# INTRODUCTION

The Long Lake of Phelps Lake District successfully applied for an AIS Control Grant in August 2007. This is the second year of treatment under this grant-funded project. Please see the 2008 treatment report for more information on the history of this project.

# TREATMENT MONITORING

Determining the success or failure of chemical treatments on Eurasian water milfoil (EWM) is often a difficult task because the criteria used in determining success or failure is ambiguous. Most people involved with EWM management, whether professionals or laypersons, understand that the eradication of EWM from a lake, or even a specific area of a lake, is nearly, if not totally, impossible. Most understand that achieving control is the best criteria for success. Similar to the 2008 treatment report, two different methods of evaluation were used to understand the level of control that was achieved by the chemical treatment. A qualitative assessment was determined for each treatment site by collecting spatial data with a sub-meter Global Positioning System (GPS), in addition to, comparing detailed notes from the pre- and post treatment observations.

Quantitative monitoring of the treatments would be completed following protocols disbursed by the WDNR in April 2007. This protocol calls for the monitoring of target plants (EWM) and native plants before and after treatments. Pretreatment surveys are completed the summer before treatment and the spring of the treatment. Post treatment surveys are completed the summer following treatment and the next spring following the treatment. A quantitative assessment of the treatment was made by collecting data at 287 point-intercept sample locations on Long Lake during the spring and summer surveys (Appendix A). At these locations, EWM presence and rake fullness was documented as well as water depth and substrate type. Native plant abundances were also determined at each plot during the post treatment surveys. Comparative data are available from the 2008 and 2009 post treatment surveys and will be discussed in further detail within the conclusion section.

## Statistical Analysis of Pre- and Post Treatment Survey Data

Scientists often rely on the use of statistical analysis to understand whether the observed differences in nature are merely a product of chance or can be attributed to a particular factor. In the case of the pre- and post treatment monitoring surveys completed on Long Lake, the particular factor we are concerned with is the herbicide treatment. The desired result is a decrease in EWM within the treatment areas. The amount of EWM within a treatment site is measured with the sub-sampling surveys and expressed in terms of percent frequency of occurrence. The EWM frequency is a percentage of sub-sampling sites that contain EWM relative to the total sub-sampling sites in the treatment area. For example if a treatment site has 20 sub-sampling locations and 5 of those locations contained EWM, then the EWM frequency would be 25%.

As a part of the treatment monitoring, the sub-sampling sites are visited before and after the treatments to produce the pre- and post treatment data. By comparing those data, we can see if there is more, less, or the same amount of EWM before and after the treatment. As mentioned

above, the desired result is to have less EWM after treatment. If there is a difference between the pre- and post treatment data, statistical analysis is used to determine if the difference is sufficient to be attributed to the treatment or if the difference may have occurred randomly. If the difference is sufficient, it is considered to be *significantly different*, if it is not sufficient, it is considered to be *insignificantly different*. In the end, a significant difference can be attributed to some factor, while an insignificant difference can only be attributed to random chance.

With guidance from WDNR Integrated Sciences, a Chi-square distribution analysis (alpha = 0.05) was used to determine if the quantitative data collected before the treatment are statically different from the data collected after the treatment. The alpha value is set such that we consider the results statistically significant when the test is 95% confident that the results are truly different and non-random.

The number of sub-sample sites within a treatment area must be considered when evaluating the treatment impacts on that particular site. A higher sample size (N), leads to more credible results and conclusions. In general, sites containing 6 or less sub-sample locations are not considered sufficient for analysis; however, those data are considered valuable when pooled (combined) with the other sub-sample sites within the lake for the lakewide analysis.

The caveat to all of this is that we assume that the differences observed were caused by the herbicide treatment, but truly, without having comparable data from a non-treatment site (control group), this cannot be absolutely certain. For example, was the reduction in EWM caused by inter-annual variations caused by competitive dynamics between species, fluctuating water levels, natural plant cycles, or changes due to climatic conditions? Without a true experimental design that uses a control site, we cannot absolutely answer that question. In the end, it is impractical to take the risk of not treating a colony of EWM within a lake just to make sure that the results of the studies are scientifically sound; therefore making the educated-assumption that the difference is caused by the herbicide treatment is reasonable.

## Pretreatment Survey – 05/7/09

The purpose of this survey was to refine the treatment areas used in the conditional permit, which was created using the 2008 peak biomass survey results, to more accurately and effectively coordinate the control effort. The weather conditions on the day of the survey were partly sunny and windy. Viewing the EWM on Long Lake from the surface was slightly challenging due to the windy conditions. The surface water temperature was approximately 50°F and the ambient air temperature was approximately 60°F. The use of an aqua scope and submersed underwater camera were used to help observe EWM occurrences and determine colony extents.

During this survey, it was determined that the extents laid out the previous summer were largely accurate. The lateral extents (parallel to the shore) for some of sites did have a scattering of single plants outside the designated treatment area. In most cases there was not enough to suggest expanding the proposed treatment area except at sites J-09 and M-09. Both of these sites were combined with another site because enough EWM had filled in between the areas to make

one large treatment site. There were a total of 117 acres treated in 2009 (Map 1). The next section describes in detail the results of the 2009 treatment.

**Post Treatment & Peak biomass EWM Survey – 8/18/2009 & 8/19/2009**

During the post treatment survey, all treatment sites were visited to determine the efficacy of the chemical application. The weather conditions during the first field visit were sunny and windy the first day and sunny with little wind the second day. The windy conditions can make it challenging to see plants in the water, but due to the high water clarity of Long Lake and the plants being high in the water column, ecologists were able to view plants from the surface during both of these surveys. All point-intercept sample locations were re-visited and data were collected in the same manner as during the pretreatment survey. Native plant occurrences were also documented from the sub-sample locations during this survey to be compared with past and future summer surveys.

Long Lake contains an established population of EWM. The criteria used to evaluate success of an herbicide treatment for this level of infestation are different than for a newly discovered, pioneer infestation. Please note that the following criteria for success is based on standards created by Onterra and are not outlined within the Long Lake Aquatic Plant Management Plan.

During this project, the impact of the herbicide treatments is evaluated in multiple ways. Qualitatively, a successful treatment on a particular site would include a reduction of Eurasian water milfoil density as demonstrated by a decrease in density rating (e.g. highly dominant to dominant). In terms of a treatment as a whole, at least 75% of the acreage treated that year would decrease by one level of density as described above for an individual site.

