sp.</i>

**FIELD NOTES:**  
 - Macrophyte densities estimated as follows:  
 1=light; 2=moderate; 3=heavy  
 - Densities generally not noted for emergent and floating leaf plants  
 - *Wolffia columbiana*, *Lemna sp.* and *Spirodela polyrhiza* found throughout entire waterbody  
 - Macrophyte growth is heaviest along the shoreline

**Legend**

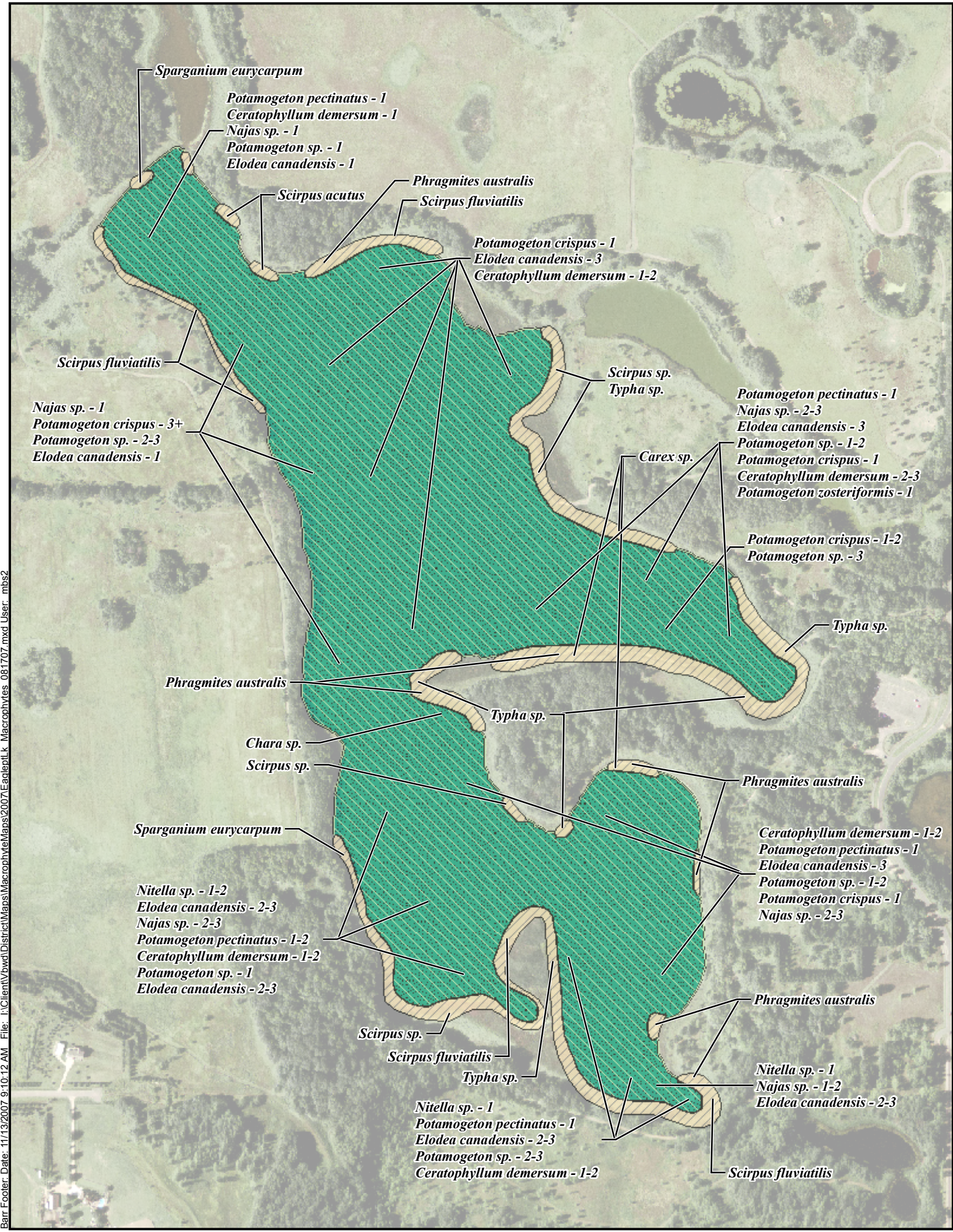
- Emergent Plants
- Floating Leaf Plants
- Submerged Aquatic Plants
- No Aquatic Vegetation



Imagery Source: 2006 AE



**EAGLE POINT LAKE MACROPHYTE SURVEY RESULTS**  
 May 25, 2007  
 Valley Branch Watershed District



**Submerged Aquatic Plants**

Common Name	Scientific Name
Canada waterweed	<i>Elodea canadensis</i>
bushy pondweed and naiads	<i>Najas sp.</i>
coontail	<i>Ceratophyllum demersum</i>
curlyleaf pondweed	<i>Potamogeton crispus</i>
flatstem pondweed	<i>Potamogeton zosteriformis</i>
muskgrass	<i>Chara sp.</i>
pondweed	<i>Potamogeton sp.</i>
sago pondweed	<i>Potamogeton pectinatus</i>
stonewort	<i>Nitella sp.</i>

**Floating Leaf Plants**

Common Name	Scientific Name
water meal	<i>Wolffia columbiana</i>
duckweed	<i>Lemna sp.</i>
greater duckweed	<i>Spirodela polyrhiza</i>

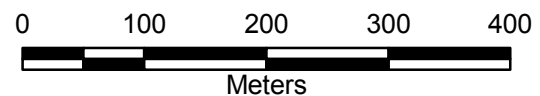
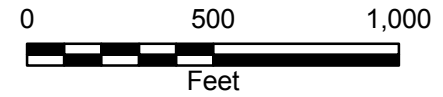
**Emergent Plants**

Common Name	Scientific Name
bulrush	<i>Scirpus sp.</i>
cattail	<i>Typha sp.</i>
common bur-reed	<i>Sparganium eurycarpum</i>
giant reed grass	<i>Phragmites australis</i>
hardstem bulrush	<i>Scirpus acutus</i>
river bulrush	<i>Scirpus fluviatilis</i>
sedge	<i>Carex sp.</i>

**FIELD NOTES:**  
 - Macrophyte densities estimated as follows:  
 1=light; 2=moderate; 3=heavy  
 - Densities generally not noted for emergent and floating leaf plants  
 - *Wolffia columbiana*, *Lemna sp.* and *Spirodela polyrhiza* found throughout entire waterbody  
 - Macrophyte growth is heaviest along the shoreline  
 - Algal mats present

**Legend**

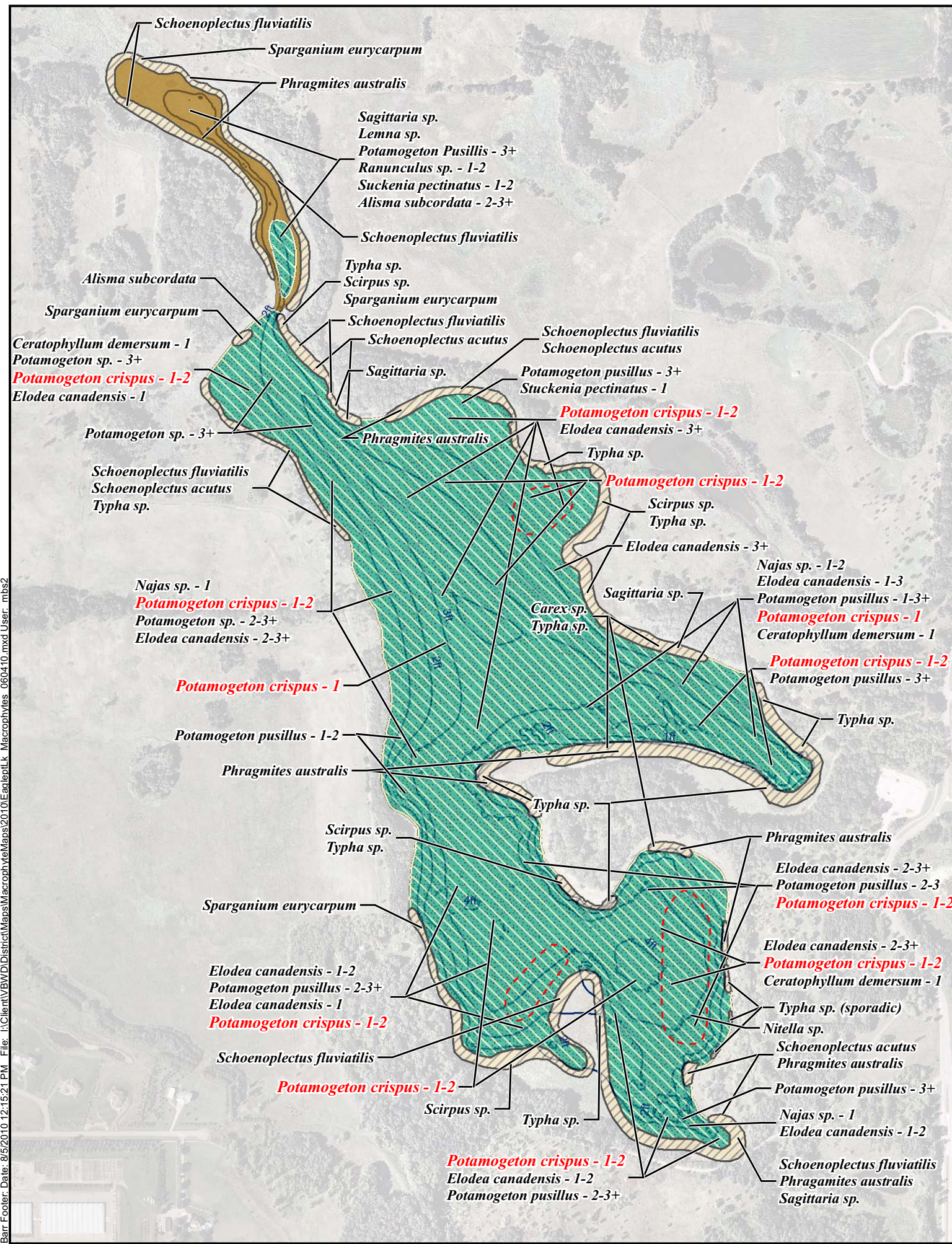
- Emergent Plants
- Floating Leaf Plants
- Submerged Aquatic Plants
- No Aquatic Vegetation



