5.27 Legion Pond Watershed Management Plan ....................................................... 5.27-1
5.27.1 General Information ............................................................................. 5.27-1
5.27.2 Water Quality Management Plan ........................................................ 5.27-2
  5.27.2.1 Water Chemistry .................................................................... 5.27-3
  5.27.2.2 Biological Data ........................................................................ 5.27-3
5.27.3 Water Quantity Management Plan ....................................................... 5.27-4
  5.27.3.1 Water Quantity Issues and History ......................................... 5.27-4
5.27.4 References............................................................................................ 5.27-7

List of Tables

Table 5.27-1 Summary of Legion Pond summer average water quality ....................... 5.27-3
Table 5.27-2 Low Structures around Legion Pond (from 1976 Flood Damage Report) ........ 5.27-5

List of Figures

Figure 5.27-1 Legion Pond Watershed – Subwatersheds and Flow Routing ............... 5.27-8
Figure 5.27-2 Legion Pond Watershed – Current (2010) and Future (2030) Land Use. 5.27-9
Figure 5.27-3 Legion Pond Water Quality Data Summary ...................................... 5.27-10
Figure 5.27-4 Legion Pond Water Level Data....................................................... 5.27-11

List of Appendices

Appendix A-5.27 Additional Macrophyte Information
5.27 Legion Pond Watershed Management Plan

5.27.1 General Information

Legion Pond is located south of 30th Street North and east of Lake Elmo Avenue North (CSAH 17), in the City of Lake Elmo. Legion Pond is landlocked and its water level has fluctuated greatly over the years, causing flooding to adjacent properties.

The entire 224-acre watershed tributary to Legion Pond lies within the City of Lake Elmo (see Figure 5.27-1). Within the watershed, approximately 8 acres is platted into 0.4-acre lots on the northeast side of Legion Pond. In addition, the residential lots (0.5 to 1.0 acre) along the south side of 30th Street North are within the Legion Pond drainage area. Some agricultural land use is located at the south end of the watershed, while the north end includes some undeveloped area. The Metropolitan Council future (2030) estimated land use assumes that the remaining agricultural and undeveloped land will be developed as rural, large-lot, or single family residential land use. Current (2010) and estimated future (2030) use of the Legion Pond watershed is shown on Figure 5.27-2.

Use of Legion Pond is limited to aesthetic viewing by area residents, and detaining and treating stormwater runoff. There is no public access to the pond.

<table>
<thead>
<tr>
<th>Legion Pond Watershed Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tributary Area (acres)</td>
<td>224</td>
</tr>
<tr>
<td>MDNR-Designated Basins within Watershed</td>
<td>82-0460W, 82-0462W (Legion Pond)</td>
</tr>
<tr>
<td>Downstream Watershed</td>
<td>Landlocked</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Legion Pond Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MDNR Designation</td>
<td>82-0462W</td>
</tr>
<tr>
<td>Surface Area (acres)</td>
<td>16.2 at El. 883.0</td>
</tr>
<tr>
<td>Mean Depth (feet)</td>
<td>Not determined</td>
</tr>
<tr>
<td>Maximum Depth (feet)</td>
<td>Not determined</td>
</tr>
<tr>
<td>Volume Below Discharge Elevation (acre-feet)</td>
<td>Not determined</td>
</tr>
<tr>
<td>Discharge Elevation</td>
<td>906.2</td>
</tr>
<tr>
<td>Outlet Type</td>
<td>Landlocked/ Overland</td>
</tr>
<tr>
<td>MDNR Ordinary High Water Level (OHW)</td>
<td>None Established</td>
</tr>
<tr>
<td>100-Year Flood Level (Elevation in NAVD88 vertical datum)</td>
<td>888.7</td>
</tr>
<tr>
<td>VBWD “Allowable Fill” (cubic yards/lineal foot of shoreline) (See Section 4.7.)</td>
<td>1.0</td>
</tr>
<tr>
<td>VBWD Water Quality Priority Category</td>
<td>Low</td>
</tr>
</tbody>
</table>

1 Elevation in NAVD88 vertical datum
5.27.2 Water Quality Management Plan

The VBWD classified and will manage Legion Pond as a Low Priority waterbody (see Section 4.1 – Water Quality) based on the lack of public access and likelihood of being classified as a wetland by the Minnesota Pollution Control Agency (MPCA). This classification is below the Medium Priority assigned to Legion Pond in the 2005 Plan and similar to the classification in the VBWD 1995 Plan, Legion Pond was classified as a Level V (wetland) waterbody.