Quantitatively, a successful treatment on a specific site would include a significant reduction in Eurasian water milfoil frequency following the treatments as exhibited by at least a 50% decrease in Eurasian water milfoil frequency based upon the sub-sampling. In other words, if the Eurasian water milfoil frequency of occurrence before the treatment was 80%, the post treatment frequency would need to be 40% or lower for the treatment to be considered a success for that particular site. Evaluation of the treatment-wide effectiveness would follow the same criteria based upon pooled sub-sample data from all treatment sites. Further, there would be a noticeable decrease in rake fullness ratings within the fullness categories of 2 and 3. Preferably, there would be no rake tows exhibiting a fullness of 2 or 3 during the post treatment surveys.

Also during this field visit, a peak biomass EWM survey was conducted to provide an accurate account of all EWM locations within the lake to aid in coordinating the 2010 management actions. Please note that these recommendations are provided within this section and two similar maps are referenced: Map 2 displays the results of the 2009 peak-biomass survey results with the 2009 final treatment areas, while Map 3 displays the results of the 2009 peak-biomass survey results and the proposed 2010 treatment areas.

***Sites A-09*** This treatment site is near the public boat landing. The density of EWM throughout a majority of the site remained the same after the treatment, but the colony has expanded. Scattered EWM was found closer to the boat landing and was found growing in between sites A-

09 and T-09 (Map 2). Sites A-09 and the area in between A-09 and T-09 are recommended for treatment in 2010 (Map 3, A-10).

***Site B-09*** This site was highly dominant before the treatment and has remained highly dominant throughout most of the treatment site. There was a small area in the western part of this site where no EWM was found. This site has been separated into two treatment areas and both are recommended for treatment again in 2010 (Map 3, O-10, N-10).

***Site C-09*** There was little change in the density of the EWM colony after the spring treatment and this area is recommended for treatment in 2010 (Map 3, L-10).

***Site D-09*** Overall there was little change in the density of the EWM after the spring treatment except for the northeast portion of the site where there was a small area at the end of the treatment site where no EWM was found. This area is recommended for treatment in 2010 (Map 3, K-10).

***Sites E-09 & F-09,*** The EWM density within both of these sites has predominately increased by one density rating since last year, but the species has not spread out parallel from the shoreline from either of these sites. Both of these colonies are proposed for treatment in 2010 (Map 3, J-10, I-10).

***Site G-09*** The EWM density within this site has expanded slightly to the south, parallel to the shore but the density has remained the same after treatment. This site has been expanded for treatment in 2010 (Map 3, H-10).

***Site H-09*** The EWM density within this site has been reduced by one density rating after the treatment but has spread slightly to the north. This site has been expanded and is recommended for treatment in 2010 (Map 3, G-10).

***Site I-09*** The southern portion of the site responded favorably to the spring treatment. The colony of EWM in this part of the site was highly dominant and after the treatment no EWM was found. The colony in the northern part of the site primarily stayed the same density and filled in some of the gaps within the site. The northern portion of this treatment area is recommended for treatment in 2010 (Map 3, F-09)

***Site K-09*** The EWM colony within this site was reduced from highly dominant to dominant after the treatment. EWM did spread to parallel to the shore to the northeast and southwest connecting with U-09. This site has been combined with a larger site to the south that wraps around to the eastern shore and is recommended for treatment in 2010 (Map 3, D-10)

***Site U-09*** The 2,4-D liquid treatment had a noticeable effect in the shallow, southern portion of the site. This area had the most effective treatment on the lake in 2009. The density of EWM colonies were reduced by two levels, from highly dominant to scattered throughout most of this site and in some areas no EWM was found (Maps 2 and 3). The EWM colonies in the deeper areas of the treatment site did not respond as well to the liquid treatment. The northwest part of the site, along the shore, remained highly dominant and the area that was once dominant has

become highly dominant and the colony has spread a little further north. This site is recommended for treatment again next year. The liquid treatment will only include the very southern part of the lake in the shallow waters (Map 3, E-10). The rest of this site will be treated as part of another treatment site, D-10.

***Sites L-09, N-09, & O-09*** During this post treatment field visit, the EWM was found to be reduced by one density rating in almost half of L-09 and in a small portion of O-09. Overall the colonies have increased in density and the area in between the sites filled in with dense clumps of EWM. L-09 has been combined with part of U-09, K-09, N-09, and O-09 to make up proposed 2010 treatment site D-10 (Map 3).

***Sites P-09 & Q-09*** EWM at site P-09 was found to be matting at the surface while site Q-09 remained dominated by EWM. The area in between the sites filled in with a highly dominant colony of EWM. These two sites have been combined and are recommended for treatment in 2010 (Map 3, Site C-10).

***Sites R-09 & S-09*** During the field visit, it was found that these EWM colonies had increased in density and expanded to combine the two sites (Map 3, Site B-10). Site B-10 is recommended for treatment in 2010.

***Site T-09*** EWM was reduced by one density level in the northeastern part of the site but most of the site maintained the same density as last year. Similar to many of the other treatment sites, the field survey revealed that the EWM colonies have spread from its original boundaries. This treatment site is proposed to be combined with A-09 to create a new site, A-10 (Map 3).

## CONCLUSIONS AND RECOMMENDATIONS

During the summer of 2008, 64.8% of the point-intercept locations contained EWM and 60.3% contained EWM after the 2009 treatment (Figure 1), showing a statistically insignificant 7% reduction in EWM occurrence within the 2009 treatment areas. Only three of the 17 sites sampled (Sites A-09, I-09, and R-09) showed reductions of EWM occurrence greater than or equal to 50%. Of these sites, R-09, had insufficient sample size (N=4) to detect a statistical difference. Chi-square analysis of A-09 (N=10) showed that the observed differences were not shown to be statistically significant and may be a result of random variation. I-09 was the only site to show a statistically significant reduction in EWM (Figure 1).

A rake fullness rating of 1-3 was used to determine abundance of EWM at each point-intercept location. Figure 2 displays the number of point-intercept locations exhibiting each of the rake fullness ratings within the areas treated on Long Lake in the summer of 2008 and the summer of 2009. The figure indicates that out of the 160 locations that contained EWM before the treatment, 80 of them had a rake fullness of 2 or 3; while after the treatment, only 51 of the locations contained ratings of 2 and 3. While this is a noticeable reduction in EWM based upon the rake tow data, the reduction was not sufficient to be detected during the qualitative assessments.

Lakewide approximately 34% of the treatment areas were reduced by at least one density rating, which does not meet the qualitative success criteria (75% reduction) for the 2009 treatments.

