# Aquatic Vegetation Management Plan Update 2013

# Beaver Dam and Loon Lakes, Kosciusko County, Indiana

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**Executive Summary**

Beaver Dam Lake and Loon Lake are located in southwest Kosciusko County, Indiana. Beaver Dam Lake has 146 surface acres with a maximum depth of 61 feet and an average depth of 15.6 feet. Its hydraulic retention time is approximately 1.4 years. Loon Lake has 43 surface acres with a maximum depth of 40 feet and an average depth of 16.7 feet. Its hydraulic retention time is 4 months (J.F.New, 2009). Eurasian watermilfoil (*Myriophyllum spicatum*) is abundant in nuisance quantities in many areas of both lakes with depths less than 6 feet. The following report summarizes Eurasian watermilfoil (EWM) control practices implemented on Beaver Dam Lake and Loon Lake through the Lake and River Enhancement Program (LARE) and outlines future plant management options.

In 2007, J.F. New Inc. surveyed Beaver Dam and Loon Lake as part of the Yellow Creek Lakes Watershed Diagnostic Study. Recommendations were made to treat areas of EWM infestation in Beaver Dam Lake. No specific measurable objectives were outlined in the original plan, but the following objectives were recommended in 2012 to define management success for these lakes in the future.

1. Limit the frequency of occurrence of Eurasian watermilfoil based on summer tier II sampling to ten percent or less in both lakes.

2. Maintain a minimum of 5 native species collected each year in tier II surveys in both lakes.

In 2005, 35 acres on Beaver Dam Lake were treated for control of EWM using Renovate Herbicide. Since then, spot treatments for EWM have taken place each year. These treatments range from 2 acres in 2008 to 23.76 acres in 2012.

On May 16, 2013, 26.04 acres on Beaver Dam Lake and 10.74 acres on Loon Lake were treated with liquid 2,4-D at a rate 2 ppm to control EWM. Average depth of all treatment areas on Beaver Dam Lake was 3 feet. On Loon Lake, average depth of treatment areas ranged from 2 to 4 feet. An additional 2.5 acres on Beaver Dam Lake were treated with liquid 2,4-d on May 23, 2013.

A tier II survey was conducted on August 7, 2013 (post-treatment) to monitor both EWM and native plant populations. The survey found that EWM was undetectable in both Beaver Dam and Loon Lakes. This indicated that EWM was being controlled effectively by the herbicide treatments. Native species diversity in Beaver Dam Lake was 0.63 which is down from 0.71 in 2012. Loon Lake was 0, as it was in 2012. In 2012, the only species collected during the summer tier II survey on Loon Lake was EWM. In 2013, the only species collected in Loon Lake was coontail *(Ceratophyllum demersum)*, which is a native species.

For 2014, three different EWM control options are given. The first would be to treat all areas of EWM infestation in Beaver Dam Lake with DMA-4 herbicide at a rate of 2 ppm. This strategy seems to be controlling EWM adequately on an annual basis. The second option would be to treat all areas of EWM infestation on Beaver Dam Lake with a liquid diquat herbicide at a rate of 2 gallons per acre along with copper sulfate at 1.0 ppm. A third option proposed by the IDNR would likely treat 14.6 acres of nuisance EWM with DMA-4 herbicide at a rate of 2 ppm. Possible advantages and disadvanges of these treatments are discussed in the action plan of this report. Total EWM acreage on Beaver Dam Lake is estimated to be approximately 35 acres. Average depth of treatment areas is estimated to be 3 feet. Areas of EWM infestation in Loon Lake should be treated with liquid 2, 4-D at a rate of 2.0 ppm. EWM acreage on Loon Lake is estimated at up to 11 acres. Average depth of these treatment areas is between 2 and 4 feet.

**Problem Statement**

Eurasian watermilfoil (EWM) is impacting the use of Beaver Dam Lake and Loon Lake in many areas. The EWM forms dense mats in shallow areas, which can inhibit fishing, swimming, and boating. Dense milfoil beds may also prevent the growth of beneficial native species which often provide less recreational interference and more desirable fish habitat.

**Objectives:**
The following specific, quantifiable objectives are recommended to evaluate the success of EWM management activities at Beaver Dam and Loon Lakes. These objectives were established in 2012.

1. Limit the frequency of occurrence of Eurasian watermilfoil based on summer tier II sampling to ten percent or less in both lakes.
2. Maintain a minimum of 5 native species collected each year in Beaver Dam Lake.

Treating EWM is not likely to eradicate it from Beaver Dam Lake and Loon Lake. However, if these objectives are met each year, the indication would be that EWM is being controlled effectively on a seasonal basis, without causing significant damage to the native plant community.

**Aquatic Vegetation Management History**

Table 1 summarizes the treatment history of EWM at Beaver Dam Lake from 2004 to the present. EWM treatments have been common on Beaver Dam Lake although treatments on Loon Lake have not been common.

**Table 1: Beaver Dam and Loon Lakes Treatment History**

| Year | Target species | Lake | Month | Acres | Herbicide | Rate |
|---|---|---|---|---|---|---|
| 2004 | EWM,CLP | Beaver Dam | June 2 | 35 | Aquathol K | NA |
| 2005* | EWM,CLP | Beaver Dam | June 9 | 35 | Renovate | NA |
| 2007 | EWM | Beaver Dam | October | 4 ac | Aquathol K | 2 ppm |
| 2008 | EWM | Beaver Dam | July 18 | 2 ac | DMA-4 | 2ppm |
| 2009 | EWM | Beaver Dam | June 25 | 16 ac | DMA-4 | 2ppm |
| 2010 | EWM | Beaver Dam | August 1 | 2.75 ac | DMA-4 | 2ppm |
| 2011 | EWM | Beaver Dam | June 13 | 3.8 ac | DMA-4 | 2ppm |
| 2012* | EWM | Beaver Dam | June 12 | 23.76 ac | DMA-4 | 2ppm |
| 2012* | EWM | Loon | June 12 | 3.47 ac | DMA-4 | 2ppm |
| 2013* | EWM | Beaver Dam | May 16 | 26.04 ac | DMA-4 | 2ppm |
| 2013* | EWM | Beaver Dam | May 23 | 2.5 ac | DMA-4 | 2ppm |
| 2013* | EWM | Loon | May 16 | 10.74 ac | DMA-4 | 2ppm |