Imagery Source: 2006 AE



**EAGLE POINT LAKE MACROPHYTE SURVEY RESULTS**  
 August 17, 2007  
 Valley Branch Watershed District



**Submerged Aquatic Plants**

Common Name	Scientific Name
bushy pondweed and naiads	<i>Najas sp.</i>
water crowfeet	<i>Ranunculus sp.</i>
coontail	<i>Ceratophyllum demersum</i>
<b>curlyleaf pondweed</b>	<b><i>Potamogeton crispus</i></b>
small pondweed	<i>Potamogeton pusillus</i>
sago pondweed	<i>Stuckenia pectinatus</i>
stoneworts	<i>Nitella sp.</i>
Canada waterweed	<i>Elodea canadensis</i>

**Floating Leaf Plants**

Common Name	Scientific Name
water meal	<i>Wolffia columbiana</i>
duckweed	<i>Lemna sp.</i>
greater duckweed	<i>Spirodela polyrhiza</i>

**Emergent Plants**

Common Name	Scientific Name
bulrush	<i>Scirpus sp.</i>
cattail	<i>Typha sp.</i>
common bur-reed	<i>Sparganium eurycarpum</i>
giant reed grass	<i>Phragmites australis</i>
hardstem bulrush	<i>Schoenoplectus acutus</i>
river bulrush	<i>Schoenoplectus fluviatilis</i>
arrowhead	<i>Sagittaria sp.</i>
water plantain	<i>Alisma subcordata</i>
sedge	<i>Carex sp.</i>

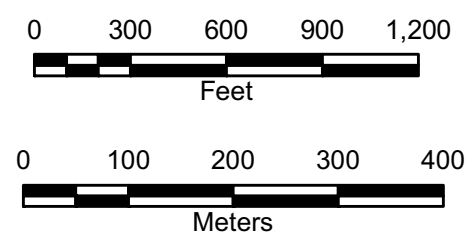
\*Note: Bold red name indicates extremely aggressive/invasive introduced species.

**FIELD NOTES:**

- Macrophyte densities estimated as follows: 1=light; 2=moderate; 3=heavy
- Densities generally not noted for emergent and floating leaf plants
- *Wolffia columbiana*, *Lemna sp.* and *Spirodela polyrhiza* found throughout entire waterbody
- Macrophyte growth is heaviest along the shoreline
- Low water level
- Algal mats present
- Wet shoreline is sporadic with: *Schoenoplectus fluviatilis*, *Typha sp.*, *Schoenoplectus acutus*, *Sagittaria sp.*
- *Potamogeton crispus* is less dense than 2009 and those present are not healthy in appearance.
- *Potamogeton sp.* and *Potamogeton pusillus* is dense in areas close to shore

**Legend**

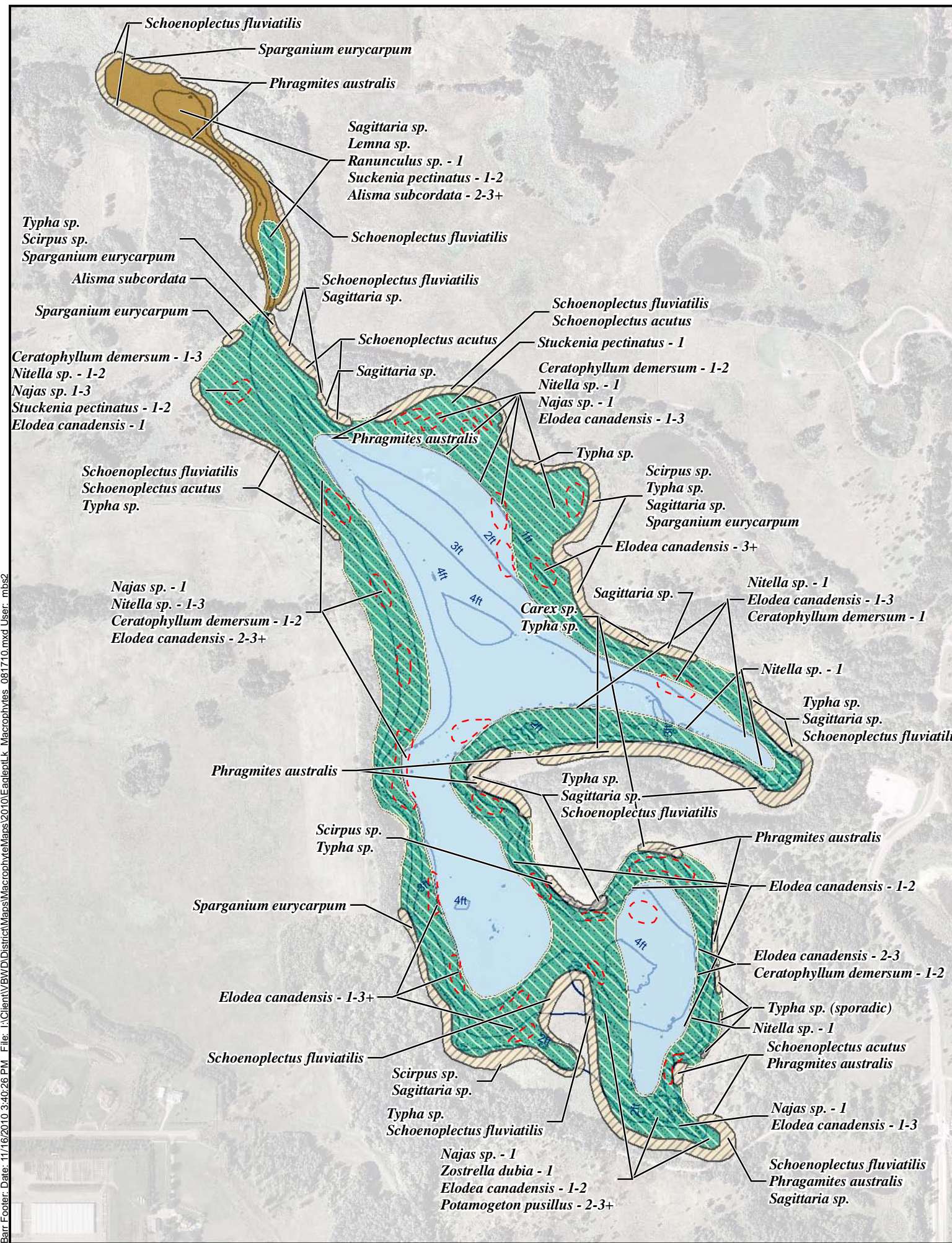
- Dry
- Emergent Plants
- Floating Leaf Plants
- Submerged Aquatic Plants
- No Aquatic Vegetation
- Extremely Dense Areas of *Potamogeton Crispus*



Imagery Source: 2009 AE



**EAGLE POINT LAKE MACROPHYTE SURVEY RESULTS**  
 June 4, 2010  
 Valley Branch Watershed District



**Submerged Aquatic Plants**

Common Name	Scientific Name
bushy pondweed and naiads	<i>Najas sp.</i>
water crowfeet	<i>Ranunculus sp.</i>
coontail	<i>Ceratophyllum demersum</i>
small pondweed	<i>Potamogeton pusillus</i>
sago pondweed	<i>Stuckenia pectinatus</i>
water stargrass	<i>Zostrella dubia</i>
stoneworts	<i>Nitella sp.</i>
Canada waterweed	<i>Elodea canadensis</i>

**Floating Leaf Plants**

Common Name	Scientific Name
duckweed	<i>Lemna sp.</i>

**Emergent Plants**

Common Name	Scientific Name
bulrush	<i>Scirpus sp.</i>
cattail	<i>Typha sp.</i>
common bur-reed	<i>Sparganium eurycarpum</i>
giant reed grass	<i>Phragmites australis</i>
hardstem bulrush	<i>Schoenoplectus acutus</i>
river bulrush	<i>Schoenoplectus fluviatilis</i>
arrowhead	<i>Sagittaria sp.</i>
water plantain	<i>Alisma subcordata</i>
sedge	<i>Carex sp.</i>

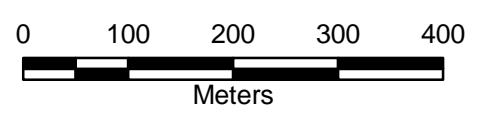
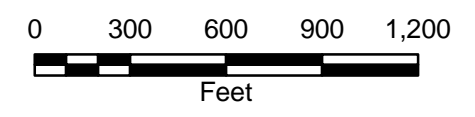
\*Note: Bold red name indicates extremely aggressive/invasive introduced species.