The post treatment survey revealed areas of EWM matting at the surface that were not found the summer of 2008. Additionally, it was found that many of the colonies had again expanded along the shoreline, particularly along the east shore (Maps 1 and 2). There was a noticeable reduction in EWM density in the southern, shallow area of the lake that was treated with liquid 2,4-D (Maps 1 and 2). Areas that were once highly dominated by EWM in this southern area are now scattered and in some areas no plants were found (Maps 1 and 2).

## Native Plants

Although it is never the intent of the treatments to impact native species, it is important to remember that these non-target impacts can only be considered in the context of the areas treated and not on a *lake-wide* basis. In other words, the impact of the treatments on a non-target species in the treatment areas cannot be extrapolated to the entire population of that plant within the lake, unless the plant species is only found in locations where there is EWM. The same cannot be said for EWM, because by targeting EWM within the lake, it is intentionally being impacted on a lake-wide basis. One may claim that an impact to non-target natives may leave a 'hole' where pioneer infestations of EWM can take hold. The herbicide used in 2009 (2,4-D) is broad-leaf (dicot) specific and as long as a particular treatment site is not dominated by broad-leaf natives, native monocots, of which most aquatic plants are, will provide ample competition to compete against the non-native threat.

Native plant frequencies were monitored on Long Lake during the 2008 summer pretreatment survey and the 2009 summer post treatment survey (Figure 3). Please note that Figure 3 is displaying the difference between frequency of occurrence determined during the summer of 2008 and the summer of 2009 for each native plant listed and <u>not</u> a percent change in frequency. For example, northern water milfoil occurred in approximately 4.9% of the plots during the summer of 2008 and 12.1% during the summer of 2009. Therefore, the chart indicates a positive difference (increase) of approximately 7.2 (12.1% – 4.9%) and <u>not</u> a percent change. If percent change was calculated, we would see in this example that northern water milfoil frequency changed by 146.9% ((12.1 - 4.9) / 4.9 x 100%).

One plant was found to have a significant decline since 2008, coontail (Figure 3). Coontail is a dicot and it is plausible that the herbicide treatment has caused the approximately 6% decline in occurrence of this species within the 2009 treatment areas. One dicot, northern water milfoil significantly increased after the treatment, in addition to three native monocots and two macroalgae (muskgrasses and stoneworts) (Figure 3). While it cannot be said with any degree of certainty, it is possible that these plants are increasing as competition from EWM decreases (Figure 3).

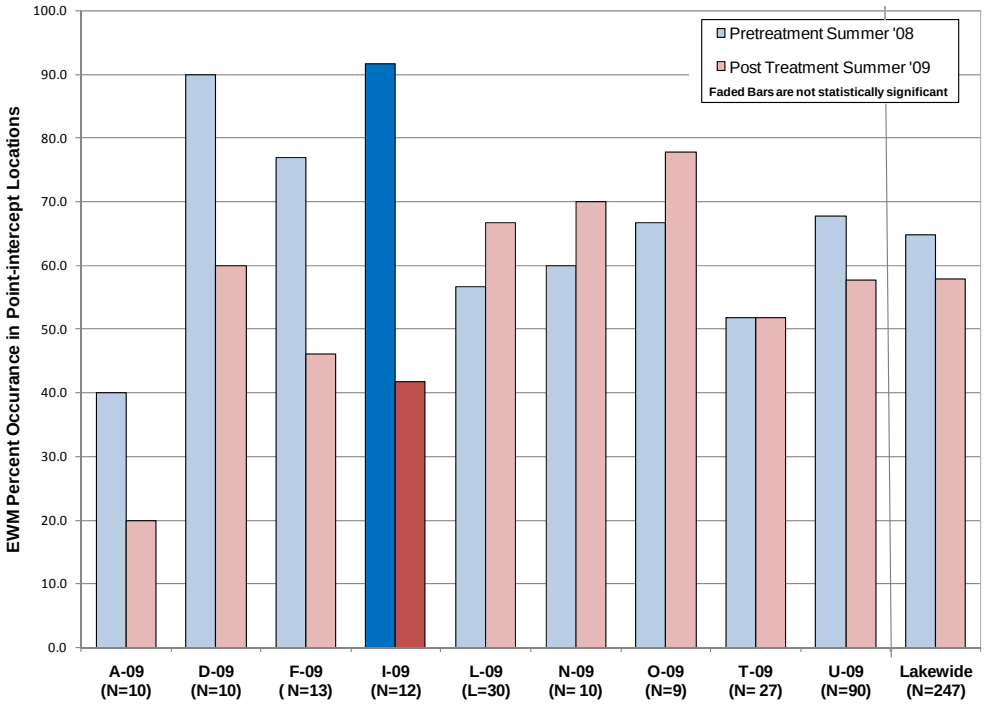



**Figure 1. EWM percent occurrence in point-intercept locations displayed by treatment site comparing summer 2008 to summer 2009.** Please note only those treatment sites with more than eight point-intercept locations are displayed on the graph. Eight treatment sites have less than eight point-intercept locations, and therefore not graphed.