The water quality of Legion Pond is generally poor. 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 \( a \)

Specific water quality implementation tasks for Legion Pond include the following:

1. The VBWD will cooperate with other entities to monitor the water quality of Legion Pond at the interval(s) specified in Section 4.1 – Water Quality for Low Priority waterbodies. As for all Low Priority waterbodies, the VBWD will perform additional monitoring or other actions on a case-by-case (see Table 4.1-6).

   The VBWD will evaluate the average summertime water quality (total phosphorus, chlorophyll \( a \), and Secchi disc transparency) and compare it to water quality standards (if applicable) and applicable action triggers (described in Section 4.1.7.5).

2. The VBWD will cooperate with other entities in support of macrophyte management efforts. 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 continue to implement its Rules and Regulations (2013, as amended) in the Legion Pond 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.

5.27.2.1 Water Chemistry

Water quality sampling has been conducted on Legion Pond as far back as 1986. The VBWD conducted water quality sampling in 2003, 2005, 2006, 2008, and 2009. 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 in Table 5.27-1. Available water quality data is presented graphically in Figure 5.27-3.

Table 5.27-1 Summary of Legion Pond summer average water quality

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>10-year Average (2004-2013)</th>
<th>Trend in Average</th>
<th>MPCA Standard$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phosphorus</td>
<td>ug/L</td>
<td>105</td>
<td>None</td>
<td>NA</td>
</tr>
<tr>
<td>Chlorophyll $a$</td>
<td>ug/L</td>
<td>45.7</td>
<td>None</td>
<td>NA</td>
</tr>
<tr>
<td>Secchi Disc Depth</td>
<td>m</td>
<td>0.68</td>
<td>None</td>
<td>NA</td>
</tr>
</tbody>
</table>

$^1$ MPCA eutrophication water quality standards are not applicable to wetlands

While water quality in Legion Pond fluctuates annually, Secchi disc transparency generally worsened during the period from 2003 through 2009. During that period, summer average chlorophyll $a$ generally increased (see Figure 5.27-3). The minimum (i.e., worst) Secchi disc transparency observed (0.3 meters in 2009) actually occurred the same season as the lowest (i.e., best) summer average total phosphorus concentration (about 40 ug/L).

The most recent 10-years of data identify no statistically significant trends in total phosphorus, chlorophyll $a$, or Secchi disc transparency.

5.27.2.2 Biological Data

Various types of biological data have been compiled and evaluated for Legion Pond, 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 a waterbody. Section 4.2 (Water Quality Background Information) provides more information about the importance of fisheries and other biological data.
The Legion Pond fishery is not currently managed by the MDNR and no stocking or fishery surveys have been performed. The pond does not have a fisheries-use classification and no fish consumption advisories are currently in effect. The MDNR’s Lakefinder website includes the most current data on Legion Pond and is available at: http://www.dnr.state.mn.us/lakefind/lake.html?id=82046200

The VBWD conducted macrophyte (large aquatic plant) surveys of Legion Pond on June 13, 2003, August 20, 2003, May 28, 2007, June 4, 2009, and June 13, 2013. Appendix A-5.27 includes the 2003, 2007, 2009, and 2013 macrophyte survey information. 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.