**FIELD NOTES:**

- Macrophyte densities estimated as follows: 1=light; 2=moderate; 3=heavy
- Densities generally not noted for emergent and floating leaf plants
- *Wolffia columbiana*, *Lemna sp.* and *Spirodela polyrhiza* found throughout entire waterbody
- Macrophyte growth is heaviest along the shoreline
- Low water level
- Wet shoreline is sporadic with: *Schoenoplectus fluviatilis*, *Typha sp.*, *Schoenoplectus acutus*, *Sagittaria sp.*
- *Potamogeton crispus* is less dense than 2009 and those present are not healthy in appearance.
- Areas of dense *Elodea canadensis* - dashed red lines

**Legend**

- Dry
- Emergent Plants
- Floating Leaf Plants
- Submerged Aquatic Plants
- No Aquatic Vegetation
- Extremely Dense Areas of *Elodea canadensis*



Imagery Source: 2009 AE



**EAGLE POINT LAKE MACROPHYTE SURVEY RESULTS**  
 August 17, 2010  
 Valley Branch Watershed District

Barr Footer: ArcGIS 10.0, 2011-07-21 08:36:00, 131000 File: I:\Client\VBWPD\District\Maps\Macrophyte\Map\2011\EaglePtLk\_Macrophytes\_060911.mxd User: kac2



**Submerged Aquatic Plants**

Common Name	Scientific Name
Muskgrass	Chara sp.
Slender naiad	Najas sp.
Water crowfeet	Ranunculus sp.
Coontail	Ceratophyllum demersum
<b>Curlyleaf pondweed</b>	<b>Potamogeton crispus</b>
Small pondweed	Potamogeton pusillus
Sago pondweed	Stuckenia pectinatus
Stoneworts	Nitella sp.
Canada waterweed	Elodea canadensis

**Floating Leaf Plants**

Common Name	Scientific Name
Water meal	Wolffia columbiana
Duckweed	Lemna sp.
Greater duckweed	Spirodela polyrhiza
Slender riccia	Riccia fluitans

**Emergent Plants**

Common Name	Scientific Name
Bulrush	Scirpus sp.
Cattail	Typha sp.
Common bur-reed	Sparganium eurycarpum
Giant reed grass	Phragmites australis
Hardstem bulrush	Schoenoplectus acutus
River bulrush	Schoenoplectus fluviatilis
Arrowhead	Sagittaria sp.
Water plantain	Alisma subcordata
Sedge	Carex sp.

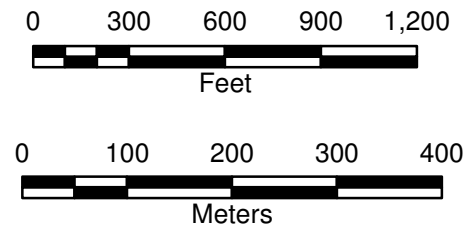
\*Note: Bold red name indicates extremely aggressive/invasive introduced species.

**FIELD NOTES:**

- Macrophyte densities estimated as follows: 1=light; 2=moderate; 3=heavy
- Densities generally not noted for emergent and floating leaf plants
- Wolffia columbiana, Lemna sp. and Spirodela polyrhiza found throughout entire waterbody
- Algal mats present - north arm
- Wet shoreline is sporadic with: Schoenoplectus fluviatilis, Typha sp. Schoenoplectus acutus, Sagittaria sp.
- Potamogeton sp. and Potamogeton pusillus is dense in areas close to shore

**Legend**

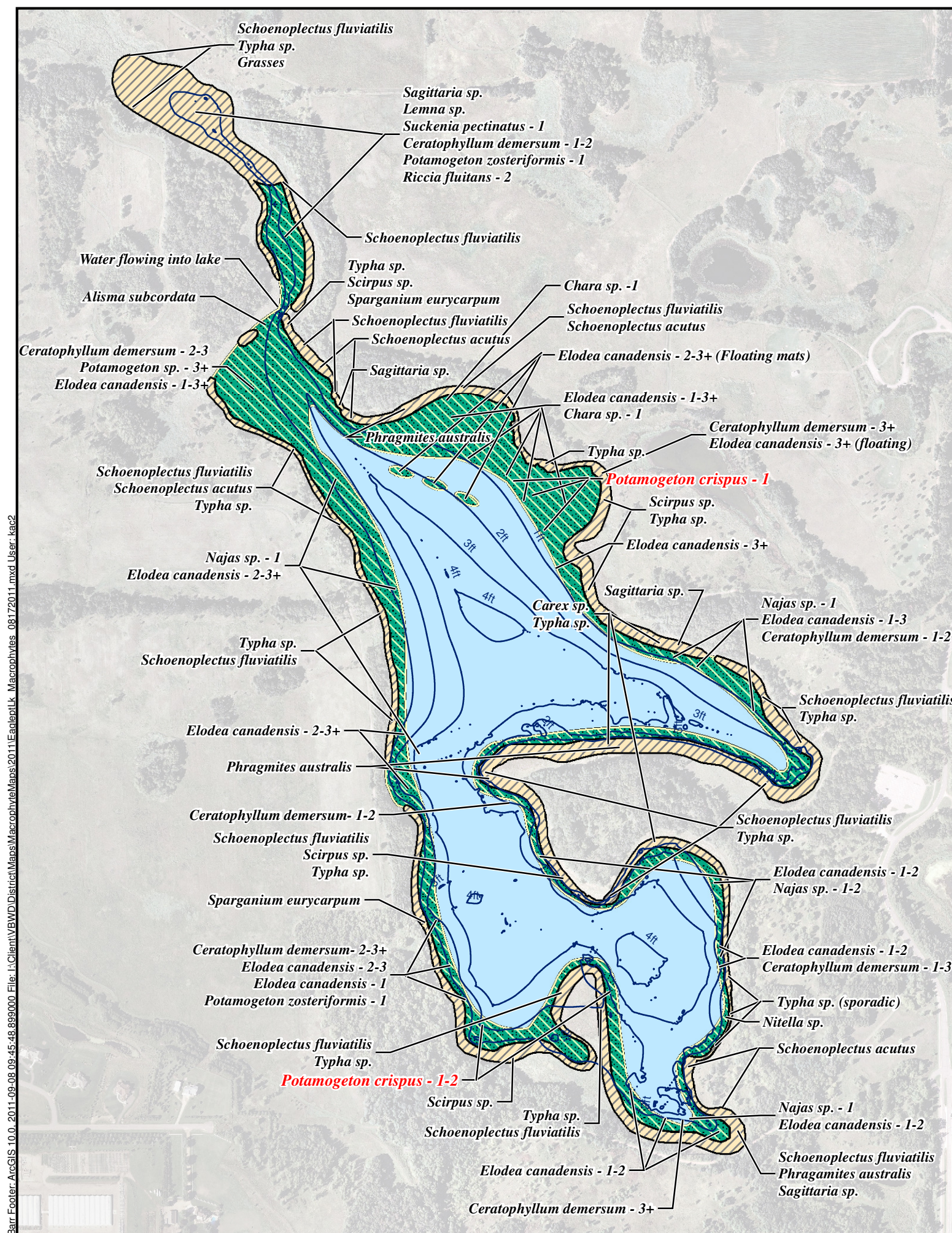
- Dry
- Emergent Plants
- Floating Leaf Plants
- Submerged Aquatic Plants
- No Aquatic Vegetation
- Extremely Dense Areas of Potamogeton Crispus Growing to Surface



Imagery Source: 2009 AE



**EAGLE POINT LAKE MACROPHYTE SURVEY RESULTS**  
 June 9, 2011  
 Valley Branch Watershed District



**Submerged Aquatic Plants**

Common Name	Scientific Name
Muskgrass	Chara sp.
Flatstem pondweed	Potamogeton zosteriformis
Slender naiad	Najas sp.
Water crowfeet	Ranunculus sp.
Coontail	Ceratophyllum demersum
<b>Curlyleaf pondweed</b>	<b>Potamogeton crispus</b>
Small pondweed	Potamogeton pusillus
Sago pondweed	Stuckenia pectinatus
Stoneworts	Nitella sp.
Canada waterweed	Elodea canadensis

**Floating Leaf Plants**

Common Name	Scientific Name
Water meal	Wolffia columbiana
Duckweed	Lemna sp.
Greater duckweed	Spirodela polyrhiza
Slender riccia	Riccia fluitans

**Emergent Plants**

Common Name	Scientific Name
Bulrush	Scirpus sp.
Cattail	Typha sp.
Common bur-reed	Sparganium eurycarpum
Giant reed grass	Phragmites australis
Hardstem bulrush	Schoenoplectus acutus
River bulrush	Schoenoplectus fluviatilis
Arrowhead	Sagittaria sp.
Water plantain	Alisma subcordata
Sedge	Carex sp.

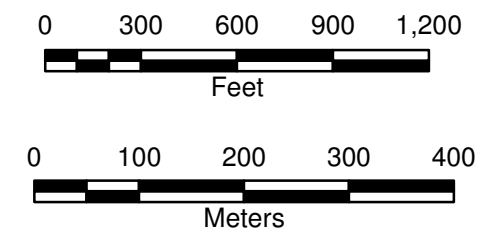
\*Note: Bold red name indicates extremely aggressive/invasive introduced species.