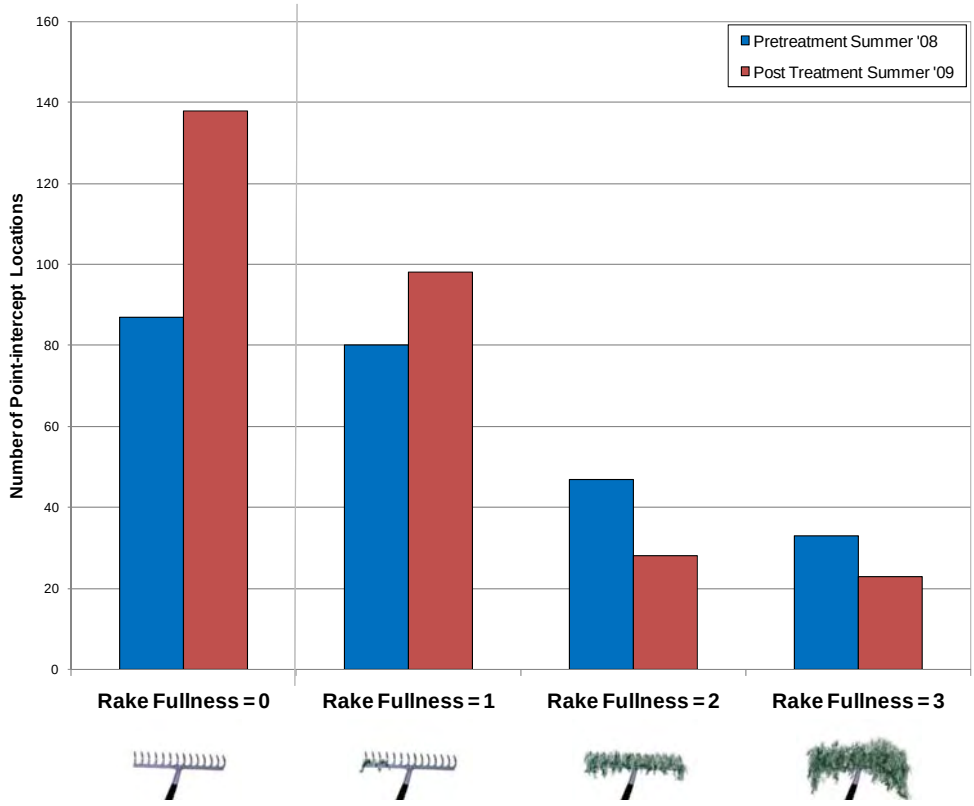



**Figure 2. EWM rake fullness distribution within treated areas on Long Lake.**

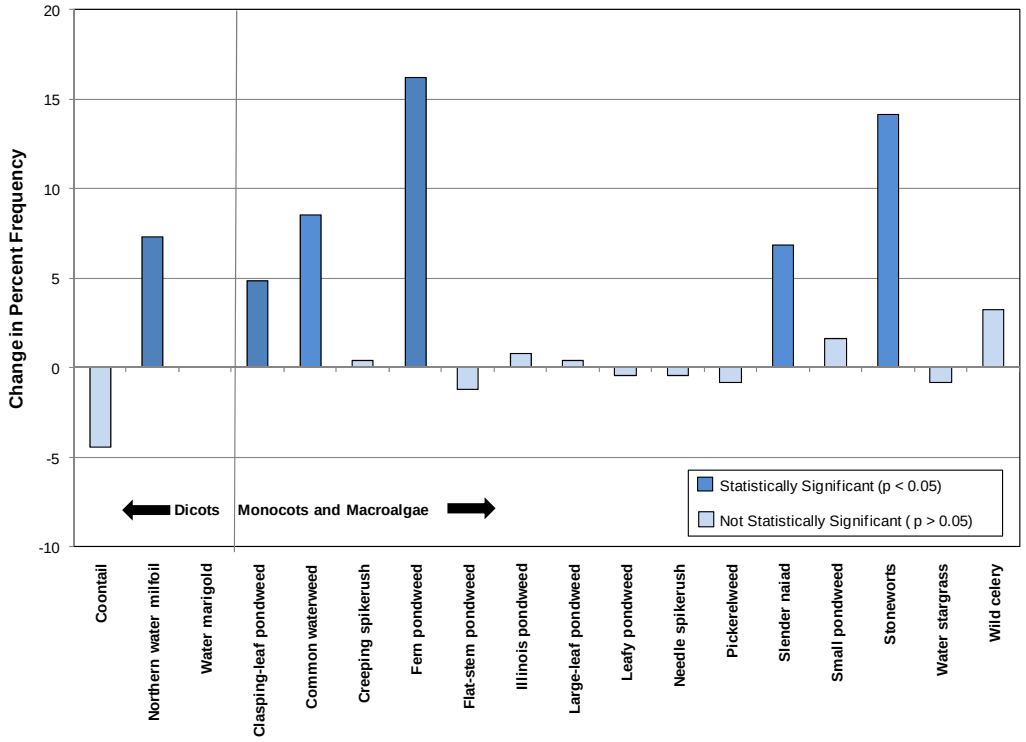



**Figure 3. Native plant change in percent frequency from 2008 to 2009 on Long Lake.**

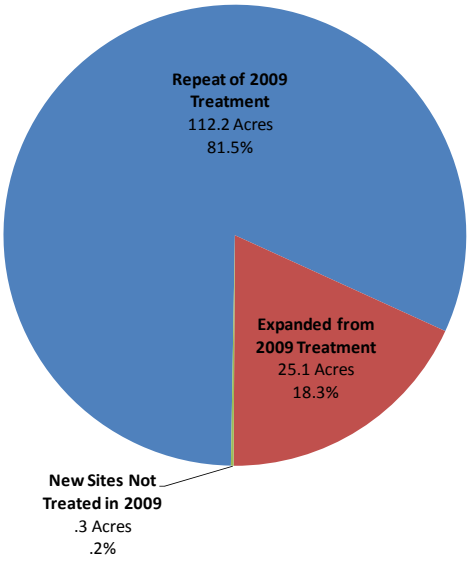



**Figure 4. Common acreage comparison between 2009 treatment and proposed treatment for 2010.**

As indicated on Map 3, there is over 137 acres of treatable EWM in Long Lake. There are no sites that were treated in 2009 that do not have at least part of the site proposed for treatment in 2010 (Maps 2 and 3), resulting in 81.5% of the 2010 treatment being common to areas treated during May 2009 (Figure 4). There is one small site, comprising of .3 acres, (Map 3, M-10) that is a new proposed treatment area that is completely independent from previously treated areas (Figure 4). Please note that this area was discovered during the 2009 spring pretreatment survey as a scattered site, as opposed to being newly discovered during the 2009 peak-biomass survey. In other words, it was not treated because it was not a priority area at the time, but has since become dominated by EWM. The remaining 25.1% are new areas adjacent to 2009 treatment sites as a result of the colony's expansion.

The reality is that the district is in line to retreat the vast majority of the 2009 treatment areas in 2010. That scenario is not uncommon in EWM management as dense areas often require multiple years of the treatment to significantly decrease the site's density and Onterra has witnessed this on other lakes. Further, the survey results do indicate that the EWM is being held

in check through the completion of the treatments. The southern portion of the lake had promising results this year and it is recommended to be treated again with the liquid 2,4-D, but only in the shallow areas with little to no slope. Areas near the boat landing and the thoroughfare to Big Sand Lake have also been recommended for liquid applications of 2, 4-D (Map 3). The rest of Long Lake, for the most part, appears to still be losing the battle with EWM thus far. This year, more EWM was found spreading along the shore mostly in the form of expanded areas of known colonies.