*LARE Funded

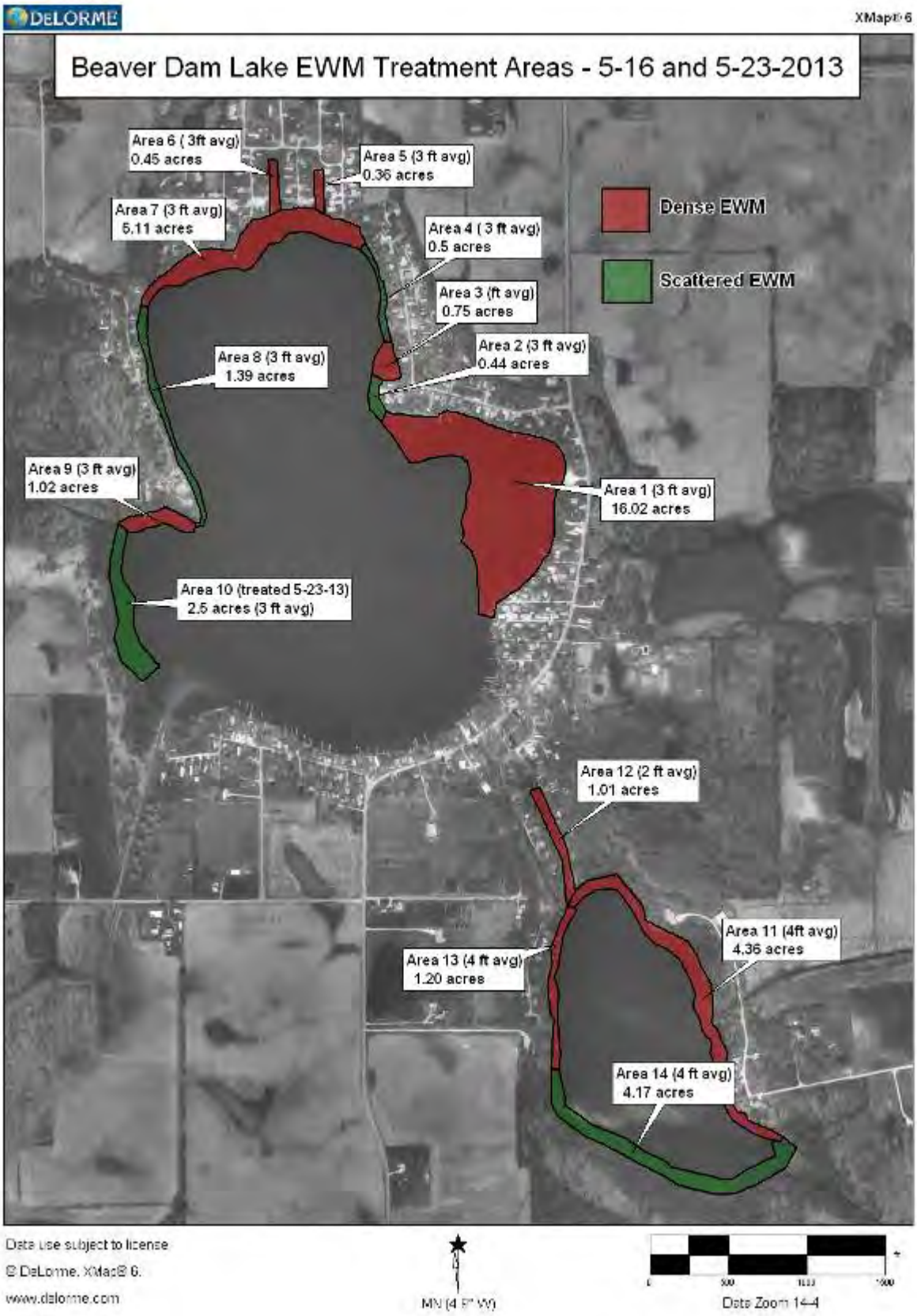
## 2013 Vegetation Treatments

A visual survey on May 13, 2013 used GPS coordinates to mark the locations of all EWM beds in Beaver Dam Lake and Loon Lake. Treatment areas were then chosen based on the survey map. More detailed information about acreage, depth, volume, and herbicide concentrations for each bed are found in Table 2. The areas in this table correspond to the labeled EWM areas in Figure 1.

**Table 2: Beaver Dam and Loon Lakes 2013 EWM Treatments**

| Area | Lake | Acres | Avg. Depth | Herbicide | Rate |
|---|---|---|---|---|---|
| **1** | Beaver Dam | 16.02 | 3 feet | DMA-4 | 2.0 ppm |
| **2** | Beaver Dam | 0.44 | 3 feet | DMA-4 | 2.0 ppm |
| **3** | Beaver Dam | 0.75 | 3 feet | DMA-4 | 2.0 ppm |
| **4** | Beaver Dam | 0.5 | 3 feet | DMA-4 | 2.0 ppm |
| **5** | Beaver Dam | 0.36 | 3 feet | DMA-4 | 2.0 ppm |
| **6** | Beaver Dam | 0.45 | 3 feet | DMA-4 | 2.0 ppm |
| **7** | Beaver Dam | 5.11 | 3 feet | DMA-4 | 2.0 ppm |
| **8** | Beaver Dam | 1.39 | 3 feet | DMA-4 | 2.0 ppm |
| **9** | Beaver Dam | 1.02 | 3 feet | DMA-4 | 2.0 ppm |
| **10** | Beaver Dam | 2.5 | 3 feet | DMA-4 | 2.0 ppm |
| **11** | Loon | 4.36 | 3 feet | DMA-4 | 2.0 ppm |
| **12** | Loon | 1.01 | 2 feet | DMA-4 | 2.0 ppm |
| **13** | Loon | 1.2 | 4 feet | DMA-4 | 2.0 ppm |
| **14** | Loon | 4.17 | 4 feet | DMA-4 | 2.0 ppm |

**Figure 1: Beaver Dam and Loon Lakes 2013 EWM Treatments**



## Tier II Survey Results

Aquatic plant sampling methods used for surveys on Beaver Dam Lake and Loon Lake are outlined in the Tier II Aquatic Vegetation Survey Protocol (IDNR 2010). The sample sites established in 2012 were used in 2013 and will continue to be used in future years to provide consistency in data. Common and scientific names for aquatic plants are consistent with those listed in the original Yellow Creek Lakes Watershed Diagnostic Study and are listed in the appendix to this report. Fifty sample sites are spaced throughout Beaver Dam Lake, and 30 sites are distributed in Loon Lake. These sites are described in Figure 2.

**Figure 2: Beaver Dam and Loon Lakes Tier II Sample Sites**

## Exotic Species

In the summer 2013 tier II survey, no exotic species were found. Eurasian water milfoil is an exotic species that has been present in these lakes for many years and is still present in these lakes. It appears that the spring 2013 treatments had reduced EWM to the point that it was undetectable in the survey. EWM is expected to be prevalent in these lakes in spring of 2014, in similar abundance and acreage as it was in spring of 2013.

## Tier II Data

Results from the August 7, 2013 tier II survey on Beaver Dam Lake are summarized in Table 3. Site frequency, dominance, diversity, and other metrics are shown for the entire survey (all depths) and also for each 5 foot depth contour where plants were present. In this survey, no plants were found deeper than 6 feet. Coontail and Illinois pondweed were the most commonly collected plants.

**Table 3: Beaver Dam Summer 2013 Tier II Data**

**Occurrence and Abundance of Submersed Aquatic Plants in Beaver Dam Lake**

| | | | | | |
|---|---|---|---|---|---|
| County: | Kosciusko | Secchi (ft): | 3 | Mean species/site: | 0.38 |
| Date: | 8/7/2013 | Sites with plants: | 17 | SE Mean species/site: | 0.08 |
| Littoral Depth (ft): | 6.0 | Sites with native plants: | 17 | Mean native species/site: | 0.38 |
| Littoral Sites: | 42 | Number of species: | 4 | SE Mean natives/site: | 0.08 |
| Total Sites: | 50 | Number of native species: | 4 | Species diversity: | 0.63 |
| | | Maximum species/site: | 2 | Native species diversity: | 0.63 |

| All Depths | Frequency of | Rake score frequency per species | | | | Plant |
|---|---|---|---|---|---|---|
| Species | Occurrence | 0 | 1 | 3 | 5 | Dominance |
| Coontail | 20.0 | 80.0 | 0.0 | 18.0 | 2.0 | 12.8 |
| Illinois pondweed | 10.0 | 90.0 | 4.0 | 4.0 | 2.0 | 5.2 |
| Sago pondweed | 6.0 | 94.0 | 0.0 | 6.0 | 0.0 | 3.6 |
| Eelgrass | 2.0 | 98.0 | 2.0 | 0.0 | 0.0 | 0.4 |
| Filamentous Algae | 16.0 | | | | | |

**Occurrence and Abundance of Submersed Aquatic Plants in Beaver Dam Lake**

| | | | | | |
|---|---|---|---|---|---|
| County: | Kosciusko | Secchi (ft): | 3 | Mean species/site: | 0.46 |
| Date: | 8/7/2013 | Sites with plants: | 16 | SE Mean species/site: | 0.10 |
| Littoral Depth (ft): | 6.0 | Sites with native plants: | 16 | Mean native species/site: | 0.46 |
| Littoral Sites: | 39 | Number of species: | 4 | SE Mean natives/site: | 0.10 |
| Total Sites: | 39 | Number of native species: | 4 | Species diversity: | 0.64 |
| | | Maximum species/site: | 2 | Native species diversity: | 0.64 |

| Depths: 0 to 5 ft | Frequency of | Rake score frequency per species | | | | Plant |
|---|---|---|---|---|---|---|
| Species | Occurrence | 0 | 1 | 3 | 5 | Dominance |
| Coontail | 23.1 | 76.9 | 0.0 | 20.5 | 2.6 | 14.9 |
| Illinois pondweed | 12.8 | 87.2 | 5.1 | 5.1 | 2.6 | 6.7 |
| Sago pondweed | 7.7 | 92.3 | 0.0 | 7.7 | 0.0 | 4.6 |
| Eelgrass | 2.6 | 97.4 | 2.6 | 0.0 | 0.0 | 0.5 |
| Filamentous Algae | 17.9 | | | | | |

**Occurrence and Abundance of Submersed Aquatic Plants in Beaver Dam Lake**

| | | | | | |
|---|---|---|---|---|---|
| County: | Kosciusko | Secchi (ft): | 3 | Mean species/site: | 0.09 |
| Date: | 8/7/2013 | Sites with plants: | 1 | SE Mean species/site: | 0.09 |
| Littoral Depth (ft): | 6.0 | Sites with native plants: | 1 | Mean native species/site: | 0.09 |
| Littoral Sites: | 3 | Number of species: | 1 | SE Mean natives/site: | 0.09 |
| Total Sites: | 11 | Number of native species: | 1 | Species diversity: | 0.00 |
| | | Maximum species/site: | 1 | Native species diversity: | 0.00 |

| Depths: 5 to 10 ft | Frequency of | Rake score frequency per species | | | | Plant |
|---|---|---|---|---|---|---|
| Species | Occurrence | 0 | 1 | 3 | 5 | Dominance |
| Coontail | 9.1 | 90.9 | 0.0 | 9.1 | 0.0 | 5.5 |
| Filamentous Algae | 9.1 | | | | | |

Results from the August 7, 2013 tier II survey on Loon Lake are summarized in Table 4. Site frequency, dominance, diversity, and other metrics are shown for the entire survey (all depths) and also for each 5 foot depth contour where plants were present. In this survey, plants were sampled down to 15ft, but no plants were found deeper than 6 feet. No other species besides coontail were collected in Loon Lake in 2013. This is not unexpected as EWM was the only species collected on Loon Lake in the summer of 2012. Loon Lake has a history of low plant diversity.