**FIELD NOTES:**

- Macrophyte densities estimated as follows: 1=light; 2=moderate; 3=heavy
- Densities generally not noted for emergent and floating leaf plants
- Wolffia columbiana, Lemna sp. and Spirodela polyrhiza found throughout entire waterbody
- Wet shoreline is sporadic with: Schoenoplectus fluviatilis, Typha sp. Schoenoplectus acutus, Sagittaria sp.
- High water level, water flowing into lake on north end
- Lake appears to have been treated since June. Elodea is brown with green tips (growing)

**Legend**

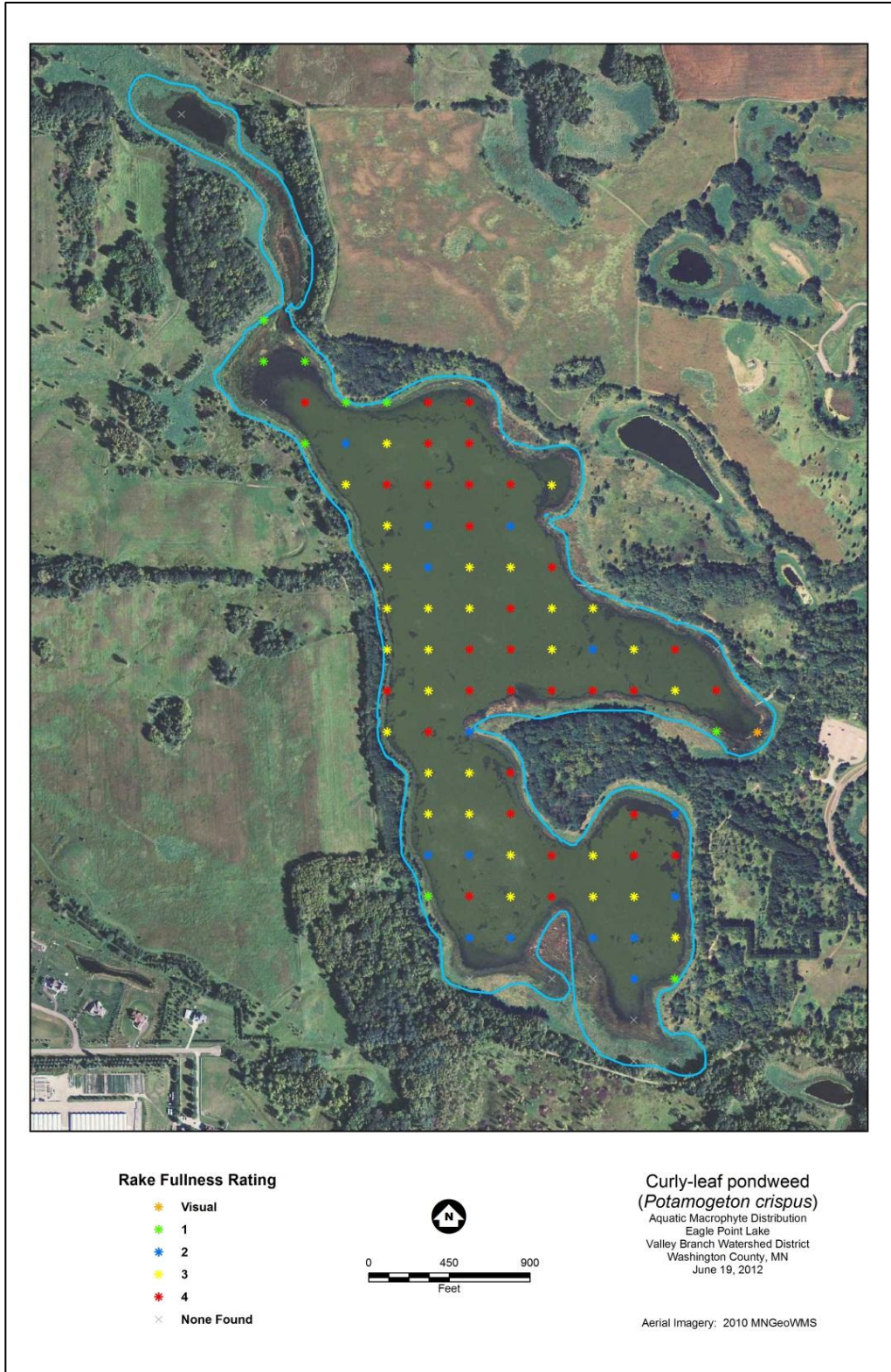
- Emergent Plants
- Floating Leaf Plants
- Submerged Aquatic Plants
- No Aquatic Vegetation