In all four survey years, a healthy, diverse plant community was found throughout the pond. Among the thirteen to fourteen species observed in the 2003 survey was a clean water species that is eliminated by degraded conditions. Whitestem pondweed (Potamogeton praelongus), which requires fairly good water clarity, was observed on the west side of the pond during both 2003 surveys. This species was not observed in 2007, 2009, or 2013, suggesting that water quality has deteriorated over this period. Plants found in Legion Pond are common to Minnesota lakes and ponds and provide good habitat for the fish and aquatic animals living within the pond. No non-native exotic species were noted in the any of the surveys.

Phytoplankton (microscopic plants), and zooplankton (microscopic animals) data have not been collected from Legion Pond.

5.27.3 Water Quantity Management Plan

As of the writing of this Plan, the VBWD has no plans to manage water levels on Legion Pond. If flooding issues occur in the Legion Pond watershed in the future (see Section 5.27.3.1), the VBWD will consider working with the City of Lake Elmo in implementing a solution to reduce flood risk.

Water level monitoring was performed on Legion Pond from 2008 to 2010 (see Figure 5.27-4). The VBWD will continue to monitor water levels on Legion Pond as volunteer or staff time and access allow.

5.27.3.1 Water Quantity Issues and History

High water levels at Legion Pond in the past have caused flooding concerns. In June 1980, the City of Lake Elmo prepared a feasibility report on temporary pumping from Legion Pond to Lake Elmo in response to a petition from Legion Pond area residents. No homes were in danger of flooding at that time, but five septic systems were believed to be inoperable. Although the City of Lake Elmo applied for a MDNR permit, no pumping occurred. As a result of the high water levels, residents adjacent to the pond placed fill on their properties. The fill created a short dike between the pond and their homes. Because the cumulative effect of the filling activity raised the 100-year flood level of Legion
Pond by approximately 0.1 foot, no additional filling around the pond is likely to be permitted by the VBWD.

High water levels during the period 1985 through 1987 caused residents to request assistance from both the VBWD and the City of Lake Elmo. In the fall of 1985, the VBWD granted a permit to the City of Lake Elmo to pump approximately 40 acre-feet of water from Legion Pond to Lake Elmo. As a result of the City’s pumping, the pond dropped 1.5 feet. In April, 1987, the City of Lake Elmo petitioned the VBWD for a project to reduce high water levels on Legion Pond. Since the petition was not in conformance with the previous VBWD water management plan, the petition could not be acted on until the water management plan was amended. Legion Pond residents rejected two City of Lake Elmo pumping proposals because of the high cost and because the proposed pumping was not a permanent solution to their high water problems. In June 1987, the City of Lake Elmo ordered a pumping project to lower water levels in Legion Pond. The pumping project was not undertaken; it is assumed that the 1987-1988 drought relieved the flooding situation on Legion Pond.

According to the City of Lake Elmo’s 1976 Flood Damage Report, the lowest home on Legion Pond is at Elevation 886.1. Table 5.27-2 lists the low home and septic tank elevations based on the 1976 report. Based on Washington County’s 2000 two-foot topography, the low point of the short dike between the pond and the homes is between Elevation 886 and Elevation 888. The lowest septic tanks are at approximately Elevation 882. Since the control elevation of Lake Elmo is at Elevation 884.1, it would be possible to install a gravity outlet from Legion Pond to Lake Elmo, protecting the low homes on Legion Pond.

<table>
<thead>
<tr>
<th>Address</th>
<th>Owner</th>
<th>Elevation of House Walk Out</th>
<th>Elevation of Top of Septic Tank</th>
</tr>
</thead>
<tbody>
<tr>
<td>2832 Legion Avenue</td>
<td>Borgegne</td>
<td>886.1</td>
<td>881.9</td>
</tr>
<tr>
<td>2790 Legion Avenue</td>
<td>Deck</td>
<td>886.5</td>
<td>C.N.L.</td>
</tr>
<tr>
<td>2814 Legion Avenue</td>
<td>Collyard</td>
<td>886.8</td>
<td>884.2</td>
</tr>
<tr>
<td>2778 Legion Avenue</td>
<td>Peterson</td>
<td>887.2</td>
<td>884.2</td>
</tr>
<tr>
<td>2764 Legion Avenue</td>
<td>Toft</td>
<td>888.4</td>
<td>Less than 882.2</td>
</tr>
<tr>
<td>2866 Legion Avenue</td>
<td>Zetterlund</td>
<td>888.9</td>
<td>886.2</td>
</tr>
</tbody>
</table>