**Table 4: Loon Lake Summer 2013 Tier II Data**

**Occurrence and Abundance of Submersed Aquatic Plants in Loon Lake**

| | | | | | |
|---|---|---|---|---|---|
| County: | Kosciusko | Secchi (ft): | 2.8 | Mean species/site: | 0.07 |
| Date: | 8/7/2013 | Sites with plants: | 2 | SE Mean species/site: | 0.05 |
| Littoral Depth (ft): | 6.0 | Sites with native plants: | 2 | Mean native species/site: | 0.07 |
| Littoral Sites: | 17 | Number of species: | 1 | SE Mean natives/site: | 0.05 |
| Total Sites: | 30 | Number of native species: | 1 | Species diversity: | 0.00 |
| | | Maximum species/site: | 1 | Native species diversity: | 0.00 |

| All Depths | Frequency of | Rake score frequency per species | | | | Plant |
|---|---|---|---|---|---|---|
| Species | Occurrence | 0 | 1 | 3 | 5 | Dominance |
| Coontail | 6.7 | 93.3 | 6.7 | 0.0 | 0.0 | 1.3 |
| Filamentous Algae | 53.3 | | | | | |

**Occurrence and Abundance of Submersed Aquatic Plants in Loon Lake**

| | | | | | |
|---|---|---|---|---|---|
| County: | Kosciusko | Secchi (ft): | 2.8 | Mean species/site: | 0.10 |
| Date: | 8/7/2013 | Sites with plants: | 1 | SE Mean species/site: | 0.10 |
| Littoral Depth (ft): | 6.0 | Sites with native plants: | 1 | Mean native species/site: | 0.10 |
| Littoral Sites: | 10 | Number of species: | 1 | SE Mean natives/site: | 0.10 |
| Total Sites: | 10 | Number of native species: | 1 | Species diversity: | 0.00 |
| | | Maximum species/site: | 1 | Native species diversity: | 0.00 |

| Depths: 0 to 5 ft | Frequency of | Rake score frequency per species | | | | Plant |
|---|---|---|---|---|---|---|
| Species | Occurrence | 0 | 1 | 3 | 5 | Dominance |
| Coontail | 10.0 | 90.0 | 10.0 | 0.0 | 0.0 | 2.0 |
| Filamentous Algae | 70.0 | | | | | |

**Occurrence and Abundance of Submersed Aquatic Plants in Loon Lake**

| | | | | | |
|---|---|---|---|---|---|
| County: | Kosciusko | Secchi (ft): | 2.8 | Mean species/site: | 0.10 |
| Date: | 8/7/2013 | Sites with plants: | 1 | SE Mean species/site: | 0.10 |
| Littoral Depth (ft): | 6.0 | Sites with native plants: | 1 | Mean native species/site: | 0.10 |
| Littoral Sites: | 7 | Number of species: | 1 | SE Mean natives/site: | 0.10 |
| Total Sites: | 10 | Number of native species: | 1 | Species diversity: | 0.00 |
| | | Maximum species/site: | 1 | Native species diversity: | 0.00 |

| Depths: 5 to 10 ft | Frequency of | Rake score frequency per species | | | | Plant |
|---|---|---|---|---|---|---|
| Species | Occurrence | 0 | 1 | 3 | 5 | Dominance |
| Coontail | 10.0 | 90.0 | 10.0 | 0.0 | 0.0 | 2.0 |
| Filamentous Algae | 80.0 | | | | | |

## Multi-Year Data Presentations

Tier II data for all surveys conducted on Beaver Dam Lake and Loon Lake during their involvement in the LARE program is included in Table 5 and Table 6. These tables compare survey results between different years and are very useful for identifying long term plant abundance trends.

**Table 5: Beaver Dam Lake Multi-Year Data Presentation**

| Beaver Dam Multi-Year Data Presentation | | | | | | |
|---|---|---|---|---|---|---|
| Date: | 5/23/2005 | 7/25/2005 | 8/28/2007 | 8/16/2012 | 8/28/2012 | 8/7/2013 |
| Total Sites: | 60 | 60 | 50 | 50 | 50 | 50 |
| Secchi (ft): | 3.0 | 2.8 | 4.5 | 5.0 | 11.0 | 3.0 |
| Number of Species: | 5 | 3 | 13 | 5 | 6 | 4 |
| Number of Native Species: | 4 | 3 | 12 | 3 | 5 | 4 |
| Species Diversity: | 0.42 | 0.29 | 0.84 | 0.62 | 0.71 | 0.63 |
| Native Species Diversity: | 0.72 | 0.29 | 0.84 | 0.49 | 0.68 | 0.63 |
| Mean Native Species/Site: | 0.1 | 0.2 | 1.06 | 0.53 | 0.58 | 0.38 |
| Surveying organization | IDNR | IDNR | JF New | IDNR | AWC | AWC |
| Species Frequency of Occurrence - All Depths | | | | | | |
| Coontail | 3.3 | 16.7 | 14.0 | 38.0 | 24.0 | 20.0 |
| Sago Pondweed | 0.0 | 0.0 | 32.0 | 8.0 | 20.0 | 6.0 |
| Illinois Pondweed | 0.0 | 0.0 | 2.0 | 0.0 | 10.0 | 10.0 |
| Eurasian milfoil | 30.0 | 0.0 | 2.0 | 6.0 | 4.0 | 0.0 |
| Eelgrass | 0.0 | 0.0 | 2.0 | 0.0 | 2.0 | 2.0 |
| Small Pondweed | 0.0 | 0.0 | 6.0 | 0.0 | 2.0 | 0.0 |
| Chara | 0.0 | 1.7 | 18.0 | 0.0 | 0.0 | 0.0 |
| Southern Naiad | 0.0 | 0.0 | 10.0 | 0.0 | 0.0 | 0.0 |
| Longleaf Pondweed | 0.0 | 0.0 | 10.0 | 0.0 | 0.0 | 0.0 |
| Grassy Pondweed | 0.0 | 0.0 | 4.0 | 0.0 | 0.0 | 0.0 |
| Leafy Pondweed | 0.0 | 0.0 | 4.0 | 10.0 | 0.0 | 0.0 |
| Slender Naiad | 1.7 | 1.7 | 2.0 | 0.0 | 0.0 | 0.0 |
| Water Stargrass | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 0.0 |
| Northern milfoil | 3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| unknown pondweed | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Curlyleaf pondweed | 0.0 | 0.0 | 0.0 | 4.0 | 0.0 | 0.0 |
| Species Frequency of Occurrence - 0 to 5 ft | | | | | | |
| Coontail | 5.3 | 20.9 | 17.5 | 44.8 | 25.6 | 23.1 |
| Sago Pondweed | 0.0 | 0.0 | 40.0 | 13.8 | 23.1 | 7.7 |
| Illinois Pondweed | 0.0 | 0.0 | 2.5 | 0.0 | 12.8 | 12.8 |
| Eurasian milfoil | 44.7 | 0.0 | 2.5 | 10.3 | 5.1 | 0.0 |
| Eelgrass | 0.0 | 0.0 | 2.5 | 0.0 | 2.6 | 2.6 |
| Small Pondweed | 0.0 | 0.0 | 7.5 | 0.0 | 2.6 | 0.0 |
| Southern Naiad | 0.0 | 0.0 | 10.0 | 0.0 | 0.0 | 0.0 |
| Longleaf Pondweed | 0.0 | 0.0 | 12.5 | 0.0 | 0.0 | 0.0 |
| Grassy Pondweed | 0.0 | 0.0 | 5.0 | 0.0 | 0.0 | 0.0 |
| Leafy Pondweed | 0.0 | 0.0 | 5.0 | 3.4 | 0.0 | 0.0 |
| Slender Naiad | 2.6 | 2.3 | 2.5 | 0.0 | 0.0 | 0.0 |
| Water Stargrass | 0.0 | 0.0 | 2.5 | 0.0 | 0.0 | 0.0 |
| Chara | 0.0 | 2.3 | 20.0 | 0.0 | 0.0 | 0.0 |
| Curly-Leaf Pondweed | 0.0 | 0.0 | 0.0 | 6.9 | 0.0 | 0.0 |
| Species Frequency of Occurrence - 5 to 10 ft | | | | | | |
| Coontail | 0.0 | 7.1 | 0.0 | 14.3 | 18.2 | 9.1 |
| Sago Pondweed | 0.0 | 0.0 | 0.0 | 0.0 | 9.1 | 0.0 |
| Southern Naiad | 0.0 | 0.0 | 10.0 | 0.0 | 0.0 | 0.0 |
| Chara | 0.0 | 0.0 | 10.0 | 0.0 | 0.0 | 0.0 |
| Northern milfoil | 10.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Eurasian milfoil | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Table 6: Loon Lake Multi-Year Data Presentation**