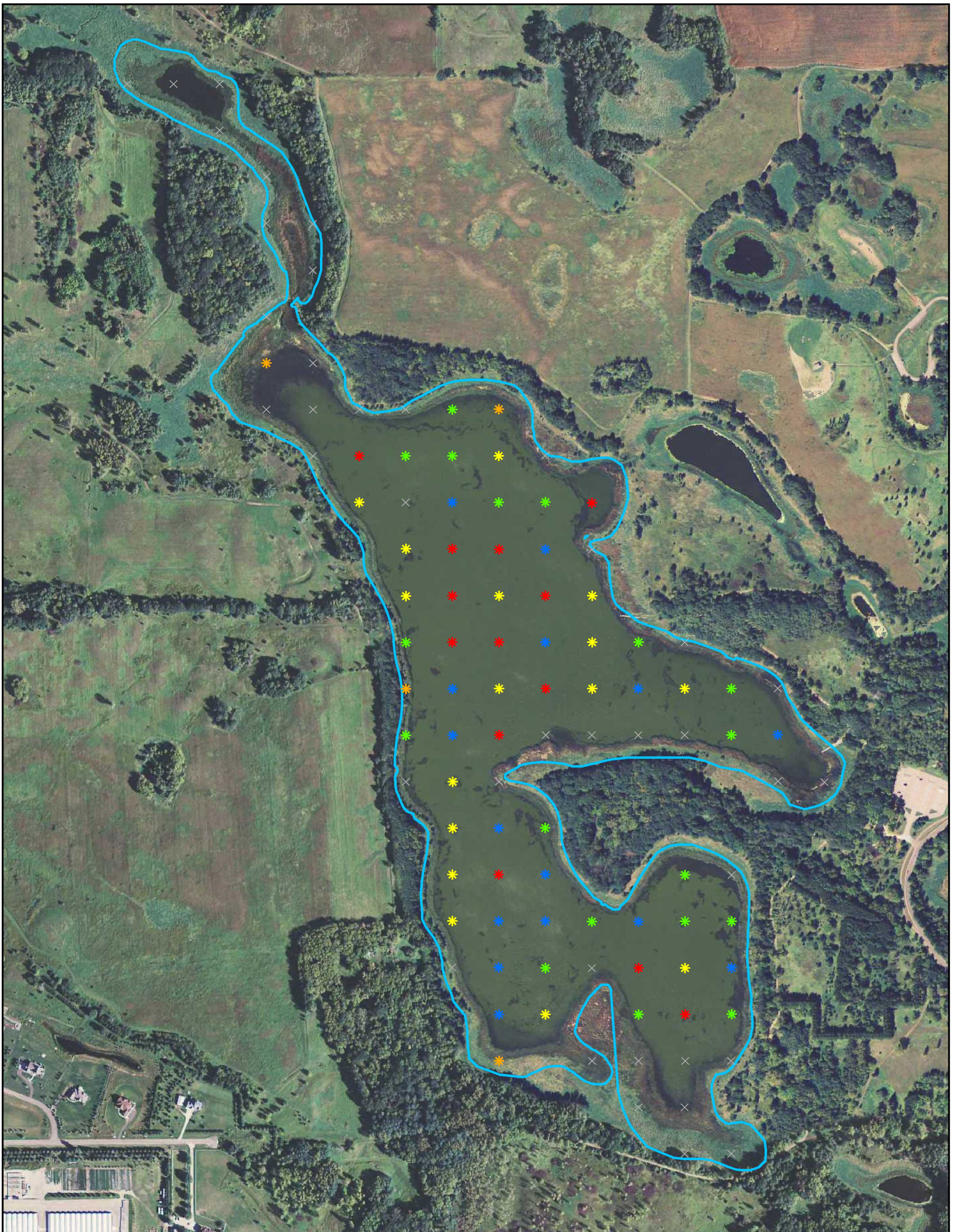
Imagery Source: 2009 AE









**EAGLE POINT LAKE MACROPHYTE SURVEY RESULTS**  
 August 17, 2011  
 Valley Branch Watershed District

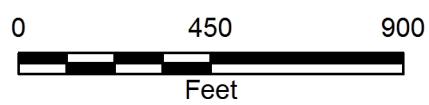


**Figure 22. Eagle Point Lake Curly-leaf Pondweed: June 19, 2012**



**Rake Fullness Rating**

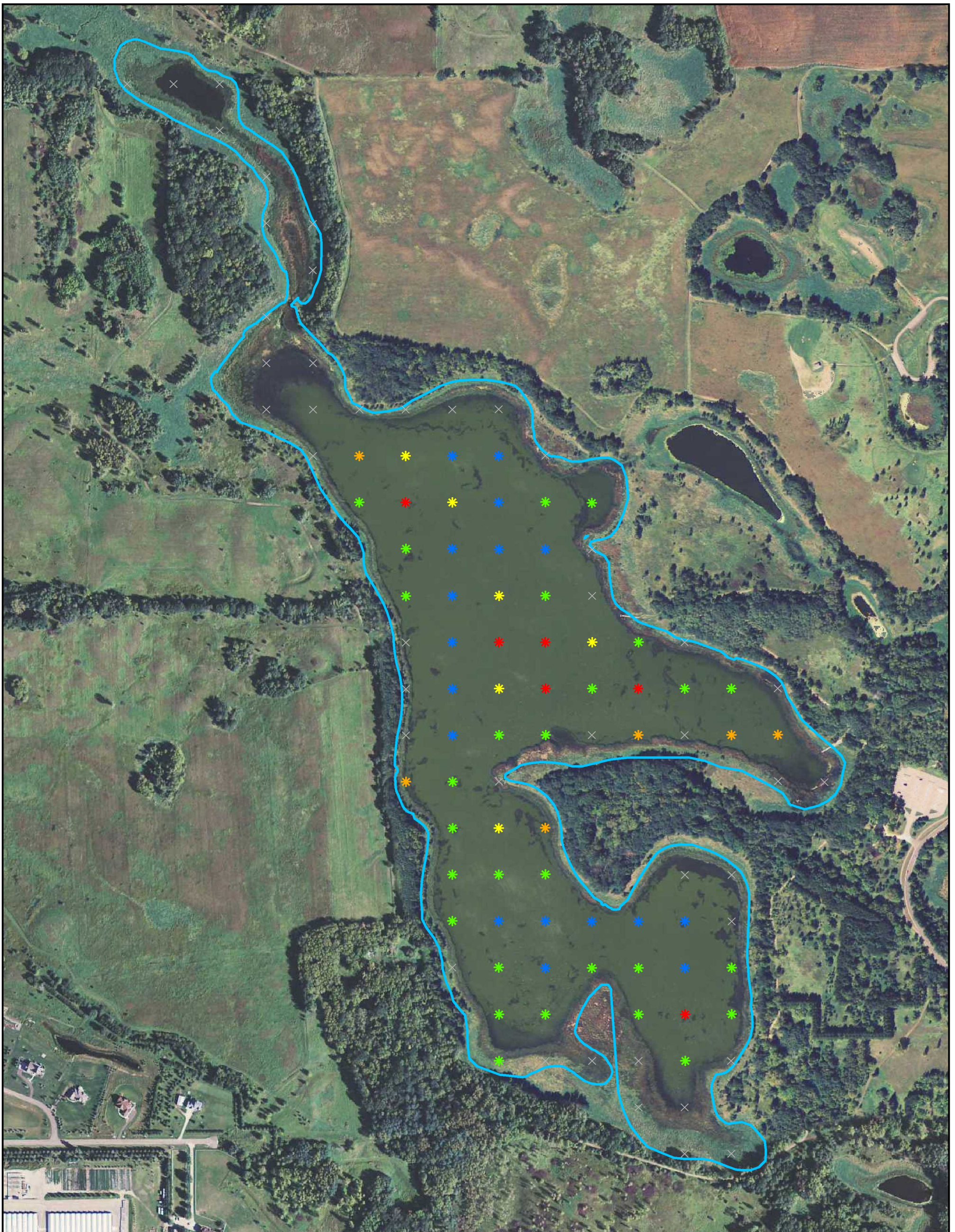
-  Visual
-  1
-  2
-  3
-  4
-  None Found









**Curly-leaf pondweed  
(*Potamogeton crispus*)**

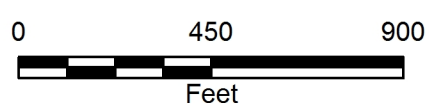
Aquatic Macrophyte Distribution  
Eagle Point Lake  
Valley Branch Watershed District  
Washington County, MN  
June 27, 2013

Aerial Imagery: 2010 MNGeoWMS



**Rake Fullness Rating**

-  Visual
-  1
-  2
-  3
-  4
-  None Found



**Curly-leaf pondweed  
(*Potamogeton crispus*)**

Macrophyte Point Intercept Survey  
Eagle Point Lake  
Valley Branch Watershed District  
Washington County, MN  
June 26, 2014

Aerial Imagery: 2010 MNGeoWMS

## **Appendix C-5.12 Additional Phytoplankton Information**

**EAGLE POINT LAKE**  
**PHYTOPLANKTON SUMMARY**  
**SAMPLE: 0-2 METERS**  
**STANDARD INVERTED MICROSCOPE ANALYSIS METHOD**

DIVISION	TAXON	06/16/98 units/mL	07/14/98 units/mL	08/11/98 units/mL	08/25/98 units/mL	09/09/98 units/mL
CHLOROPHYTA (GREEN ALGAE)	<i>Actinastrum Hantzschii</i>	0	137	0	92	42
	<i>Ankistrodesmus falcatius</i>	42	410	137	646	0
	<i>Ankistrodesmus Brauni</i>	0	0	0	92	0
	<i>Chlamydomonas globosa</i>	5,878	1,093	1,093	1,200	1,517
	<i>Coelastrum microporum</i>	0	46	273	92	632
	<i>Dictyosphaerium Ehrenbergianum</i>	0	46	0	0	0
	<i>Elakatothrix gelatinosa</i>	0	91	0	92	0
	<i>Golenkinia radiata</i>	0	0	0	0	42
	<i>Lagerheimia sp.</i>	0	0	0	0	169
	<i>Oocystis parva</i>	105	319	0	185	169
	<i>Pediastrum Boryanum</i>	0	0	0	92	84
	<i>Pediastrum duplex</i>	0	0	0	0	126
	<i>Pediastrum simplex</i>	0	0	0	0	42
	<i>Scenedesmus dimorphus</i>	0	91	0	0	0
	<i>Scenedesmus quadricauda</i>	21	319	0	277	253
	<i>Scenedesmus sp.</i>	21	0	0	0	0
	<i>Schroederia Judayi</i>	337	91	0	0	0
	<i>Selenastrum minutum</i>	885	46	0	92	42
	<i>Sphaerocystis Schroeteri (Colony)</i>	0	0	0	0	211
	<i>Selenastrum minutum</i>	0	0	0	185	126
	<i>Staurastrum sp.</i>	21	0	137	185	211
	<i>Tetraedron muticum</i>	0	0	0	0	42
	<i>Tetraedron sp.</i>	0	0	0	92	42
<i>Treubaria setigerum</i>	0	0	0	0	42	
<b>CHLOROPHYTA TOTAL</b>		<b>7,311</b>	<b>2,687</b>	<b>1,640</b>	<b>3,322</b>	<b>3,793</b>
CHRYSTOPHYTA ( GOLDEN BROWN ALGAE)	<b>CHRYSTOPHYTA TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
CYANOPHYTA (BLUE-GREEN ALGAE)	<i>Anabaena affinis</i>	0	1,731	2,186	0	126
	<i>Anabaena flos-aquae</i>	21	3,826	1,230	0	84
	<i>Anabaena spiroides v. crassa</i>	42	137	0	0	0
	<i>Anabaenopsis raciborski</i>	21	2,505	48,644	27,406	1,601
	<i>Aphanizomenon flos-aquae</i>	990	9,701	11,614	2,584	590
	<i>Aphanocapsa delicatissima</i>	0	46	0	0	0
	<i>Coelosphaerium Naegelianum</i>	0	0	137	554	0
	<i>Merismopedia tenuissima</i>	21	319	0	0	0
	<i>Merismopedia sp.</i>	0	0	137	0	0
	<i>Microcystis aeruginosa</i>	253	4,099	1,913	1,476	2,908
	<i>Microcystis incerta</i>	0	547	410	92	126
	<i>Oscillatoria Agardhii</i>	0	0	9,155	13,565	126
	<i>Oscillatoria limnetica</i>	21	501	137	277	295
	<i>Rhabdoderma lineare</i>	42	0	0	0	0
<b>CYANOPHYTA TOTAL</b>		<b>1,412</b>	<b>23,411</b>	<b>75,562</b>	<b>45,954</b>	<b>5,857</b>
BACILLARIOPHYTA (DIATOMS)	<i>Cocconeis placentula</i>	21	0	0	0	0
	<i>Fragilaria crotonensis</i>	0	0	0	0	42
	<i>Gomphonema sp.</i>	21	0	0	0	0
	<i>Melosira granulata</i>	274	364	137	277	2,402
	<i>Melosira granulata v. angustissima</i>	0	0	0	185	1,096
	<i>Navicula sp.</i>	0	46	0	0	42
	<i>Stephanodiscus Hantzschii</i>	84	182	0	92	506
<b>BACILLARIOPHYTA TOTAL</b>		<b>400</b>	<b>592</b>	<b>137</b>	<b>554</b>	<b>4,088</b>
CRYPTOPHYTA (CRYPTOMONADS)	<i>Cryptomonas erosa</i>	1,096	137	273	2,768	1,686
<b>CRYPTOPHYTA TOTAL</b>		<b>1,096</b>	<b>137</b>	<b>273</b>	<b>2,768</b>	<b>1,686</b>
EUGLENOPHYTA (EUGLENOIDS)	<b>EUGLENOPHYTA TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
PYRRHOPHYTA (DINOFLAGELLATES)	<i>Ceratium hirundinella</i>	21	0	0	0	42
	<b>PYRRHOPHYTA TOTAL</b>		<b>21</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTALS</b>		<b>10,240</b>	<b>26,827</b>	<b>77,611</b>	<b>52,597</b>	<b>15,465</b>