C.N.L. = Could not locate

There appear to be three feasible solutions to the Legion Pond high water problem. Each of the following solutions would require an analysis of the water quality impacts of a Legion Pond discharge on Lake Elmo:
1. Construct a pumped outlet from Legion Pond to Lake Elmo. As a result, the Legion Pond water level could be lowered below the low home elevation and below the elevation of the septic systems. Water could also be pumped from Legion Pond when the Lake Elmo water level is higher than the Legion Pond water level, assuming there is not an appreciable rise in the Lake Elmo water level as a result. However, if pumping does not begin until the septic systems are flooded, or if water levels rise above the elevation of the septic systems during pumping, untreated or poorly treated sewage could enter Lake Elmo. In addition, there will be annual expenses for operation and maintenance costs.

2. Construct a gravity outlet from Legion Pond to Lake Elmo. This option will prevent the flooding of low homes around Legion Pond, but only when the Lake Elmo water level is lower than Elevation 886. A gate or a valve would be required to prevent backflow of water into Legion Pond when the Lake Elmo water level is higher than the Legion Pond water level. This option will not prevent flooding of the septic systems around Legion Pond since the outlet elevation of Lake Elmo is at 884.1.

3. Provide only emergency pumping relief. In this case, it is very likely that septic systems would be flooded before pumping would be initiated. As a result, the water quality impacts of such a pumping project would have to be investigated.

If detrimental water quality impacts would result from a Legion Pond discharge to Lake Elmo, other options would be to discharge the water to the Horseshoe Lake outlet structure, to the Horseshoe Lake drainage area, or to the Downs Lake watershed. Water quality (and quantity) impacts to these water bodies would also need to be investigated prior to the initiation of any project.

The primary concern expressed by area residents and the City of Lake Elmo is the probability of high water levels in subsequent years. Area residents and the City of Lake Elmo would like Legion Pond’s water level maintained at a level which would avoid flooding problems for area residents.

Because of water quality concerns, it is unlikely that an outlet to Lake Elmo will be feasible unless a communal drainfield system is constructed. Then any of the three solutions presented above might be feasible. Another potentially feasible solution is to floodproof the homes, including re-locating their septic systems. If flooding recurs in the Legion Pond area, the VBWD will consider assisting the City of Lake Elmo to correct the situation. It is anticipated that the City of Lake Elmo will address this problem when the City prepares its water management plan.

In 2003, Washington County contracted with the VBWD to develop a 100-year flood level for Legion Pond that would be approved by the Federal Emergency Management Agency (FEMA). The VBWD used a hydrologic and hydraulic model (XP-SWMM) to run a 50-year simulation of the water levels of Legion Pond. A statistical analysis performed on the resulting annual high water levels to determine the 1% probability flood level (i.e., 100-year flood level). The study determined 100-year flood level of Elevation 888.7 (NAVD88 datum). The FEMA-established 100-year flood level for Legion Pond is Elevation 889 (NAVD88 datum) and the floodplain is mapped on the Washington County Flood Insurance Rate Map (FIRM) which became effective in 2010. Prior to this detailed
study, the VBWD used its 100-year annual runoff method to establish a 100-year flood level of Legion Pond at Elevation 890.0 (see Section 4.7).

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 to establish the VBWD and FEMA 100-year flood elevations within the Legion Pond subwatershed. Over the next several years, the VBWD will update its hydrologic-hydraulic modeling of major subwatersheds, including Legion Pond. 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 levels.