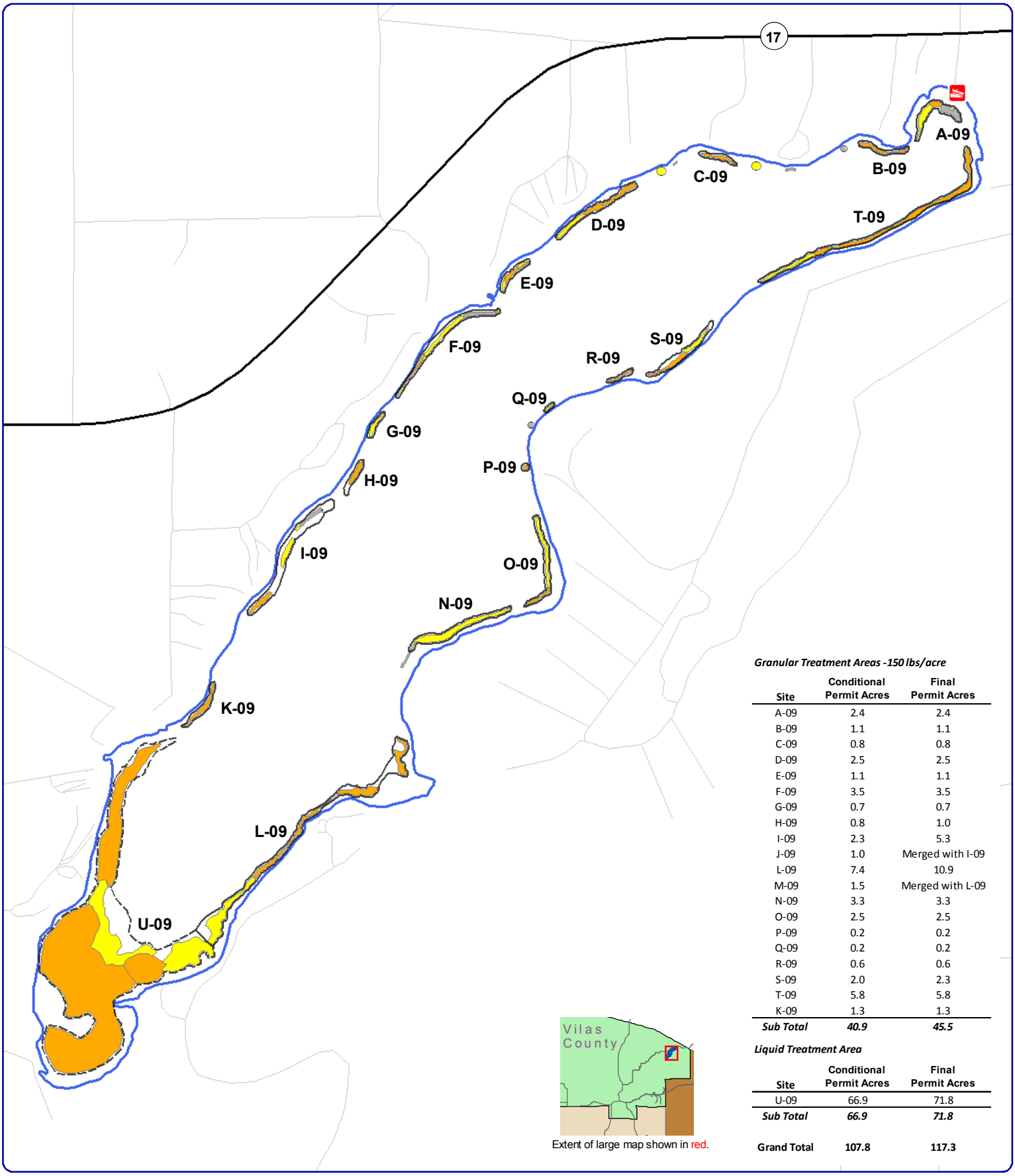
As mentioned in the 2008 treatment report, the steep slopes of Long Lake are likely a primary factor reducing the efficacy of the treatments. The target herbicide concentration may be met in some parts of the treatment area and not others due to the differences in water volume above the lake bottom. Liquid 2,4-D was utilized on the northern portion of U-09, which is both deep and sloping like the granular treatment sites. Similar to the granular treatment areas, the use of liquid 2, 4-D was found to have little impact on the EWM in the steeply sloped sites.

In order to reduce the treatable acreage of EWM it is believed that multiple years of treatment might be the key on Long Lake. This may not be the definitive answer, but on lakes with significant amounts of colonized EWM, like in Long Lake, we have found better results after a series of annual treatments. A good example of this is Lake Metonga in Forest County. We did not see significant reductions of EWM in that lake until the third or fourth year of treatment was completed. One explanation for this may be the fact that the colony rebounds after treatment through germination of existing stock within the sediment's seed bank and/or through the propagation of new plants through dormant root crowns. As the area is repetitively treated, the source for new plants is depleted and the colony cannot rebound. This is much like using repeated, annual treatments to reduce the turion (reproductive structure) bank which is common in the management of curly-leaf pondweed. In the situation of curly-leaf pondweed, we expect to treat the same area annually over 3 to 5 years in order to deplete the turion bank held in the sediment.

Impacts resulting from the 2009 treatments that were not detectable during the 2009 summer surveys may become apparent during the 2010 spring and summer surveys. In some lakes, surveys completed the summer following treatment indicated poor treatment efficacy, but when the sites are reassessed the following year, treatment impacts can be seen in the form of reduced biomass. In cases such as this, the EWM may be injured to the point that it can survive the growing season following treatment, but not the following winter because the plant did not have the ability to build energy reserves in its root crown. As a result, the plant is unable to produce foliage the following spring and perishes. This would be analogous to a squirrel being injured during the summer. That squirrel may have the ability to feed itself while food supplies are high, but not the ability to gather and store food for the winter. As a result, the squirrel would survive the summer, but not make it through the winter or following spring when food is not as plentiful.

As discussed above, we believe the most likely reason for not finding better results on Long Lake is that the steep slopes found in most of the treatment areas are diluting the 2,4-D below target concentrations. To solve that issue, we suggest that the areas treated last year with granular 2,4-D at the rate of 150 lbs/acre be increased to 200 lbs/acre. However, this would raise the cost of the treatments by approximately $200/acre, which may not be feasible for the district

even with grant-funding by the state. Also, that recommendation is made without the benefit of the results from the 2, 4-D residual samples collected by the district prior to and following the spring 2009 treatments. Once those results are available from the USACE, we may be able to create a more effective treatment strategy, especially where dosages are concerned.