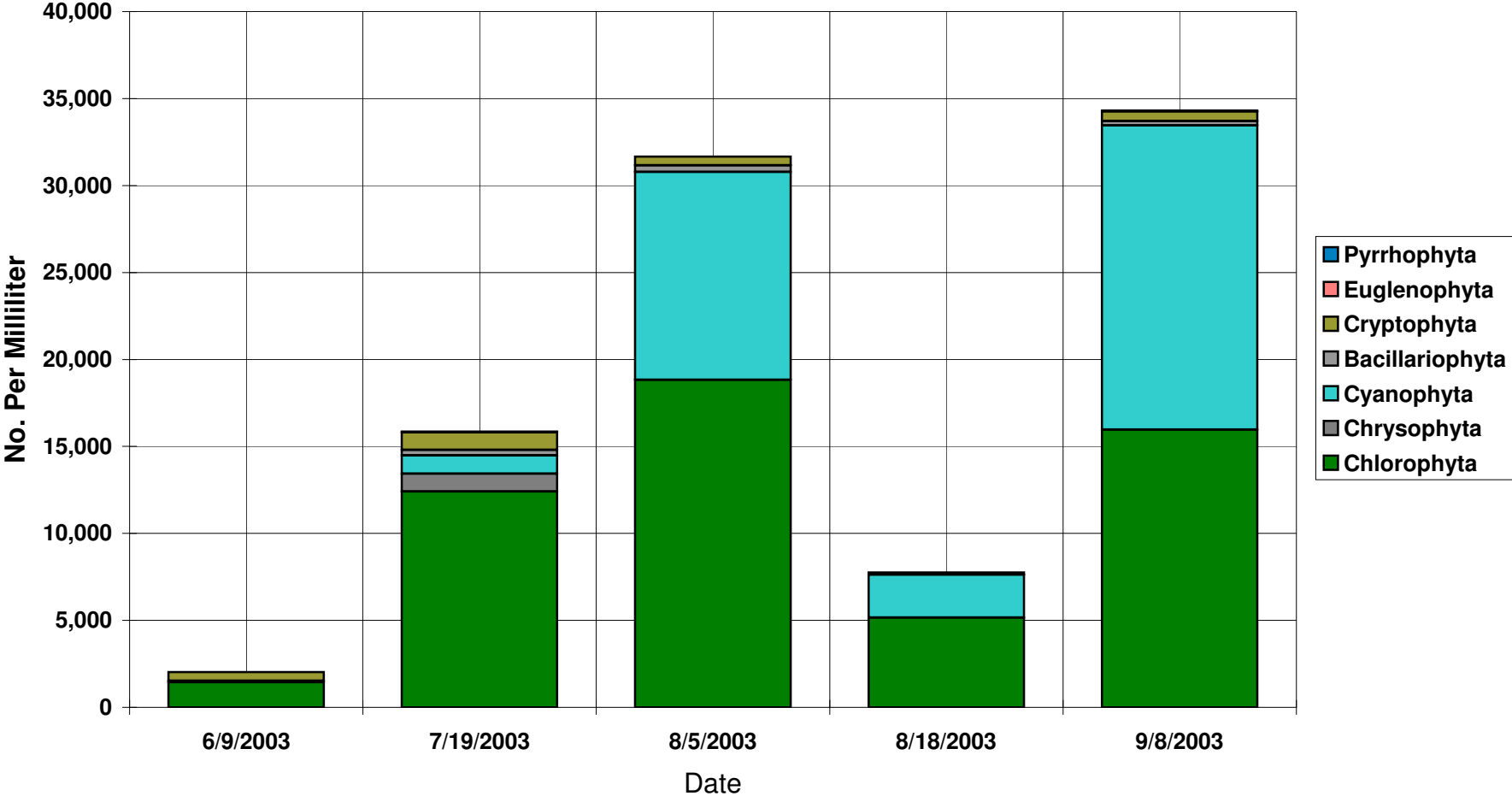
**EAGLE POINT LAKE**

SAMPLE: 0-2 METERS (INT. TUBE)

STANDARD PHYTOPLANKTON CLUMP COUNT

DIVISION	TAXON	6/9/2003	7/19/2003	8/5/2003	8/18/2003	9/8/2003	
		units/mL	units/mL	units/mL	units/mL	units/mL	
CHLOROPHYTA (GREEN ALGAE)	<i>Actinastrum Hantzschii</i>	0	0	0	59	182	
	<i>Ankistrodesmus falcatus</i>	0	78	62	0	61	
	<i>Ankistrodesmus Brauni</i>	0	78	187	0	182	
	<i>Botryococcus sudeticus</i>	0	0	0	0	61	
	<i>Chlamydomonas globosa</i>	1,288	6,520	11,717	2,420	8,016	
	<i>Closterium sp.</i>	0	0	0	39	182	
	<i>Coelastrum microporum</i>	0	0	810	625	486	
	<i>Cosmarium sp.</i>	0	78	125	59	0	
	<i>Dictyosphaerium sp.</i>	0	0	0	0	61	
	<i>Elakatorhrix gelatinosa</i>	78	0	0	0	0	
	<i>Elakotothrix sp.</i>	0	39	0	0	0	
	<i>Golenkenia sp.</i>	0	39	0	0	0	
	<i>Kirchneriella sp.</i>	0	0	0	0	61	
	<i>Lagerheimia sp.</i>	0	78	0	20	911	
	<i>Oocystis parva</i>	0	4,099	3,303	1,425	2,126	
	<i>Pediastrum Boryanum</i>	0	0	125	59	121	
	<i>Pediastrum duplex v. clathratum</i>	0	0	62	0	0	
	<i>Quadrigula sp.</i>	0	0	125	0	0	
	<i>Rhizoclonium hieroglyphicum</i>	0	0	187	0	0	
	<i>Schroederia Judayi</i>	0	468	187	0	1,154	
	<i>Scenedesmus dimorphus</i>	0	0	62	0	0	
	<i>Scenedesmus quadricauda</i>	39	234	623	371	1,215	
	<i>Scenedesmus sp.</i>	0	39	125	0	243	
	<i>Selenastrum minutum</i>	39	0	312	0	0	
	<i>Selenastrum sp.</i>	0	0	0	20	61	
	<i>Sphaerocystis Schroeteri (Colony)</i>	0	312	499	0	547	
	<i>Staurastrum sp.</i>	0	39	0	20	0	
	<i>Tetraedron muticum</i>	0	156	249	20	0	
	<i>Tetraedron sp.</i>	0	78	62	20	304	
	<i>Treubaria setigerum</i>	0	78	0	0	0	
	<b>CHLOROPHYTA TOTAL</b>		<b>1,444</b>	<b>12,415</b>	<b>18,823</b>	<b>5,153</b>	<b>15,972</b>
	CHRYSTOPHYTA (YELLOW-BROWN ALGAE)	<i>Dinobryon sociale</i>	0	1,015	0	0	0
		<b>CHRYSTOPHYTA TOTAL</b>	<b>0</b>	<b>1,015</b>	<b>0</b>	<b>0</b>	<b>0</b>
CYANOPHYTA (BLUE-GREEN ALGAE)	<i>Anabaena affinis</i>	0	39	312	0	1,154	
	<i>Anabaena flos-aquae</i>	0	0	62	0	0	
	<i>Anabaena spiroides v. crassa</i>	0	0	436	0	0	
	<i>Anabaena sp.</i>	0	0	0	0	61	
	<i>Anabaenopsis raciborski</i>	0	0	3,553	234	11,417	
	<i>Aphanizomenon flos-aquae</i>	0	0	0	0	2,429	
	<i>Aphanocapsa delicatissima</i>	0	78	125	0	0	
	<i>Coelosphaerium Naegelianum</i>	0	0	0	0	304	
	<i>Merismopedia tenuissima</i>	0	0	187	20	0	
	<i>Merismopedia sp.</i>	0	0	0	78	121	
	<i>Microcystis aeruginosa</i>	0	859	6,046	2,050	1,761	
	<i>Microcystis incerta</i>	0	39	1,184	59	182	
	<i>Oscillatoria limnetica</i>	0	0	62	39	61	
	<i>Oscillatoria Agardhii</i>	0	39	0	0	0	
<b>CYANOPHYTA TOTAL</b>	<b>0</b>	<b>1,054</b>	<b>11,967</b>	<b>2,479</b>	<b>17,490</b>		
BACILLARIOPHYTA (DIATOMS)	<i>Cymbella sp.</i>	0	39	0	0	0	
	<i>Fragilaria capucina</i>	0	39	0	0	0	
	<i>Fragilaria crotonensis</i>	39	39	0	0	0	
	<i>Melosira granulata</i>	0	0	125	0	0	
	<i>Melosira granulata v. angustissima fo spiralis</i>	0	0	187	0	61	
	<i>Navicula sp.</i>	0	0	0	0	61	
	<i>Stephanodiscus Hantzschii</i>	0	156	0	0	0	
	<i>Stephanodiscus sp.</i>	0	0	0	0	61	
<i>Synedra ulna</i>	39	39	62	0	61		
<b>BACILLARIOPHYTA TOTAL</b>	<b>78</b>	<b>312</b>	<b>374</b>	<b>0</b>	<b>243</b>		
CRYPTOPHYTA (CRYPTOMONADS)	<i>Cryptomonas erosa</i>	508	1,015	499	117	547	
	<b>CRYPTOPHYTA TOTAL</b>	<b>508</b>	<b>1,015</b>	<b>499</b>	<b>117</b>	<b>547</b>	
EUGLENOPHYTA (EUGLENOIDS)	<i>Euglena sp.</i>	0	39	0	0	0	
	<i>Phacus sp.</i>	0	78	0	0	0	
<b>EUGLENOPHYTA TOTAL</b>	<b>0</b>	<b>39</b>	<b>0</b>	<b>0</b>	<b>0</b>		
PYRRHOPHYTA (DINOFLAGELLATES)	<i>Peridinium cinctum</i>	0	0	0	0	61	
	<b>PYRRHOPHYTA TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>61</b>	
<b>TOTALS</b>		<b>2,030</b>	<b>15,850</b>	<b>31,662</b>	<b>7,749</b>	<b>34,312</b>	