5.27.4 References


Figure 5.27-2
LEGION POND WATERSHED
CURRENT (2010) AND FUTURE (2030) LANDUSE

2015-2025 Watershed Management Plan
Valley Branch Watershed District

Source: Metropolitan Council 2010

1 inch = 1,000 feet
Legion Pond Water Quality
2015 - 2025 Watershed Management Plan
Valley Branch Watershed District
LEGION POND WATER LEVELS
2015 - 2025 Watershed Management Plan
Valley Branch Watershed District

Figure 5.27-4

Observed elevations in NGVD29 datum
100-year flood level in NAVD88 datum
Pond is landlocked
• Macrophytes Found Throughout Entire Water Body
• Macrophyte Densities Estimated as Follows: 1 = Light; 2 = Moderate; 3 = Heavy
• Nuphar Microphyllum Sporadic Along Entire Pond Edge, Heavier in Areas Marked on Map

**Common Name**

Submerged Aquatic Plants:
- Whitestem pondweed
- Large-leaf pondweed
- Coontail
- Elodea
- Stonewort
- Bladderwort
- Busby pondweed and naiad

Floating Leaf:
- Yellow water lily
- Little yellow water lily
- Watershield

Emergent:
- Water smartweed
- Cattail
- Arrowhead
- Spikerush

**Scientific Name**

Potamogeton paeponus
Potamogeton amplifolius
Ceratophyllum demersum
Elodea canadensis
Nitella spp.
Utricularia spp.
Najas spp.

Nuphar variegata
Nuphar microphyllum
Brasenia schreberi

Polygonaum amphibium
Typha spp.
Sagittaria spp.
Eleocharis spp.

Nitella spp.
Potamogeton paeponus

Utricularia spp.

Water Quality Monitoring Location

NOT TO SCALE

LEGION POND
MACROPHYTE SURVEY
JUNE 13, 2003
- Macrophytes Found Throughout Entire Water Body
- Macrophyte Densities Estimated as Follows: 1 = Light; 2 = Moderate; 3 = Heavy
- Nuphar Microphyllum Sporadic Along Entire Pond Edge, Heavier in Areas Marked on Map

### Submerged Aquatic Plants:

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whistestem pondweed</td>
<td>Potamogeton praetangus</td>
</tr>
<tr>
<td>Large-leaf pondweed</td>
<td>Potamogeton amplifolius</td>
</tr>
<tr>
<td>Coontail</td>
<td>Ceratophyllum demersum</td>
</tr>
<tr>
<td>Elodea</td>
<td>Elodea canadensis</td>
</tr>
<tr>
<td>Stonewort</td>
<td>Nitella spp.</td>
</tr>
<tr>
<td>Bladderwort</td>
<td>Utricularia spp.</td>
</tr>
<tr>
<td>Busby pondweed and naiad</td>
<td>Nuphar variegata</td>
</tr>
<tr>
<td></td>
<td>Nuphar microphyllum</td>
</tr>
<tr>
<td></td>
<td>Sagittaria spp.</td>
</tr>
</tbody>
</table>

### Floating Leaf:

- Yellow water lily
- Little yellow water lily
- Watershield
- Nuphar variegata
- Nuphar microphyllum
- Brasenia schreberi

### Emergent:

- Water smartweed
- Cattail
- Arrowhead
- Spikerush
- Polygonum amphibium
- Typha spp.
- Sagittaria spp.
- Eleocharis spp.
- Water smartweed
- Cattail
- Arrowhead
- Spikerush
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- Eleocharis spp.
- Water smartweed
- Cattail
- Arrowhead
- Spikerush
- Polygonum amphibium
- Typha spp.
- Sagittaria spp.
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada waterweed</td>
<td>Elodea canadensis</td>
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<td>bladderwort</td>
<td>Utricularia sp.</td>
</tr>
<tr>
<td>coontail</td>
<td>Ceratophyllum demersum</td>
</tr>
<tr>
<td>largeleaf pondweed</td>
<td>Potamogeton amplifolius</td>
</tr>
<tr>
<td>smartweed</td>
<td>Polygonum sp.</td>
</tr>
<tr>
<td>stonewort</td>
<td>Nitella sp.</td>
</tr>
<tr>
<td>little yellow pondlily</td>
<td>Nuphar microphyllum</td>
</tr>
<tr>
<td>spatterdock</td>
<td>Nuphar variegata</td>
</tr>
<tr>
<td>watershield</td>
<td>Brasenia schreberi</td>
</tr>
<tr>
<td>arrowhead</td>
<td>Sagittaria sp.</td>
</tr>
<tr>
<td>cattail</td>
<td>Typha sp.</td>
</tr>
<tr>
<td>river bulrush</td>
<td>Scirpus fluviatilis</td>
</tr>
<tr>
<td>spikerush</td>
<td>Eleocharis sp.</td>
</tr>
<tr>
<td>water knotweed</td>
<td>Polygonum amphibium</td>
</tr>
</tbody>
</table>