*Granular Treatment Areas -150 lbs/acre*

| Site | Conditional Permit Acres | Final Permit Acres |
|---|---|---|
| A-09 | 2.4 | 2.4 |
| B-09 | 1.1 | 1.1 |
| C-09 | 0.8 | 0.8 |
| D-09 | 2.5 | 2.5 |
| E-09 | 1.1 | 1.1 |
| F-09 | 3.5 | 3.5 |
| G-09 | 0.7 | 0.7 |
| H-09 | 0.8 | 1.0 |
| I-09 | 2.3 | 5.3 |
| J-09 | 1.0 | Merged with I-09 |
| L-09 | 7.4 | 10.9 |
| M-09 | 1.5 | Merged with L-09 |
| N-09 | 3.3 | 3.3 |
| O-09 | 2.5 | 2.5 |
| P-09 | 0.2 | 0.2 |
| Q-09 | 0.2 | 0.2 |
| R-09 | 0.6 | 0.6 |
| S-09 | 2.0 | 2.3 |
| T-09 | 5.8 | 5.8 |
| K-09 | 1.3 | 1.3 |
| ***Sub Total*** | ***40.9*** | ***45.5*** |

*Liquid Treatment Area*

| Site | Conditional Permit Acres | Final Permit Acres |
|---|---|---|
| U-09 | 66.9 | 71.8 |
| ***Sub Total*** | ***66.9*** | ***71.8*** |
| **Grand Total** | **107.8** | **117.3** |




Extent of large map shown in red.

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Feet

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**Sources:**
Roads & Hydro: WDNR
Bathymetry: WDNR, Digitized by Onterra
Aquatic Plants: Onterra (August 2008)
**Map date: October 14, 2009**
*File Name: Map1_LongV_2009TreatReport.mxd*

**Legend**

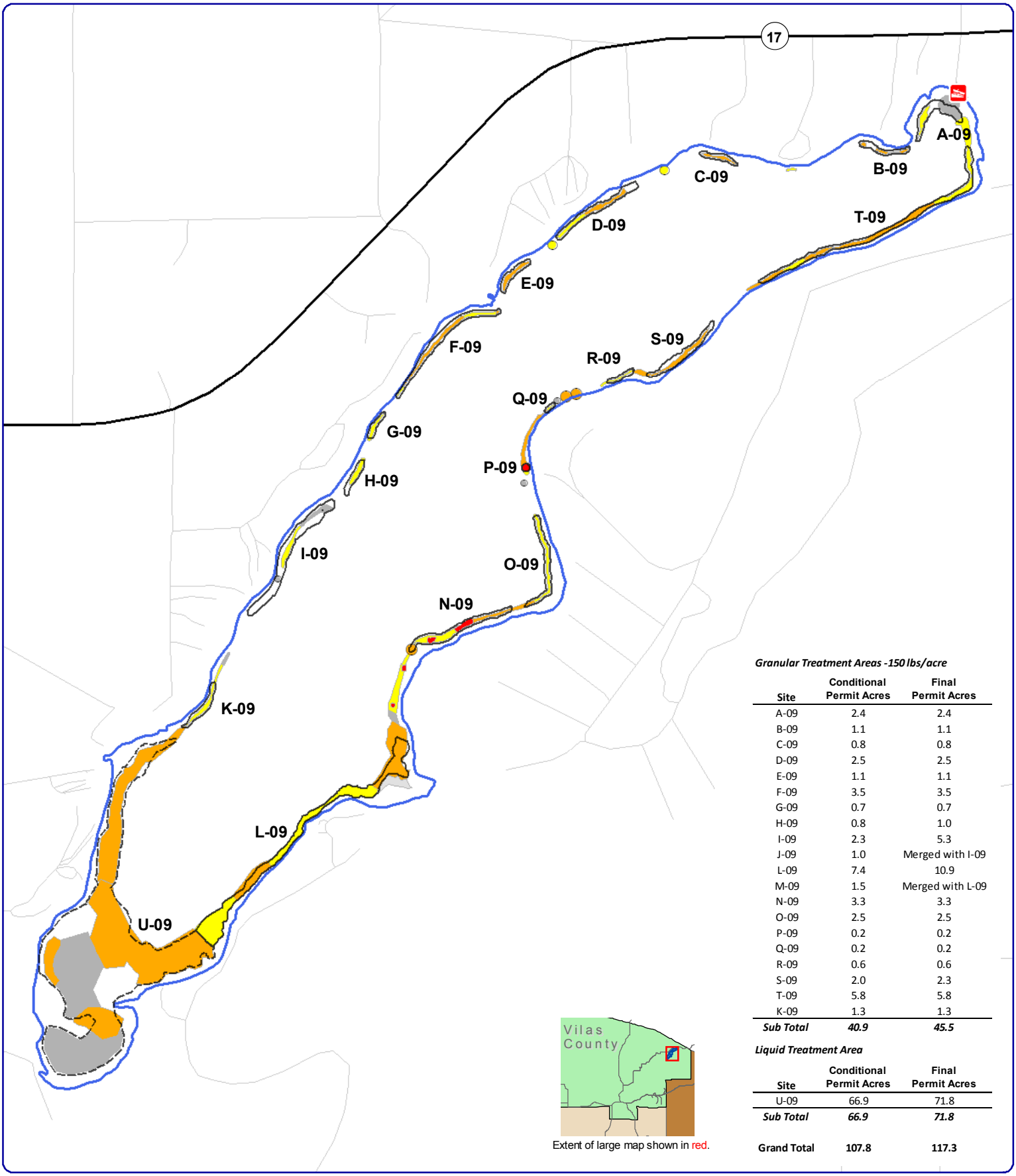
**2009 Treatment Area**
- Liquid 2, 4-D
- Granular 2,4-D

**EWM Survey Results (Aug 2008)**
- Single or Few Plants
- Clumps of Plants

**EWM Survey Results (Aug 2008)**
- Highly Scattered (none found)
- Scattered (1.6 acres)
- Dominant (19.2 acres)
- Highly Dominant (59.7 acres)
- Surface Matting (none found)