| Loon Lake Multi-year Data Presentation | | | |
|---|---|---|---|
| Date: | 8/28/2007 | 8/28/2012 | 8/7/2013 |
| Total Sites: | 31 | 30 | 30 |
| Secchi (ft): | 4.5 | 6 | 2.8 |
| Number of Species: | 6 | 1 | 1 |
| Number of Native Species: | 5 | 0 | 1 |
| Species Diversity;: | 0.42 | 0 | 0 |
| Native Species Diversity: | 0.32 | 0 | 0 |
| Mean Native Species/Site: | 0.71 | 0 | 0.05 |
| Surveying organization | JF New | AWC | AWC |
| Species Frequency of Occurrence - All Depths | | | |
| Eurasian milfoil | 6.45 | 43.3 | 0.0 |
| Coontail | 58.1 | 0.0 | 6.7 |
| Small Pondweed | 3.2 | 0.0 | 0.0 |
| Southern Naiad | 3.2 | 0.0 | 0.0 |
| Northern watermilfoil | 3.2 | 0.0 | 0.0 |
| Chara | 3.2 | 0.0 | 0.0 |
| | | | |
| Species Frequency of Occurrence - 0 to 5 ft | | | |
| Eurasian milfoil | 14.3 | 70.0 | 0.0 |
| Coontail | 92.9 | 0.0 | 10.0 |
| Small Pondweed | 7.1 | 0.0 | 0.0 |
| Southern Naiad | 7.1 | 0.0 | 0.0 |
| Northern watermilfoil | 7.1 | 0.0 | 0.0 |
| Chara | 7.1 | 0.0 | |
| Species Frequency of Occurrence - 5 to 10 ft | | | |
| Eurasian milfoil | 14.3 | 60.0 | 0.0 |
| Coontail | 38.5 | 0.0 | 10.0 |

## Water Clarity and Water Quality

Table 7 summarizes the Secchi readings taken in each tier II survey on Beaver Dam Lake since 2005. Water clarity can fluctuate greatly based on weather, rain events, and algal blooms. From the available data it is difficult to determine if there have been any change at all in water clarity in recent years. It is noteworthy that 2012 was an extremely dry year and 2013 was a somewhat wet year.

**Table 7: Beaver Dam Lake Secchi History**

| **Date** | 5/23/2005 | 7/25/2005 | 8/28/2007 | 8/16/2012 | 8/28/2012 | 8/7/2013 |
|---|---|---|---|---|---|---|
| **Secchi Depth (ft)** | 3.0 | 2.8 | 4.5 | 5.0 | 11.0 | 3.0 |

During the summer 2013 tier II survey, Aquatic Weed Control collected data to construct dissolved oxygen and temperature profiles for Beaver Dam Lake. These profiles are described in Figure 3 and Figure 4. At the time of the tier II survey, Beaver Dam Lake had adequate oxygen to support fish life down to about 11 feet. There was not a strong thermocline at the time this data was collected, but water temperatures started to drop more rapidly at depths past 15 feet.

**Figure 3: Beaver Dam Lake 2013 Dissolved Oxygen Profile**

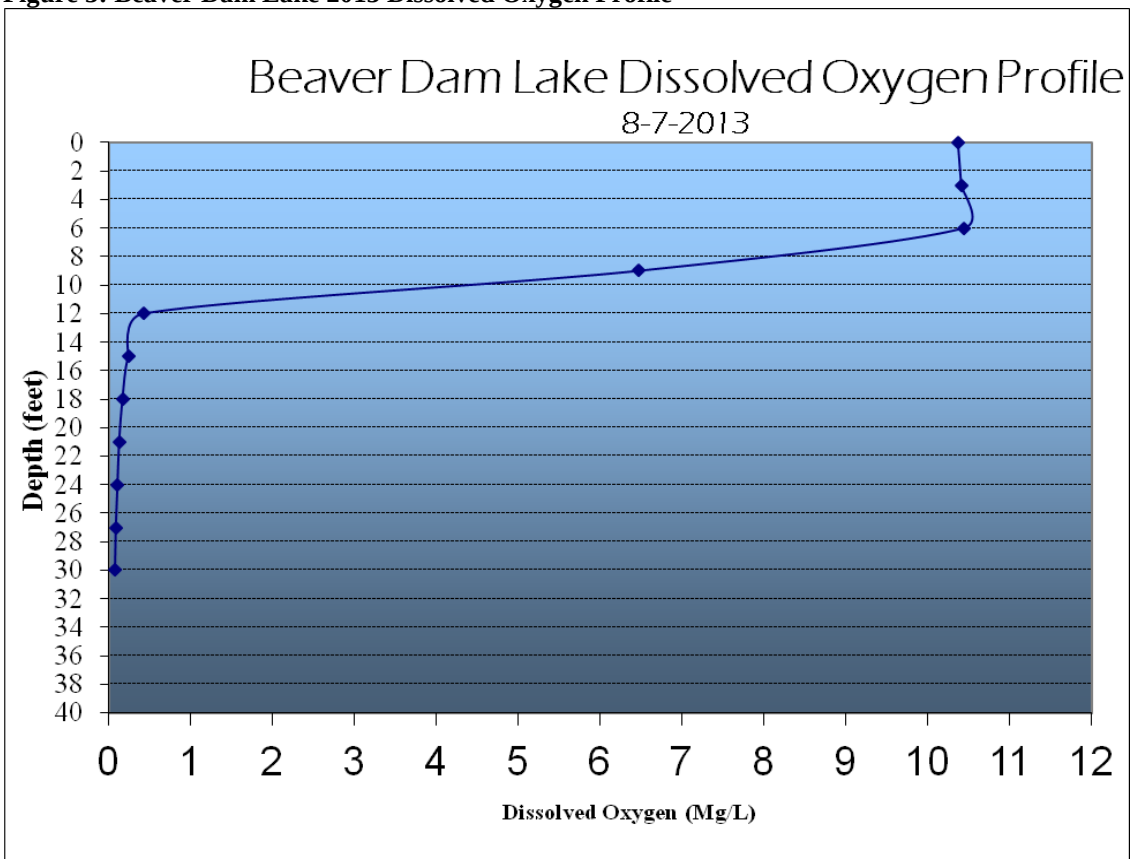
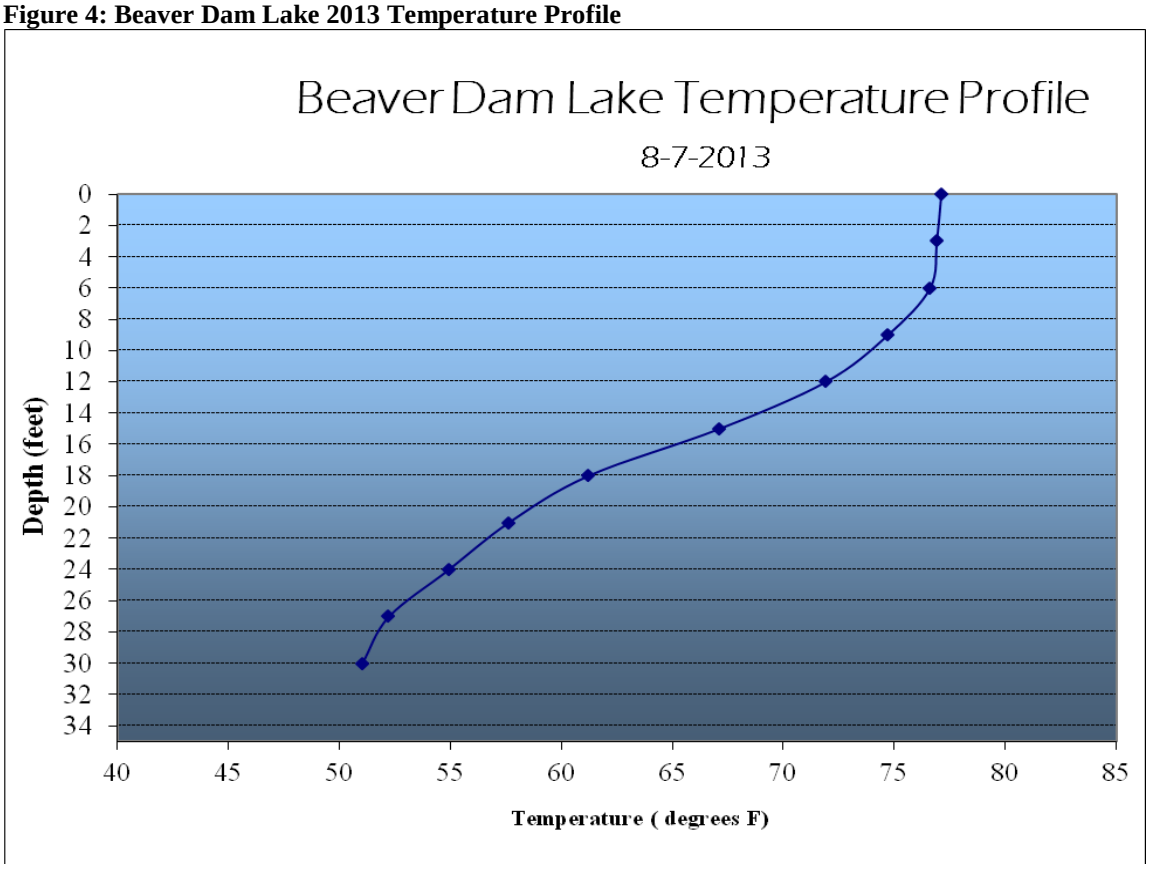