# 2003 Eagle Point Lake Phytoplankton Data Summary



## **Appendix D-5.12 Additional Zooplankton Information**

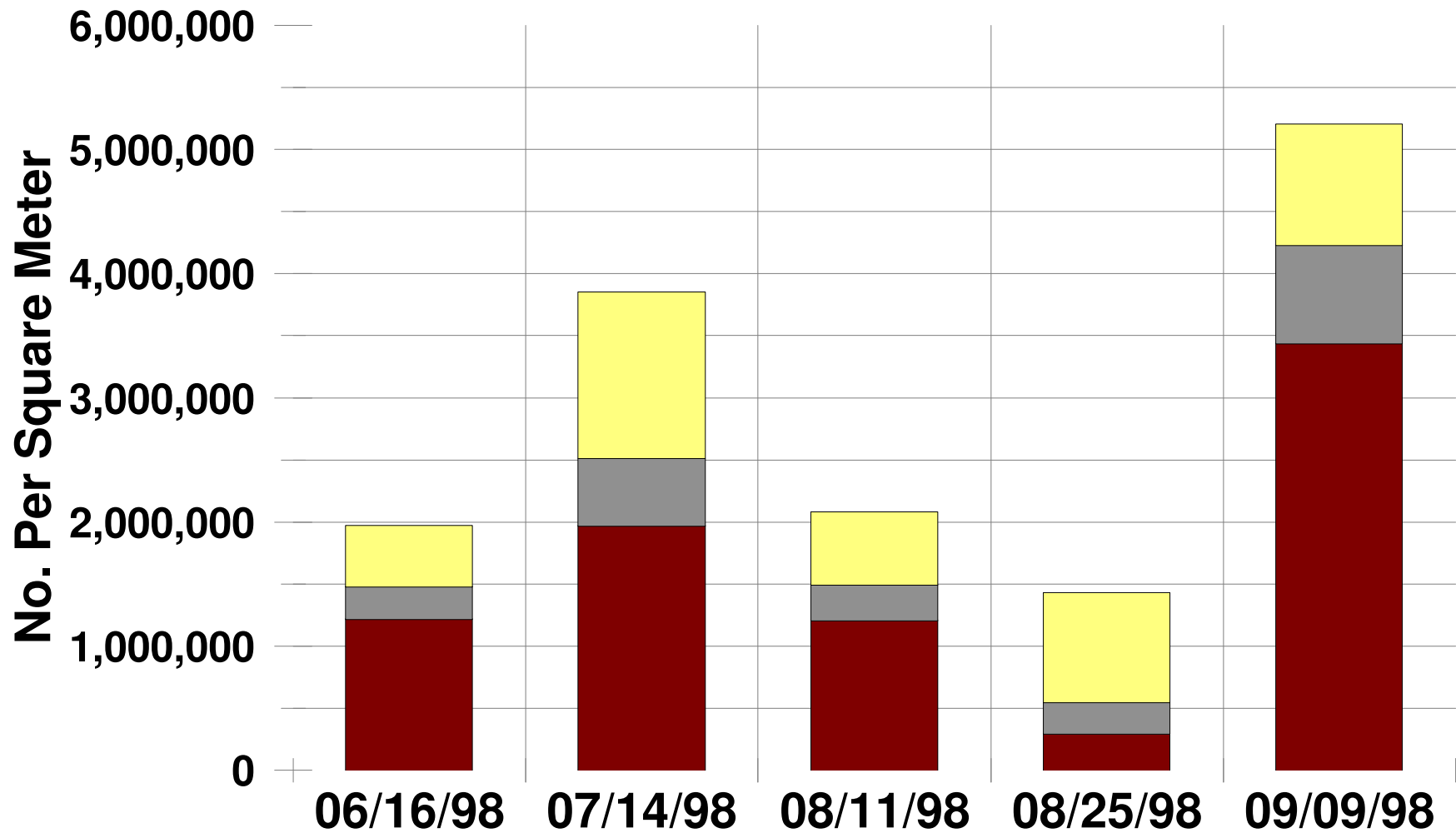
# ZOOPLANKTON IDENTIFICATION SUMMARY (#/sq. m)

VALLEY BRANCH WATERSHED DISTRICT  
23/83 207 V98 030

LAKE: **Eagle Point**

DIVISION	TAXON	SAMPLE DATE				
		06/16/98	07/14/98	08/11/98	08/25/98	09/09/98
CLADOCERA						
	<i>Bosmina sp.</i>	1,165,842	1,940,633	1,167,840	270,251	3,342,811
	<i>Chydorus sp.</i>	36,035	4,386	8,966	6,871	59,693
	<i>Diaphanosoma sp.</i>	0	19,735	29,140	13,742	14,326
	<i>Ceriodaphnia sp.</i>	21,197	6,578	4,483	0	26,265
	Total Cladocera	1,223,074	1,971,332	1,210,429	290,864	3,443,095
COPEPODA						
	Nauplii	175,936	456,104	248,810	116,803	592,155
	<i>Cyclops sp.</i>	2,120	35,085	20,174	11,451	162,365
	<i>Mesocyclops sp.</i>	14,838	52,627	20,174	36,644	33,428
	<i>Diaptomus sp.</i>	69,951	0	0	93,901	4,775
	Total Copepoda	262,844	543,816	289,158	258,800	792,724
ROTIFERA						
	<i>Keratella cochlearis</i>	154,739	1,078,860	412,442	421,409	768,846
	<i>Asplanchna sp.</i>	40,275	2,193	2,242	2,290	2,388
	<i>Kellicottia sp.</i>	25,437	0	0	2,290	2,388
	<i>Polyarthra vulgaris</i>	161,098	52,627	49,314	11,451	152,814
	<i>Conochilus sp.</i>	80,549	28,506	13,449	70,998	21,489
	<i>Trichocerca sp.</i>	12,718	28,506	17,932	4,581	11,939
	<i>Filinia sp.</i>	0	43,856	65,005	98,481	9,551
	<i>Brachionus sp.</i>	12,718	105,255	20,174	272,541	0
	<i>Lecane sp.</i>	0	0	0	0	2,388
	<i>Playtias sp.</i>	0	0	0	0	2,388
	<i>Monostyla sp.</i>	0	0	2,242	0	0
	Total Rotifera	487,534	1,339,804	582,799	884,042	974,191
	TOTAL ZOOPLANKTON	1,973,452	3,854,953	2,082,386	1,433,705	5,210,009