# Map 1
# Long Lake
Vilas County, Wisconsin

## 2008 EWM Survey Results and 2009 Treatment Areas




*Granular Treatment Areas -150 lbs/acre*

| Site | Conditional Permit Acres | Final Permit Acres |
|---|---|---|
| A-09 | 2.4 | 2.4 |
| B-09 | 1.1 | 1.1 |
| C-09 | 0.8 | 0.8 |
| D-09 | 2.5 | 2.5 |
| E-09 | 1.1 | 1.1 |
| F-09 | 3.5 | 3.5 |
| G-09 | 0.7 | 0.7 |
| H-09 | 0.8 | 1.0 |
| I-09 | 2.3 | 5.3 |
| J-09 | 1.0 | Merged with I-09 |
| L-09 | 7.4 | 10.9 |
| M-09 | 1.5 | Merged with L-09 |
| N-09 | 3.3 | 3.3 |
| O-09 | 2.5 | 2.5 |
| P-09 | 0.2 | 0.2 |
| Q-09 | 0.2 | 0.2 |
| R-09 | 0.6 | 0.6 |
| S-09 | 2.0 | 2.3 |
| T-09 | 5.8 | 5.8 |
| K-09 | 1.3 | 1.3 |
| ***Sub Total*** | ***40.9*** | ***45.5*** |

*Liquid Treatment Area*

| Site | Conditional Permit Acres | Final Permit Acres |
|---|---|---|
| U-09 | 66.9 | 71.8 |
| ***Sub Total*** | ***66.9*** | ***71.8*** |
| **Grand Total** | **107.8** | **117.3** |




Extent of large map shown in red.

N
W E
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1,700

Feet

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**Map date: October 14, 2009**
*File Name: Map2_LongV_2009TreatReport.mxd*

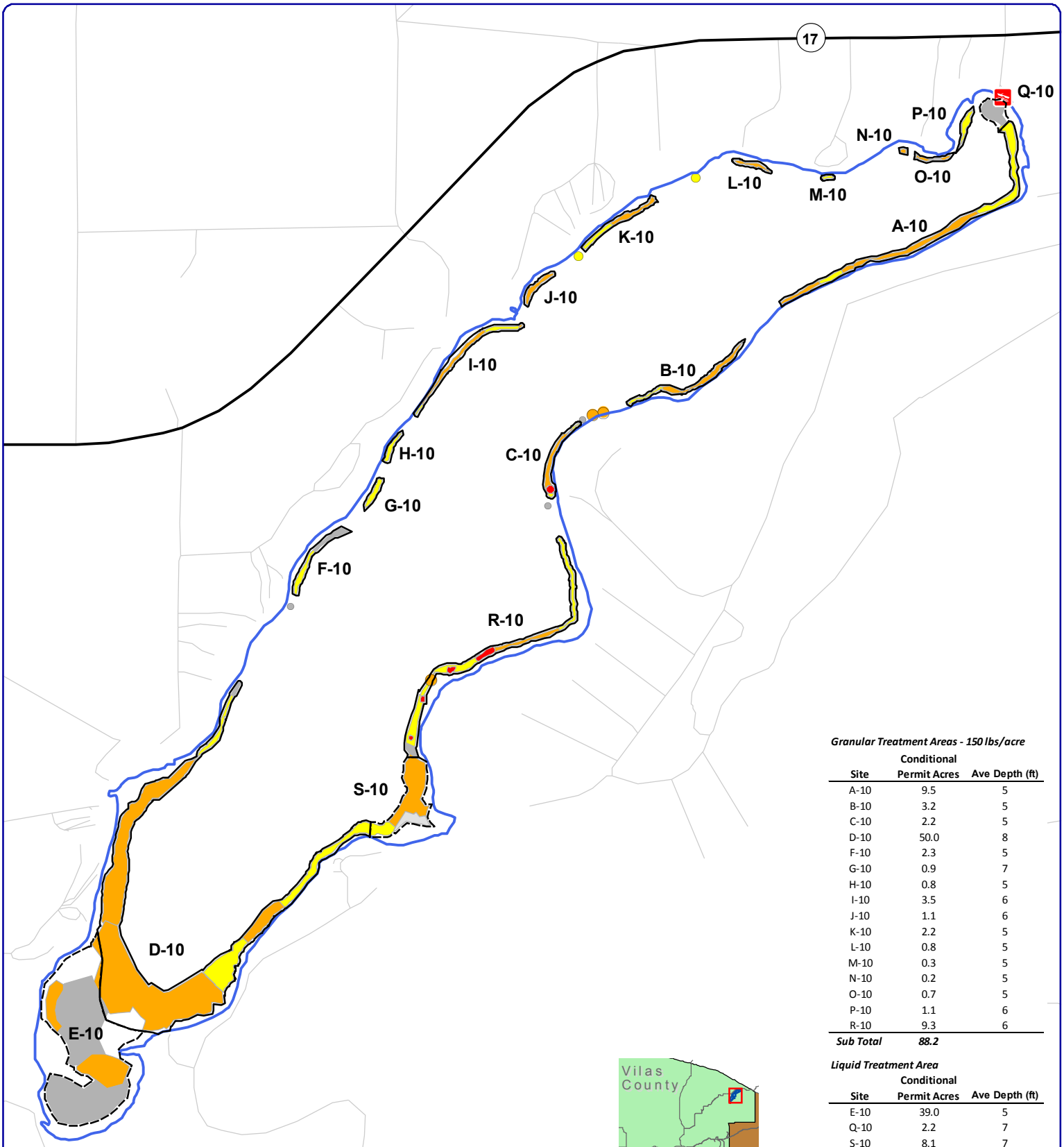
**Legend**

**2009 Treatment Areas**
- Liquid 2, 4-D
- Granular 2,4-D

**EWM Survey Results (Aug 2009)**
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony

**EWM Survey Results (Aug 2009)**
- Highly Scattered (1.0 acres)
- Scattered (24.4 acres)
- Dominant (17.5 acres)
- Highly Dominant (53.3 acres)
- Surface Matting (0.9 acres)

Map 2
# Long Lake
Vilas County, Wisconsin
## 2009 EWM Densities and Treatment Areas




*Granular Treatment Areas - 150 lbs/acre*

| Site | Conditional Permit Acres | Ave Depth (ft) |
|---|---|---|
| A-10 | 9.5 | 5 |
| B-10 | 3.2 | 5 |
| C-10 | 2.2 | 5 |
| D-10 | 50.0 | 8 |
| F-10 | 2.3 | 5 |
| G-10 | 0.9 | 7 |
| H-10 | 0.8 | 5 |
| I-10 | 3.5 | 6 |
| J-10 | 1.1 | 6 |
| K-10 | 2.2 | 5 |
| L-10 | 0.8 | 5 |
| M-10 | 0.3 | 5 |
| N-10 | 0.2 | 5 |
| O-10 | 0.7 | 5 |
| P-10 | 1.1 | 6 |
| R-10 | 9.3 | 6 |
| ***Sub Total*** | ***88.2*** | |

*Liquid Treatment Area*

| Site | Conditional Permit Acres | Ave Depth (ft) |
|---|---|---|
| E-10 | 39.0 | 5 |
| Q-10 | 2.2 | 7 |
| S-10 | 8.1 | 7 |
| ***Sub Total*** | 49.3 | |
| **Grand Total** | **137.5** | |



Extent of large map shown in red

**Please Note:**
1. Entire area of lake used for fishing.
2. Proposed Treatment areas are used for all boating activities.