**FIELD NOTES:**
- Macrophyte densities estimated as follows: 1=light; 2=moderate; 3=heavy
- Densities generally not noted for emergent and floating leaf plants
- Macrophytes found throughout entire waterbody
- Nuphar microphyllum sporadic along entire pond edge, heavier in areas marked on map

LEGION POND MACROPHYTE SURVEY RESULTS
May 28, 2007
Valley Branch Watershed District
LEGION POND MACROPHYTE SURVEY RESULTS
June 4, 2009
Valley Branch Watershed District

FIELD NOTES:
- Macrophyte densities estimated as follows:
  1=light; 2=moderate; 3=heavy
- Densities generally not noted for emergent and floating leaf plants
- Macrophytes found throughout entire waterbody
- Nuphar microphyllum sporadic along entire pond edge, heavier in areas marked on map
- Very low water level
- Ranunculus repens found along shoreline (sporadic to dense in dry areas)

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

Common Name | Scientific Name
---|---
Canada waterweed | Elodea canadensis
largeleaf pondweed | Potamogeton amplifolius
cootail | Ceratophyllum demersum
smartweed | Polygonum sp.
stonewort (algae) | Nitella sp.

Common Name | Scientific Name
---|---
little yellow pondlily | Nuphar microphyllum
spatterdock | Nuphar variegata
watershield | Brasenia schreberi

Common Name | Scientific Name
---|---
arrowhead | Sagittaria sp.
cattail | Typha sp.
Creeping buttercup | Ranunculus repens
spikerush | Eleocharis sp.
river bulrush | Scirpus fluviatilis
water knotweed | Polygonum amphibium

Imagery Source: 2008 AE
LEGION POND MACROPHYTE SURVEY RESULTS
June 13, 2013
Valley Branch Watershed District

FIELD NOTES:
- Macrophyte densities estimated as follows:
  1=light; 2=moderate; 3=heavy
- Densities generally not noted for emergent and floating leaf plants
- Macrophytes found throughout entire waterbody
- Nuphar microphyllum sporadic along entire pond edge, heavier in areas marked on map
- Spirodela polyrhiza, Carex comosa, Scirpus fluviatilis was found along entire perimeter sporadically

Emerged Plants
Floating Leaf Plants
Submerged Aquatic Plants
No Aquatic Vegetation

Common Name
Scientific Name
Coontail
Ceratophyllum demersum
Canada waterweed
Elodea canadensis
Smartweed
Polygonum sp.
Stonewort
Nitella sp.
Large leaf pondweed
Potamogeton amplifolius
Common bladderwort
Utricularia macrorhiza

Common Name
Scientific Name
Nuphar microphyllum
Nuphar variegata
Brahea schreberi (very light density)

Common Name
Scientific Name
Arrowhead
Sagittaria sp.
Cattail
Typha sp.
Hardstem bulrush
Schoenoplectus acutus
Bristly sedge
Carex comosa
River bulrush
Scirpus fluviatilis
Water knotweed
Polygonum amphibium

LEGION POND MACROPHYTE SURVEY RESULTS
June 13, 2013
Valley Branch Watershed District