**Figure 4: Beaver Dam Lake 2013 Temperature Profile**



**Discussion**

Summer EWM frequency in Beaver Dam Lake has remained very low (6 percent or less) in every summer tier II survey since 2005. No spring tier II surveys have taken place since 2005. Spring visual surveys indicate that EWM is still abundant in many areas of the lake each year. In Beaver Dam Lake, EWM was found at one sample site in 2007 and at 2 sample sites in 2012. In summer of 2013, EWM was not collected in either Beaver Dam or Loon Lake. It appears that the spot treatments for EWM are adequately controlling EWM on an annual basis and meeting the management objective for EWM control.

Species diversity is low in both lakes when compared to other Northern Indiana lakes (Pearson 2004). In summer of 2013, 4 native plant species were collected in Beaver Dam Lake, and only 1 native plant species was found in Loon Lake. Native diversity in Beaver Dam Lake was 0.63 while there was no diversity at all in Loon Lake. A cool, wet summer could have reduced native abundance in 2013. Reduced native abundance was observed in 2013 tier II data from other area lakes as well. Management practices chosen on these lakes should be geared toward helping native plants compete with EWM, as well as increasing use of the lake in severely infested areas. Meeting the management objectives outlined in this plan should provide reasonable access for lake users while seasonally controlling the exotic EWM population.

The IDNR feels that plant coverage is declining in Beaver Dam Lake. The percent of sample sites with plants ranged from 58% to 52% from 2007 to 2012 and was only 34% in 2013. Water clarity could be a limiting factor that inhibits vegetation growth and may have more of an impact on the native community than EWM. While it is clear that the current management strategy has been successful at reducing EWM, native diversity remains low and does not appear to be responding to the annual reduction in EWM (IDNR, 2014).

Based on the recent data and the concern over an apparent reduction in diversity and plant coverage an additional objective has been suggested by IDNR for 2014.

1. Maintain 50% coverage of plants while reducing the frequency of occurrence of Eurasian watermilfoil based on summer tier II sampling to ten percent or less in both lakes.

**Changes over Time**

Surveys by both AWC and the IDNR have yielded fairly consistent results in the past with 3 to 6 species being found in each survey since 2005. A survey conducted by J.F. New in 2007 yielded quite different results with 13 species being collected. Differences in this survey result could be due to surveying organization or above average plant diversity in 2007. Coontail is consistently the most abundant plant in summer surveys on Beaver Dam Lake, with other natives being collected in low abundances each year. The 2013 summer tier II survey collected 4 native plant species, which seems about average for Beaver Dam Lake when compared to past surveys.

Loon Lake EWM is thought to have increased in recent years. In 2012, EWM was the only plant collected in Loon Lake. In 2013, EWM was extremely abundant in the spring visual survey. In the summer 2013 tier II survey, one native plant (coontail) was collected. It is unclear if EWM treatments in Loon Lake will provide any benefit to a native plant population as natives are very scarce. However, EWM treatments in 2013 greatly increased the accessibility of the lake.

**Action Plan**

For 2014, three different EWM control options are given. The first option is to treat all areas of EWM infestation in Beaver Dam Lake with DMA-4 herbicide at a rate of 2 ppm. This strategy seems to be controlling EWM adequately on an annual basis. The second option would be to treat all areas of EWM infestation on Beaver Dam Lake with a liquid diquat herbicide at a rate of 2 gallons per acre along with copper sulfate at 1.0 ppm when water temperatures approach 50° F (warming trend) and are not higher than 60° F. A third option, as provided by IDNR, would be to treat only nuisance areas of EWM as needed with DMA-4 herbicide at a rate of 2 ppm. This option is referred to as a "maintenance treatment" option and is desrcribed below. Total EWM acreage on Beaver Dam Lake is estimated to be approximately 35 acres. Average depth of treatment areas is estimated to be 3 feet.

The diquat treatment is offered as another treatment option with a few goals in mind. There may be some advantage to treating EWM very early in the year with diquat to help native plants compete with EWM. DMA-4 treatments generally take place a little later in the year, and EWM may have already shaded out some native plants. The native plant population in Beaver Dam Lake is very low, and it is possible that this treatment may be beneficial to natives.

Another reason that an early season diquat treatment could be beneficial is because the EWM at Beaver Dam Lake seems to reach the surface so quickly after ice-out. The water in Beaver Dam Lake appears to warm very quickly, and EWM growing in shallow areas becomes dominant quickly as well. An earlier treatment might prevent EWM from reaching nuisance levels in spring prior to treatment.

A possible disadvantage of an early season diquat treatment is the possibility of re-growth. This is more than likely related to the fact that an early season treatment affords EWM a longer growing season with which to try to re-establish itself. Areas with a nuturient rich substrate appear to be more susceptible to rapid EWM re-growth and may need a second treatment in summer. Any treatment for re-growth in summer would use liquid 2, 4-D because 2, 4-D is selective to EWM at any time of year. Diquat is not a selective herbicide but can achieve selective results by controlling EWM early in the year before the emergence of native plants.

Areas of EWM infestation in Loon Lake should be treated with liquid 2, 4-D at a rate of 2.0 ppm. EWM acreage on Loon Lake is estimated at up to 11 acres. Average depth of these treatment areas is between 2 and 4 feet. Diquat treatments are not recommended for Loon Lake because it has a very nutrient rich bottom which would likely be conducive to rapid EWM re-growth. Cost estimates for these treatment options are listed below.

**Action Plan as Provided by IDNR**

A final option, as provided by IDNR would be to treat only nuisance areas of EWM, while leaving natural shorelines and less abundant areas untreated. While spring weather plays an important role on water clarity leaving some EWM in the lake may actually improve clarity by tying up nutrients which may otherwise cause algae blooms. It is also possible that the fishery may benefit by having more aquatic plants in the lake which provides valueable habitat for invertebrates and fish. While native plants in general may be more beneficial, in the absence of native plants EWM is considered better habitat than nothing at all (Valley et al. 2004). By using a selective herbicide like 2, 4-D this maintenance approach still allows native plants to compete with EWM in areas that would otherwise be dominated by EWM. This option may allow for the objectives to be met while potenially

benefiting the health of the lake. A disadvantage to this approach is that natives may have a difficult time competing in areas where EWM is left untreated and the amount of EWM in these areas overtime could increase. It may also be appropriate to limit EWM treatments at Loon Lake to only areas where it reaches nuisance conditions. In areas along natural shorelines EWM is likely providing beneficial habitat (IDNR 2014).

**Priority Areas**

Treatment areas may need to be prioritized based upon the amount of LARE funding available and the abundance of EWM. If treatment areas must be prioritized, area 1 in Figure 1 would be the top priority. This area is 16.02 acres of very dense EWM, and it is in a high traffic area adjacent to the public access site. The next highest priority would be area 7 in Figure 1.

**Surveys and Planning**

A viusal survey should be sufficient in spring of 2013 to verify EWM locations prior to any herbicide treatments. A summer (post –treatment) tier II survey should be used to monitor both EWM and native plant populations and update the AVMP.

**2014 Project Budget**

The following budget estimates are based on an 80/20 cost share between the LARE program and the lake association. However, it is also possible that LARE could grant funding as part of what is called a "maintenance treatment" option. In this case, LARE would provide a 50/50 cost share and provide a maximum of $5,000 dollars towards EWM treatments. Treatments in channels adjacent to a lake are not eligible for maintenance treatment funding.

