**MEMORANDUM**

**TO:** RPBCWD Board of Managers

**FROM:** Joshua Maxwell – Water Resources Coordinator

**DATE:** March 6th, 2024

**RE:** 2024 RPBCWD Lake Vegetation Management

As part of the RPBCWD 10-Year Management Plan, the District manages aquatic invasive vegetation to improve water quality and the overall ecological health of lakes. The district will continue to conduct comprehensive vegetation monitoring and analysis to guide management activities. Management activities will follow all product specifications and will be consistent with state Department of Natural Resources-approved Lake Vegetation Management Plans and guidance from aquatic vegetation experts. Below is a list of proposed herbicide treatments for the district for 2024. The species to be treated include curly leaf pondweed (CLP) and Eurasian watermilfoil (EWM). The proposed treatments were accepted by MNDNR aquatic invasive species Specialist April Londo, University of Minnesota Professor/Researcher Ray Newman, Certified Lake Manager Freshwater Scientific Services, and herbicide applicators. District staff sent out a request for quotes for the treatment of District lakes to nine herbicide applicators and heard back from five, of which four provided quotes. Of the companies that responded, only PLM Lake and Land Management Corporation and Lake Improvement Consulting were authorized by the Procellacor manufacturer to apply this herbicide.



The extent of the proposed 2024 treatments will be adjusted, as necessary, after spring delineations of vegetation growth. Treatment area size was mostly overestimated to give flexibility for each treatment and total treatment acreage as well as cost will likely be reduced. Quotes gathered were based on 2023 treatment areas and point intercept surveys. PLM Lake and Land Management Corporation submitted the lowest quote for all combined treatments in 2024. While PLM did not submit the lowest quote for the Lotus Fluridone alone, its $35,000 quote is only $7,845.20 higher which is associated with the higher cost of Sonar AS. Sonar AS was used on Staring Lake in 2022 which resulted in EWM Frequency of Occurrence of 0% in a 2023 point intercept survey. Its utilization on Lotus Lake would give us a deep lake example of its treatment effectiveness within RPBCWD. Lake Improvement declined to provide a quote for Sonar AS when asked. PLM also has many years of experience applying herbicide across the Midwest and specifically in RPBCWD. PLM’s successful track record applying fluridone is robust which was taken into consideration. Additionally, there is convenience and efficiency of having one firm complete all of RPBCWD’s 2024 aquatic vegetation management treatments.

**Staff recommends to the Board of Managers to have PLM Lake and Land Management Corporation carry out all herbicide treatments (Mitchell, Susan, Red Rock, Riley, Staring – curly-leaf pondweed; Duck and Lotus – Eurasian watermilfoil) for 2024.**

**BACKGROUND**

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| **Table 1 – RPBCWD 10 Year Management Plan – Vegetation Management** | | |
| **Chapter 9** | **Section** | **Page Number** |
| 9.1 Watershed Management | 9.1.1.2 Vegetation | 9-10 |
| 9.5 Data Collection & Analysis | 9.5.2.2 Lake Veg & Fisheries | 9-30 |
| 9.5 Data Collection & Analysis | 9.5.4 Plant Restoration | 9-32 |
| 9.10 Lake Vegetation Management Plan |  | 9-39 |

Eurasian watermilfoil (EWM) and Curly-leaf pondweed (CLP) are non-native species that can rapidly expand within lakes if not kept in check. Both plants can form dense mats at the water’s surface inhibiting water recreation. They can also overtake habitat and outcompete native aquatic plants, potentially lowering diversity while providing unsuitable shelter, food, and nesting habitat for native animals. CLP also has midsummer die-offs which can litter the shoreline with dead plants and increase nutrients levels within the lake. Both species are spread primarily through the movement of watercraft and water-related equipment. The district has been consistently treating both plant species across many of the lakes. **Table 1** highlights sections within the RPBCWD’s 10 Year Management Plan that address aquatic vegetation management.

* **DIQUAT TREATMENT -** The herbicide Diquat is one of the most commonly applied herbicides for the treatment of CLP in Minnesota and has consistently been used within the RPBCWD. When targeting dense invasive species areas, it also has a low potential impact on native species, and it is often less expensive. Based on historical vegetation monitoring data and/or 2023 visual observations, the following diquat treatments were recommended for CLP: Lake Riley - 20 acres is near the 15% littoral acreage treatment limit for herbicide treatments. Diquat has been used on Riley the past number of years and has been effective at keeping CLP under control.
* **A map of water with green dots

  Description automatically generatedPROCELLACOR -** PLM has shifted to using Procellacor for Eurasian watermilfoil which is an auxin mimic like 2,4-D and Triclopyr. Procellacor has a very unique entry point in the plant which requires significantly less exposure time and reduces exposure to native plants. The results have been very successful on other lakes outside the district, and the rates have been refined to achieve multi-year control like the 2,4-D and Triclopyr. On Duck Lake, the EWM frequency of occurrence was 34% based on the 2023 PI survey (Figure 1).This density deems treatment to reduce to prevent EWM from increasing and reducing native plants. The small allowable treatment area (<15% of littoral areas) of 7 acres, the low average depth, and the grouped plant location in the east bay (likely treatment area) makes Procellacor a good option.