N
W E
S
1,700
Feet

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**Sources:**
Roads & Hydro: WDNR
Bathymetry: WDNR, Digitized by Onterra
Aquatic Plants: Onterra (August 2009)
**Map date: October 14, 2009**
*File Name: Map3_LongV_2009TreatReport.mxd*

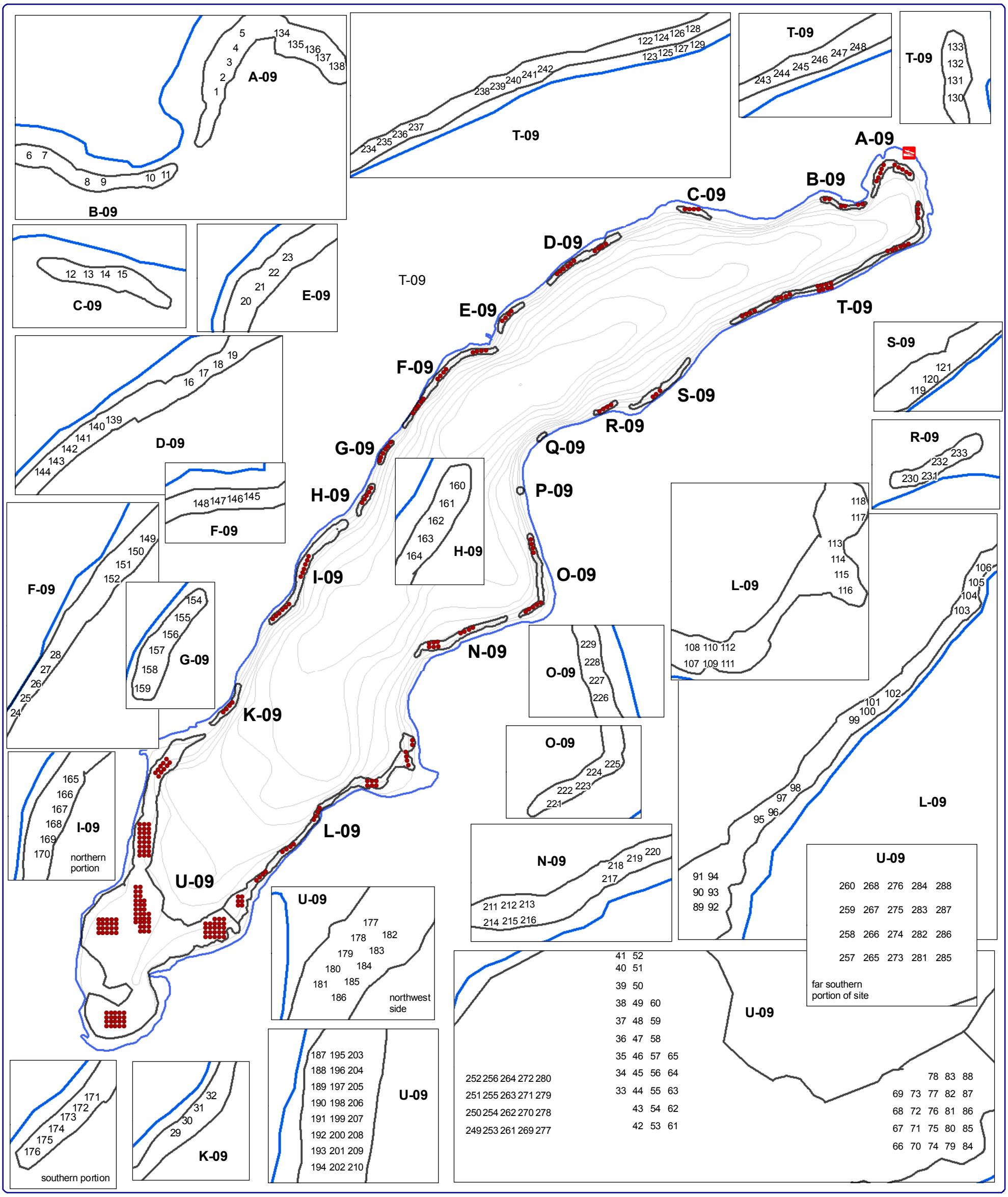
**Legend**

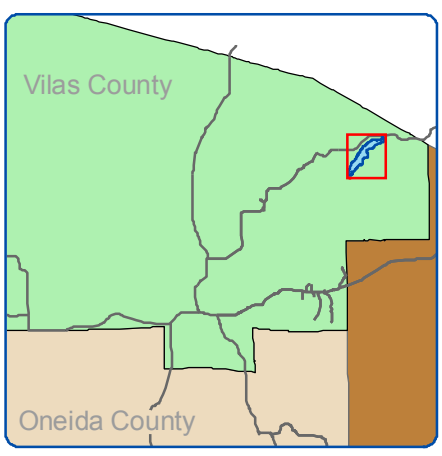
**2010 Proposed Treatment Areas**
- Liquid 2, 4-D
- Granular 2,4-D

**EWM Survey Results (Aug 2009)**
- Single or Few Plants
- Clumps of Plants
- Small Plant Colony

**EWM Survey Results (Aug 2009)**
- Highly Scattered (1.0 acres)
- Scattered (24.4 acres)
- Dominant (17.5 acres)
- Highly Dominant (53.3 acres)
- Surface Matting (0.9 acres)

Map 3
# Long Lake
Vilas County, Wisconsin
## 2010 Proposed Eurasian Water Milfoil Treatment Areas v.1




Extent of large map shown in red.

**Sources:**

Roads & Hydro: WDNR
Bathymetry: WDNR - Digitized by Onterra
Aquatic Plant Data: Onterra, 2009

**Map Date:** October 23, 2009

*File Name: App_LongV_EWM_Pt_Intercept.mxd*

## Legend

- # — EWM Point-Intercept Location
- 2009 Treatment Area
- Public Access

# Appendix A

# Long Lake

Vilas County, Wisconsin

## 2009 Eurasian Water Milfoil Treatment Point-Intercept Monitoring Locations

N, W, E, S

1,450 Feet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