**<u>Option #1: Liquid 2,4-D Treatment for EWM</u>**

| | |
|---|---|
| Treat up to 35 acres (3 ft avg depth) of EWM on Beaver Dam Lake with liquid 2, 4-D at 2.0 ppm. | $ 12,250 |
| Treat up to 11 acres on Loon Lake with liquid 2, 4-D at 2 ppm | $ 3,850 |
| Spring visual survey, summer Tier II survey and plan update | $ 4,000 |
| Total cost estimate and Grant Request | $ 20,100 |
| LARE share (80%-subject to availability) | $ 16,080 |
| Assocaitions share (20%) | $ 4,020 |

**<u>Option #2: Early Season Diquat Treatment for EWM</u>**

| | |
|---|---|
| Treat up to 35 acres (3 ft avg depth) of EWM on Beaver Dam Lake with diquat (early season) at 2 gallons per acre and copper sulfate at 1.0 ppm | $ 14,000 |
| Treat up to 20 acres of EMW re-growth with liquid 2, 4-D at 2.0 ppm (if needed) | $ 7,000 |
| Treat up to 11 acres on Loon Lake with liquid 2, 4-D at 2 ppm | $ 3,850 |
| Spring visual survey, summer Tier II survey and plan update | $ 4,000 |

| | |
|---|---|
| Total cost estimate and Grant Request | up to $ 28,850 |
| LARE share (80%-subject to availability) | up to $ 23,080 |
| Assocaitions share (20%) | up to $ 5,770 |

**<u>As Provided by IDNR</u>**
**<u>Option #3: Liquid 2,4-D Maintenance Treatment for EWM</u>**

| | |
|---|---|
| Treat up to 23.5 acres (3 ft avg depth) of EWM on Beaver Dam Lake with liquid 2, 4-D at 2.0 ppm. | $ 8,225 |
| Treat up to 5 acres on Loon Lake with liquid 2, 4-D at 2 ppm | $ 1,775 |
| Total cost estimate and Grant Request | $ 10,000 |
| LARE share (50%-subject to availability) | $ 5,000 |
| Assocaitions share (50%) | $ 5,000 |

**Public Involvement**

Parties interested in the improvement of Beaver Dam Lake and Loon Lake includes members of the Beaver Dam and Loon Lake Conservation Club as well as others who access the lake at the IDNR owned access site on Beaver Dam Lake. The most common and often most effective methods for keeping the public informed about aquatic vegetation management practices are lake association meetings as well as periodical newsletters sent out by the association. It is recommended that association members encourage neighbors and other lake users to attend lake association meetings so that interested parties are well informed about the LARE program. Making sure that meetings are well advertised and planned well in advance of the meeting dates are ways to help ensure good attendance. Carry-in dinners, door prizes, contests, guest speakers, and discussion panels are all excellent ways to boost attendance, encourage involvement, and keep association members informed about lake management activities.

The Beaver Dam and Loon Lake Conservation Club held a public meeting on May 8, 2013 to discuss issues related to the LARE program. Jim Donahoe of Aquatic Weed Control attended this meeting to summarize LARE activities on the lake. Association members were happy with the timing of the EWM treatment as EWM was growing very quickly after ice-out. Nineteen lake use surveys were returned, and the results of those survey responses are summarized in Figure 5.

**Figure 5: Beaver Dam and Loon Lakes 2013 Public Survey**

Lake Use Survey — Lake name Beaver Dam and Loon

Are you a lake property owner? Yes 19 No 0

Are you currently a member of your lake association? Yes 16 No 0

How many years have you been at the lake? 2 or less 2
2 – 5 years 3
5-10 years 3
Over 10 years 11

How do you use the lake (mark all that apply)

| | |
|---|---|
| 19 Swimming | 1 Irrigation |
| 18 Boating | 0 Drinking water |
| 17 Fishing | 0 Other _____ |

Do you have aquatic plants at your shoreline in nuisance quantities? Yes 13 No 5

Do you currently participate in a weed control project on the lake? Yes 18 No 1

Does aquatic vegetation interfere with your use or enjoyment of the lake? Yes 14 No 4

Does the level of vegetation in the lake affect your property values? Yes 14 No 2

Are you in favor of continuing efforts to control vegetation on the lake? Yes 18 No 1

Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded? Yes 18 No 0

Mark any of these you think are problems on your lake:

3 Too many boats access the lake
3 Use of jet skis on the lake
0 Too much fishing
3 Fish population problem
2 Dredging needed
3 Overuse by nonresidents
9 Too many aquatic plants
1 Not enough aquatic plants
2 Poor water quality
0 Pier/funneling problem

Please add any comments:
Appreciate the timely spray of Eurasian milfoil!!!
Thank You!
Fish population too few.

**References Cited**

J.F. New, 2009. Yellow Creek Lakes Waterhsed Diagnostic Study. J.F. New. 708 Rosevelt Road, Walkerton, IN 46510.

IDNR. 2010. Procedure Manual for Surveying Aquatic Vegetation: Tier II Reconnaissance Surveys. IN Department of Natural Resources. Indianapolis, Indiana.

IDNR 2014. LARE and Fisheries Staff Revision Comments and Additions. Indiana Department of Natural Resources. Indianapolis, Indiana.

Pearson, 2004. A Study of 21 Northern Indiana Lakes. Indiana Department of Natural Resources. Indianapolis, Indiana.

Valley, R.D., T.K. Cross, and P. Radomski. 2004. The role of submersed aquatic vegetation as habitat for fish in Minnesota lakes, including the implications of non-native plant invasions and their management. Special Publication 160. Minnesota Department of Natural Resources. St. Paul, MN (Cited by IDNR).

Appendix

Common and scientific plant names

| Common Name | Scientific Name |
|---|---|
| Chara | *Chara sp.* |
| Coontail | *Ceratophyllum demersum* |
| Curly leaf pondweed | *Potamogeton crispus* |
| Eelgrass | *Vallisneria americana* |
| Eurasian watermilfoil | *Myriophyllum spicatum* |
| Illinois pondweed | *Potamogeton illinoensis* |
| Leafy pondweed | *Potamogeton foliosus* |
| Longleaf pondweed | *Potamogeton nodosus* |
| Northern watermilfoil | *Myriophyllum sibiricum* |
| Sago pondweed | *Potamogeton pectinatus* |
| Slender naiad | *Najas flexilis* |
| Small pondweed | *Potamogeton pusillus* |
| Southern naiad | *Najas guadalupensis* |
| Water stargrass | *Heteranthera dubia* |