# 1998 Eagle Point Lake Zooplankton Data Summary



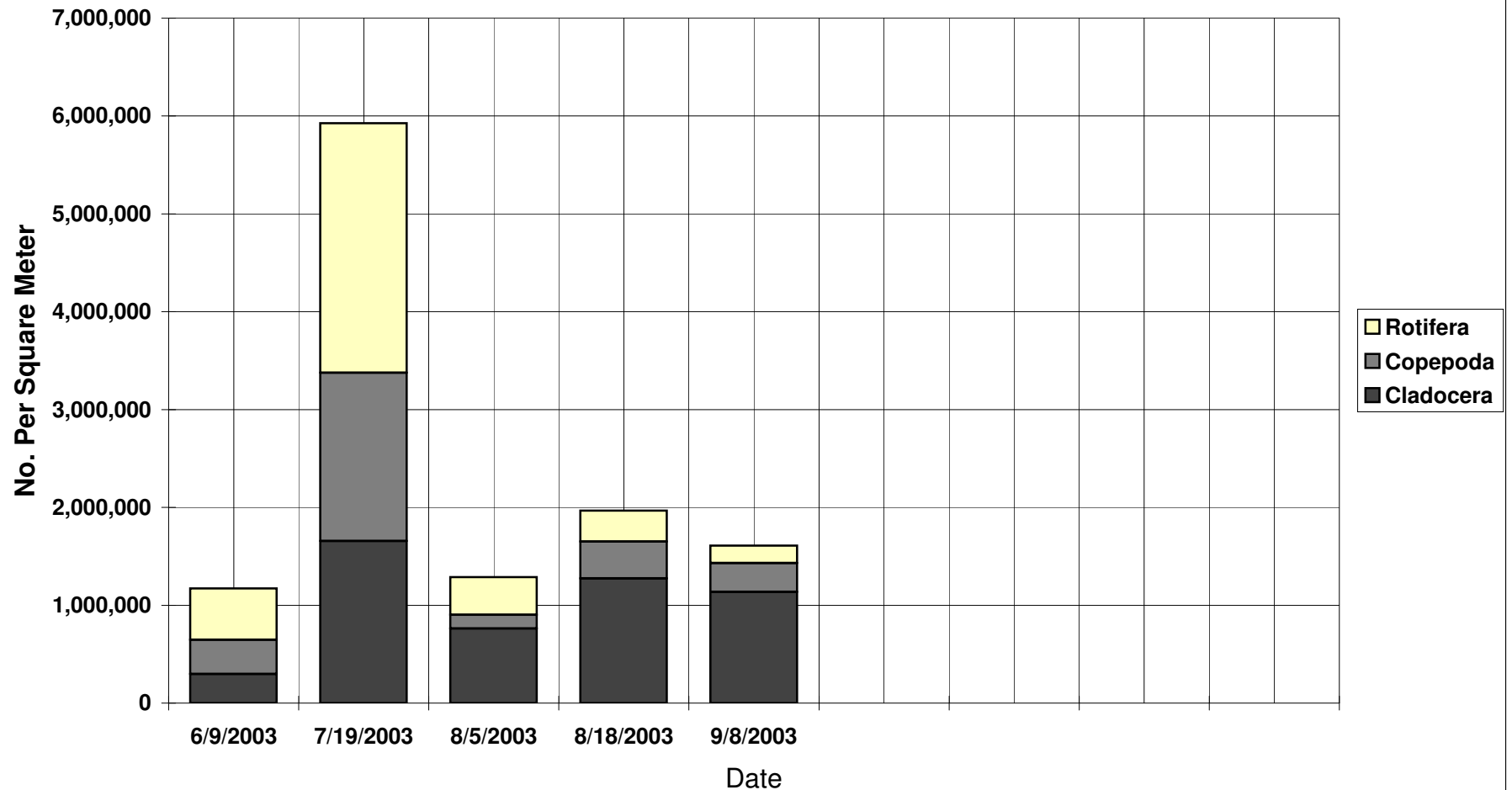
**Total Cladocera**   **Total Copepoda**   **Total Rotifera**

# EAGLE POINT LAKE

SAMPLE: BOTTOM TO SURFACE TOW  
ZOOPLANKTON ANALYSIS

DIVISION	TAXON	<i>Vertical Tow (m)</i>				
		6/9/2003 #/m2	7/19/2003 #/m2	8/5/2003 #/m2	8/18/2003 #/m2	9/8/2003 #/m2
CLADOCERA	<i>Bosmina longirostris</i>	15,208	1,169,347	584,275	968,016	972,614
	<i>Ceriodaphnia sp.</i>	15,208	366,056	49,515	231,482	124,495
	<i>Chydorus sp.</i>	258,538	71,178	59,418	21,044	23,343
	<i>Daphnia galeata mendotae</i>	0	0	0	0	0
	<i>Daphnia retrocurva</i>	0	0	0	0	0
	<i>Diaphanosoma leuchtenbergianum</i>	7,604	50,841	49,515	21,044	15,562
	Immature Cladocera	0	0	19,806	31,566	0
<b>CLADOCERA TOTAL</b>		<b>296,559</b>	<b>1,657,422</b>	<b>762,529</b>	<b>1,273,151</b>	<b>1,136,013</b>
COPEPODA	<i>Cyclops sp.</i>	212,914	427,066	138,642	157,829	77,809
	<i>Diaptomus sp.</i>	0	20,336	0	0	7,781
	Nauplii	129,269	1,271,029	0	220,960	210,085
	Cyclopoid Copepodid	7,604	0	0	0	0
<b>COPEPODA TOTAL</b>		<b>349,787</b>	<b>1,718,431</b>	<b>138,642</b>	<b>378,789</b>	<b>295,675</b>
ROTIFERA	<i>Asplanchna priodonta</i>	0	0	19,806	52,610	0
	<i>Brachionus havanaensis</i>	0	30,505	29,709	0	0
	<i>Filinia longiseta</i>	7,604	0	0	0	7,781
	<i>Lecane sp.</i>	0	20,336	19,806	10,522	7,781
	<i>Keratella cochlearis</i>	243,330	1,586,244	168,351	115,741	93,371
	<i>Keratella quadrata</i>	0	20,336	0	0	0
	<i>Kellicottia sp.</i>	0	0	9,903	10,522	0
	<i>Polyarthra vulgaris</i>	258,538	823,627	108,933	84,175	15,562
	<i>Polyarthra eurypta</i>	7,604	71,178	9,903	42,088	31,124
	<i>Trichocerca cylindrica</i>	7,604	0	0	0	0
<i>Trichocerca multicrinis</i>	0	0	19,806	0	23,343	
<b>ROTIFERA TOTAL</b>		<b>524,681</b>	<b>2,552,226</b>	<b>386,216</b>	<b>315,657</b>	<b>178,961</b>
<b>TOTALS</b>		<b>1,171,027</b>	<b>5,928,080</b>	<b>1,287,387</b>	<b>1,967,597</b>	<b>1,610,648</b>

# 2003 Eagle Point Lake Zooplankton Data Summary



**Appendix E-5.12 Eagle Point Lake Operating Plan**

VALLEY BRANCH WATERSHED DISTRICT  
OPERATION, INSPECTION AND MAINTENANCE PLAN FOR EAGLE POINT LAKE DAM

INTRODUCTION

This plan is submitted by Valley Branch Watershed District (Watershed District) to fulfill Special Provision 8 of Protected Waters Permit 86-6264, issued July 7, 1986 by the Minnesota Department of Natural Resources (MnDNR). It describes the operation, inspection and maintenance plan for the Eagle Point Lake Dam.

PROCEDURE

This Operation, Inspection and Maintenance Plan will be adopted tentatively for a period of one year after which it will be reviewed before permanent adoption. It will be reviewed thereafter on a two-year basis.

OPERATION PLAN

1. Under normal conditions, no operation of the dam or control structures is anticipated.
2. The water level of Eagle Point Lake is controlled by a stoplog weir which is set at Elevation 894.0 feet. The stoplog design was chosen so that MnDNR staff could temporarily raise and lower the water level of Eagle Point Lake to aid in fish rearing. Additional stoplogs may be added to raise the water level to Elevation 896.0 feet and stoplogs may be removed to lower the water level to Elevation 893.0 feet. The MnDNR shall notify the Watershed District five working days in advance of any proposed water level changes. Otherwise, stoplogs are not to be added or removed.

INSPECTION PLAN

The dam and control structures shall be inspected annually by a registered engineer. A report of the inspection shall be submitted to the Dam Safety Unit of the Division of Waters of the MnDNR.

1. The outlet structures and outlet works shall be inspected annually for evidence of:
  - o accumulated debris
  - o cracking or spalling of concrete and opening of joints
  - o deterioration of concrete
  - o abnormal leakage through concrete surfaces or along pipe outlet
  - o unusual or inadequate operational behavior
  
2. Upstream embankment slopes shall be inspected annually for evidence of:
  - o wave erosion
  - o cracks
  - o slides
  - o sloughs
  - o subsidences
  - o damages to slope protection
  - o other signs of serious erosion
  - o failure of vegetation
  - o growth of trees, brush or other unsuitable vegetation
  - o animal burrows
  
3. Downstream slopes shall be inspected annually for evidence of:
  - o wave erosion
  - o cracks
  - o slides
  - o sloughs
  - o subsidences
  - o damages to slope protection
  - o other signs of serious erosion
  - o springs
  - o seeps
  - o boggy areas
  - o failure of vegetation cover
  - o establishment of brush or trees
  - o animal burrows
  
4. During periods of low reservoir levels, the exposed portions of the abutments and lake bottom shall be examined annually for sinks or seepage holes, and cracking.
  
5. During periods of sustained high water (above Elevation 898.0 feet), a weekly inspection shall be made of the embankment for evidence of abnormal development, with particular attention being given to:

- o the crest of the dam
- o the visible portions of the upstream slope protection
- o downstream slope protection
- o areas downstream from the dam

The Watershed District shall promptly notify the MnDNR of any abnormal developments.

#### MAINTENANCE PLAN

The Watershed District shall be responsible for and promptly perform all necessary dam maintenance. Possible maintenance activities include the following:

1. Vegetative cover shall be maintained on the dam.
  - o Lost or destroyed vegetative cover shall be reseeded or resodded. The reshaping, fertilizing, reseeded and resodding shall follow the original construction specifications.
  - o Vegetation shall be fertilized as necessary to maintain the desired vegetative stand.
  - o Vegetation shall be mowed at regular intervals to a minimum height of 3 to 4 inches. Trees and deep rooting plants shall be removed.
2. The structural integrity and function of the earth dam and outlet structures shall be maintained.
  - o Soil removed by burrowing animals shall be replaced.
  - o The outlet piping system and the toe drains shall be cleaned or replaced as necessary.
  - o Any slides on the embankment areas shall be stabilized as soon as practical.
  - o Any settled portions of the dam shall be restored to their proper elevation.
  - o Eroded material shall be replaced and the eroded areas revegetated.
  - o Unusual seepages, boils, subsidences or settlements in fill areas shall be investigated and repaired.

- o Eroded materials around pipe outlets and inlets shall be restored.
- o Deteriorated or damaged concrete shall be restored.
- o The outlet structures shall be maintained in proper working order. Ice and debris that may hamper its function shall be removed. Damaged protective coatings shall be restored.