# Data Sheets and GPS Coordinates

August 7, 2013 Secchi 3.0

| Beaver Dam | Secchi | Depth | Site | Eurasian m | Coontail | Sago Pond | Illinois Pon | Small Pond | Eelgrass | algae | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41.093626 | -85.97037 | 2 | 1 | — | | | | | | | | | | |
| 41.093978 | -85.970933 | 3 | 2 | — | | | | | | | | | | |
| 41.093778 | -85.972351 | 7 | 3 | — | | | | | | | | | | |
| 41.094447 | -85.97319 | 3 | 4 | — | | | | | | | | | | |
| 41.094124 | -85.974153 | 4 | 5 | — | | | | | | | | | | |
| 41.095104 | -85.974803 | 5 | 6 | — | | | | | | | | | | |
| 41.096259 | -85.974545 | 5 | 7 | | | | 1 | | | | | | | |
| 41.096893 | -85.974596 | 10 | 8 | — | | | | | | | | | | |
| 41.097705 | -85.974945 | 3 | 9 | — | | | | | | | | | | |
| 41.097992 | -85.975793 | 2 | 10 | — | | | | | | | | | | |
| 41.09797 | -85.97687 | 4 | 11 | — | | | | | | | | | | |
| 41.097616 | -85.977619 | 3 | 12 | | | 3 | | | | | | | | |
| 41.097462 | -85.978364 | 4 | 13 | | 3 | | | | | | | | | |
| 41.09697 | -85.979099 | 8 | 14 | — | | | | | | | | | | |
| 41.096681 | -85.979882 | 4 | 15 | | 3 | | | | | | | | | |
| 41.095993 | -85.979962 | 4 | 16 | | | | 5 | | | | | | | |
| 41.095075 | -85.979695 | 3 | 17 | — | | | | | | | | | | |
| 41.094257 | -85.979283 | 4 | 18 | — | | | | | | | | | | |
| 41.093675 | -85.978818 | 10 | 19 | — | | | | | | | | | | |
| 41.093227 | -85.978642 | 4 | 20 | — | | | | | | | | | | |
| 41.092723 | -85.978949 | 3 | 21 | — | | | | | | | | | | |
| 41.09291 | -85.979548 | 4 | 22 | | 3 | | | | | | | | | |
| 41.092664 | -85.980339 | 3 | 23 | | 5 | | | | | | | | | |
| 41.091911 | -85.980572 | 6 | 24 | | 3 | | | | | | | | | |
| 41.091505 | -85.980507 | 4 | 25 | | 3 | | | | | | | | | |
| 41.091269 | -85.980492 | 3 | 26 | — | | | | | | | | | | |
| 41.090755 | -85.980407 | 3 | 27 | | 3 | | | | | | | | | |
| 41.090336 | -85.980058 | 4 | 28 | | 3 | | | | | | | | | |
| 41.090355 | -85.979379 | 9 | 29 | — | | | | | | | | | | |
| 41.089742 | -85.979266 | 3 | 30 | | 3 | | | | | | | | | |
| 41.089613 | -85.978591 | 3 | 31 | | 3 | | | | | | | | | |
| 41.089818 | -85.978112 | 4 | 32 | — | | | | | | | | | | |
| 41.089728 | -85.977527 | 5 | 33 | — | | | | | | | | | | |
| 41.089524 | -85.976821 | 9 | 34 | — | | | | | | | | | | |
| 41.089144 | -85.976311 | 5 | 35 | | | | 3 | | | | | | | |
| 41.088913 | -85.975519 | 4 | 36 | | | 3 | 3 | | | | | | | |
| 41.089014 | -85.974421 | 4 | 37 | | | 3 | 1 | | | | | | | |
| 41.089133 | -85.973529 | 3 | 38 | — | | | | | | | | | | |
| 41.089569 | -85.973042 | 10 | 39 | — | | | | | | | | | | |
| 41.089762 | -85.9726 | 4 | 40 | — | | | | | | | | | | |
| 41.090402 | -85.972064 | 5 | 41 | — | | | | | | | | | | |
| 41.091116 | -85.972116 | 5 | 42 | | | | | | 1 | | | | | |
| 41.09172 | -85.971853 | 2 | 43 | — | | | | | | | | | | |
| 41.092096 | -85.972311 | 8 | 44 | — | | | | | | | | | | |
| 41.092602 | -85.972739 | 6 | 45 | — | | | | | | | | | | |
| 41.092788 | -85.971275 | 5 | 46 | — | | | | | | | | | | |
| 41.093039 | -85.970671 | 4 | 47 | — | | | | | | | | | | |
| 41.093375 | -85.971429 | 6 | 48 | — | | | | | | | | | | |
| 41.093364 | -85.972207 | 5 | 49 | — | | | | | | | | | | |
| 41.093676 | -85.972076 | 4 | 50 | — | | | | | | | | | | |

$O_2$ Profile

| | | |
|---|---|---|
| 0 | 10.37 | 77.1 |
| 1 | 10.41 | 76.7 |
| 2 | 10.44 | 76.6 |
| 3 | 6.47 | 74.9 |
| 4 | 0.43 | 71.9 |
| 5 | 0.28 | 67.1 |
| 6 | 0.17 | 61.2 |
| 7 | 0.13 | 57.6 |
| 8 | 0.11 | 54.9 |
| 9 | 0.09 | 52.2 |
| 10 | 0.08 | 51.0 |

August 7, 2013 Secchi - 2.8 water temp 76.4

Loon Lake Secchi:

| latitude | longitude | depth | site | Eurasian milfoil | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41.08224 | -85.96563 | 4 | A 51 | — | (cont.) | | | | | | | | | |
| 41.08241 | -85.96617 | 6 | A 52 | — | | | | | | | | | | |
| 41.08303 | -85.9667 | 11 | 53 | — | | | | | | | | | | |
| 41.08353 | -85.96658 | 4 | A 54 | — | | | | | | | | | | |
| 41.08399 | -85.96683 | 6 | A 55 | — | | | | | | | | | | |
| 41.0844 | -85.96748 | 12 | 56 | — | | | | | | | | | | |
| 41.08473 | -85.96699 | 4 | A 57 | — | | | | | | | | | | |
| 41.0852 | -85.96734 | 6 | A 58 | — | | | | | | | | | | |
| 41.08541 | -85.96828 | 13 | 59 | — | | | | | | | | | | |
| 41.08574 | -85.96841 | 3 | 60 | — | | | | | | | | | | |
| 41.08632 | -85.96882 | 6 | A 61 | — | | | | | | | | | | |
| 41.08636 | -85.96936 | 12 | 62 | — | | | | | | | | | | |
| 41.08637 | -85.96971 | 5 | A 63 | — | | | | | | | | | | |
| 41.08619 | -85.96993 | 6 | A 64 | — | | | | | | | | | | |
| 41.08587 | -85.96996 | 14 | 65 | — | | | | | | | | | | |
| 41.08566 | -85.97028 | 5 | 66 | — | | | | | | | | | | |
| 41.08547 | -85.9703 | 9 | 67 | — | | | | | | | | | | |
| 41.08525 | -85.97012 | 15 | 68 | — | | | | | | | | | | |
| 41.08498 | -85.97042 | 4 | A 69 | — | | | | | | | | | | |
| 41.0845 | -85.97042 | 6 | A 70 | — | | | | | | | | | | |
| 41.08404 | -85.97023 | 13 | 71 | — | | | | | | | | | | |
| 41.0838 | -85.97042 | 5 | 72 | | | | | | | | | | | |
| 41.08346 | -85.97038 | 7 | 73 | — | | | | | | | | | | |
| 41.08303 | -85.97004 | 13 | 74 | — | | | | | | | | | | |
| 41.08232 | -85.96993 | 3 | A 75 | — | | | | | | | | | | |
| 41.08215 | -85.96883 | 6 | A 76 | — | | | | | | | | | | |
| 41.08187 | -85.96787 | 14 | 77 | — | | | | | | | | | | |
| 41.08125 | -85.96681 | 3 | A 78 | — | | | | | | | | | | |
| 41.08169 | -85.96579 | 8 | A 79 | — | | | | | | | | | | |
| 41.08191 | -85.96591 | 11 | A 80 | — | | | | | | | | | | |

Aquatic Weed Control

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# Beaver Dam Lake Permit

| | | | |
|---|---|---|---|
| | | | *Return to:* Page 1 of |
| **APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT** | **FOR OFFICE USE ONLY** | | DEPARTMENT OF NATURAL RESOURCES |
| State Form 26727 (R4 / 2-04) | License No. | | Division of Fish and Wildlife |
| Approved State Board of Accounts 2004 | | | Commercial License Clerk |
| [ ] Whole Lake [X] Multiple Treatment Areas | Date Issued | | 402 West Washington Street, Room W273 |
| Check type of permit | | | Indianapolis, IN 46204 |
| *INSTRUCTIONS: Please print or type information* | Lake County | | FEE: $5.00 |

| | | |
|---|---|---|
| Applicant's Name: Jim Donahoe | Lake Assoc. Name: Beaver Dam and Loon Lake Conservation Club | |
| Rural Route or Street: P. O. Box 325 | | Phone Number: 1-574-533-2597 |
| City and State: Syracuse, IN | | ZIP Code: 46567 |
| Certified Applicator (if applicable): Jim Donahoe | Company or Inc. Name: above | Certification Number: f -19215 |
| Rural Route or Street: P. O. Box 325 | | Phone Number: 1-574-533-2597 |
| City and State: Syracuse, IN | | ZIP Code: 46567 |

| | | |
|---|---|---|
| Lake (One application per lake): Beaver Dam | Nearest Town: Claypool | County: Kosciusko |
| Does water flow into a water supply | [ ] Yes | [X] No |

**Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.**

| | | | | | |
|---|---|---|---|---|---|
| Treatment Area # | 1 | LAT/LONG or UTM's | see map | | |
| Total acres to be controlled | up to 14.6 | Proposed shoreline treatment length (ft) | NA | Perpendicular distance from shoreline (ft) | NA |
| Maximum Depth of Treatment (ft) | 6 | Expected date(s) of treatment(s) | May | | |

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. 2,4-D, Early season Diquat

Plant survey method: [ ] Rake [X] Visual [ ] Other (specify)

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
| Eurasian watermilfoil | x | 70 |
| coontail | | 20 |
| sago pondweed | | 10 |
| | | |
| | | |
| | | |
| | | |
| areas 1 and 7 on map are highest priority | | |
| anything over 14.6 acres will require prior inspection by IDNR | | |
| | | |
| | | |
| | | |
| | | |

| | | | | | |
|---|---|---|---|---|---|
| Treatment Area # | 7 | LAT/LONG or UTM's | see map | | |
| Total acres to be controlled | up to 5.11 | Proposed shoreline treatment length (ft) | NA | Perpendicular distance from shoreline (ft) | NA |
| Maximum Depth of Treatment (ft) | 6 | Expected date(s) of treatment(s) | May | | |

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. 2,4-D, Early season Diquat

Plant survey method: [ ] Rake [X] Visual [ ] Other (specify)

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
| Eurasian watermilfoil | x | 70 |
| coontail | | 20 |
| sago pondweed | | 10 |
| | | |
| | | |
| areas 1 and 7 on map are highest priority | | |
| anything over 14.6 acres will require prior inspection by IDNR | | |
| | | |
| | | |
| | | |

| | | | | | |
|---|---|---|---|---|---|
| Treatment Area # | all channels | LAT/LONG or UTM's | on map | | |
| Total acres to be controlled | 0.81 | Proposed shoreline treatment length (ft) | NA | Perpendicular distance from shoreline (ft) | NA |
| Maximum Depth of Treatment (ft) | 6 | Expected date(s) of treatment(s) | May | | |

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. 2,4-D, Early season Diquat

Plant survey method: [ ] Rake [X] Visual [ ] Other (specify)

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
| Eurasian watermilfoil | x | 70 |
| coontail | | 20 |
| sago pondweed | | 10 |
| | | |
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| | | | |
|---|---|---|---|
| Treatment Area # | | LAT/LONG or UTM's | |
| Total acres to be controlled | | Proposed shoreline treatment length (ft) | Perpendicular distance from shoreline (ft) |
| Maximum Depth of Treatment (ft) | | Expected date(s) of treatment(s) | |

Treatment method: ☐ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.

Plant survey method: ☐ Rake ☐ Visual ☐ Other (specify)

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
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*INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.*

| Applicant Signature | Date |
|---|---|
| | |
| **Certified Applicant's Signature** | **Date** |
| | |

**FOR OFFICE ONLY**

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|---|---|
| ☐ Approved ☐ Disapproved | Fisheries Staff Specialist |
| ☐ Approved ☐ Disapproved | Environmental Staff Specialist |

Mail check or money order in the amount of $5.00 to:

**DEPARTMENT OF NATURAL RESOURCES**
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

# Loon Lake Permit

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|---|---|---|---|
| | | | *Return to:* Page **1** of |
| **APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT** | **FOR OFFICE USE ONLY** | | DEPARTMENT OF NATURAL RESOURCES |
| State Form 26727 (R4 / 2-04) | License No. | | Division of Fish and Wildlife |
| Approved State Board of Accounts 2004 | Date Issued | | Commercial License Clerk |
| ☐ Whole Lake ☒ Multiple Treatment Areas | | | 402 West Washington Street, Room W273 |
| Check type of permit | Lake County | | Indianapolis, IN 46204 |
| *INSTRUCTIONS: Please print or type information* | | | FEE: $5.00 |

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|---|---|---|
| Applicant's Name: Jim Donahoe | Lake Assoc. Name: Beaver Dam and Loon Lake Conservation Club | |
| Rural Route or Street: P. O. Box 325 | | Phone Number: 1-574-533-2597 |
| City and State: Syracuse, IN | | ZIP Code: 46567 |
| Certified Applicator (if applicable): Jim Donahoe | Company or Inc. Name: above | Certification Number: f -19215 |
| Rural Route or Street: P. O. Box 325 | | Phone Number: 1-574-533-2597 |
| City and State: Syracuse, IN | | ZIP Code: 46567 |

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| Lake (One application per lake): Beaver Dam | Nearest Town: Claypool | County: Kosciusko |
| Does water flow into a water supply | ☐ Yes | ☒ No |

**Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.**

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| Treatment Area # | 11 | LAT/LONG or UTM's | see map | | |
| Total acres to be controlled | up to 4.36 | Proposed shoreline treatment length (ft) | NA | Perpendicular distance from shoreline (ft) | NA |
| Maximum Depth of Treatment (ft) | 6 | Expected date(s) of treatment(s) | May | | |

Treatment method: ☒ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. 2,4-D.

Plant survey method: ☐ Rake ☒ Visual ☐ Other (specify)

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
| Eurasian watermilfoil | x | 90 |
| coontail | | 10 |
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|---|---|---|---|---|---|
| Treatment Area # | all channels | LAT/LONG or UTM's | see map | | |
| Total acres to be controlled | 1.01 | Proposed shoreline treatment length (ft) | NA | Perpendicular distance from shoreline (ft) | NA |
| Maximum Depth of Treatment (ft) | 5 | Expected date(s) of treatment(s) | May or June | | |

Treatment method: [x] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. 2, 4-D

Plant survey method: [ ] Rake [x] Visual [ ] Other (specify)

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
| Eurasian watermilfoil | x | 90 |
| coontail | | 10 |
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| Applicant Signature | Date |
|---|---|
| | |

| Certified Applicant's Signature | Date |
|---|---|
| | |

**FOR OFFICE ONLY**

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| [ ] Approved [ ] Disapproved | Fisheries Staff Specialist |
| [ ] Approved [ ] Disapproved | Environmental Staff Specialist |

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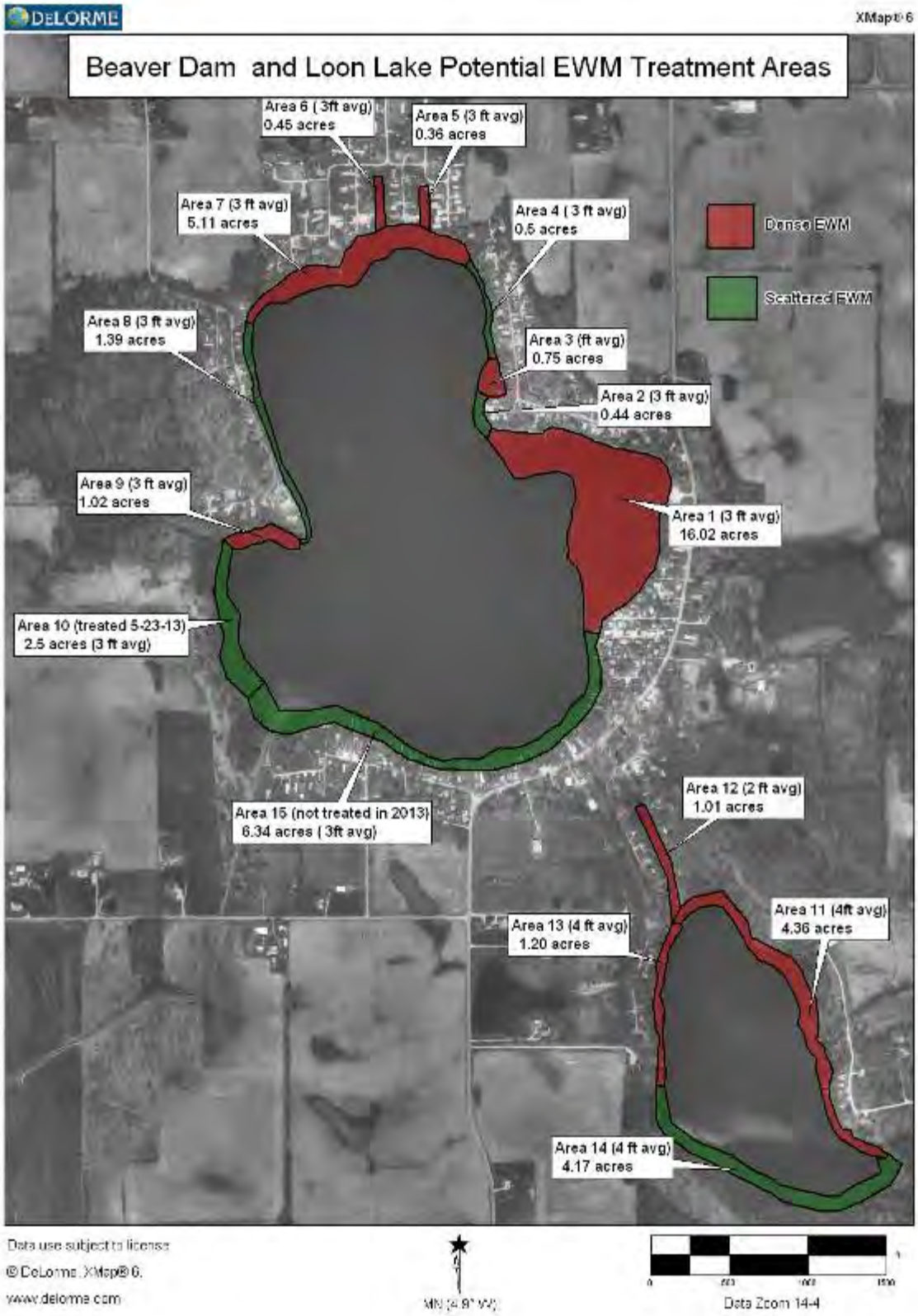
**Beaver Dam and Loon Lake Permit Map Notes**

Areas 1 and 7 on Beaver Dam Lake are highest priority areas.
District fisheries biologist Jed Pearson can approve 14.6 acres without prior inspection which will likely be in areas 1 and 7. Anything over 14.6 acres on Beaver Dam Lake will require IDNR inspection before treatment.