Figure 1: 2023 Duck Lake Point Intercept Eurasian Watermilfoil Density Map

* **FLUMIOXAZIN** – In 2022, PLM began a trial using Flumioxazin for control of Curly Leaf Pondweed in conjunction with Mankato State University. In 2023, the district partnered with the MNDNR and UMN to look at success of the herbicide and the effect on native taxa using a concentrated PI survey pre and post treatment. The herbicide had a relatively short residence time and was effective at reducing CLP abundance. Lake Susan had an 86% and Mitchell Lake had a 99% reduction in CLP. Natives in the respective lakes had a 21% reduction and near zero reduction. Previously, this herbicide was used more in Wisconsin. It has a selectivity profile similar to Endothall but appears to be more selective on valuable plants such as large leaf pondweed, clasping leaf pondweed and other pondweed species at our proposed rates. It is significantly more affordable than Endothall treatments and is like in cost to Diquat. We have had issues with Diquat controlling CLP in soft sediment lakes such as Susan, Mitchell and Red Rock, so switching to Flumioxazin is recommended. Lower concentrations 125-150ppb vs the max concentration rate of 200ppb will be used to ensure the lakes are not overtreated. These lower doses were what was used in 2023 with good results.
* **FLURIDONE** - Whole-lake, low-dose applications of fluridone herbicide have been used to control infestations of EWM. Studies in mesotrophic lakes have documented extended reductions in EWM with limited effects on native macrophytes and water quality with the use of fluridone. This has been documented on a number of lakes in the state of Minnesota as well as in North America. Fluridone was used in 2022 on Staring Lake which reduced EWM to 0% frequency of occurrence. Although the use of fluridone in MN is increasing, it is still considered experimental by the MN Department of Natural Resources (MNDNR). The treatment would include a first initial treatment, followed by monitoring of herbicide levels. Once concentrations are reduced, additional second and third bump applications will occur. For all subsequent bump treatments, the district would only be charged for the amount of chemical needed in order to increase concentrations back to the desired concentration. A fluridone treatment in Lotus Lake would potentially:

1. Reduce the abundance EWM (primary), CLP (secondary), and likely Coontail (which is a potentially nuisance native plant species).
2. Allow for the potential expansion of the abundance and distribution of native plants.
3. Potentially reduce the frequency of treatment needed to control EWM.
4. Be the second of its kind within the district (Staring first) and provide support to use in other District lakes if successful.
5. Expand upon the knowledge base of this type of treatment and its impacts on native and nonnative aquatic plants.

A map of a river with green dots

Description automatically generated**Lotus Lake Eurasian Watermilfoil**

During the past late summer PI surveys, EWM has been increasing within Lotus Lake. In 2022, the frequency of occurrence was 21% and it was the most abundant found in the lake. In 2023, the spring delineation survey yielded a narrow band of extremely dense EWM that essentially rimmed the entire lake. With this type of expansion, native species have a difficult time establishing.

The contact herbicide diquat has been used the past three years in an attempt to control EWM, but the population continues to expand. In 2023, Procellacor was planned to be used however due to the extensive population and the growth in dense narrow bands, it was deemed cost prohibitive and would likely be less successful because concentrations would dissipate out of the stands. Because of this, using a whole lake Fluridone would essentially reset the EWM in the lake and allow native plants to expand. This in conjunction with the alum treatment set from the fall of 2024, should increase native plant diversity and density with increased water clarity.

Figure 2: 2023 Lotus Lake Spring Delineation Eurasian Watermilfoil Density Map

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| **Riley Purgatory Bluff Creek Watershed District** | | |
| **Goals and Strategies Addressed by this Project** | | |
|  | PROJECT NAME: | 2024 RPBCWD Lake Vegetation Management |
|  | | |
| **3.2.2** | **DATA COLLECTION** | |
| 3.2.2.1 | ***Goals*** | |
|  | DC 1 | Collect data and use the best available science to recommend and support management decisions. |
| 3.2.2.2 | ***Strategies*** | |
|  | DC S2 | The District will develop and implement a Monitoring Plan. Collected data may include, but is not limited to: water chemistry, fisheries, macroinvertebrates, water levels, vegetation, planktons, shoreline and streambank inventories, flow data, and climatic data |
|  | DC S3 | The District maintains the flexibility to modify its monitoring and data collection programs as necessary to capture the most relevant information. The District will periodically review and update its Monitoring Plan to address emerging contaminants of concern, improved analytical methods, or other developing issues. |
|  | DC S5 | The District will monitor District-managed resources for the presence of aquatic invasive species. |
|  | DC S7 | The District will analyze data to help inform management decisions. |
|  | DC S8 | The District will coordinate its monitoring efforts with other entities to promote efficiency, increase data availability, and to identify and fill data gaps. |
| **3.2.4** | **PLANNING** |  |
| 3.2.4.1 | ***Goals*** | |
|  | Plan 1 | Plan and conduct the District’s implementation program to most effectively accomplish its vision with consideration for all stakeholders and resources. |
| 3.2.4.2 | ***Strategies*** | |
|  | Plan S1 | The District will use an adaptive management approach to protect, manage, and restore District- managed resources (see Section 9.1). |
|  | Plan S6 | The District will implement projects that address a District-managed resource. The District will prioritize planned projects based on methodology included in Section 4.0 of this Plan, which is based on the following factors:  • Targeting • Shoreline/streambank restoration and stabilization • District goals • Watershed benefits • Sustainability • Partnership opportunities • Volume management • Public education and access • Habitat restoration |
|  | Plan S7 | The District will seek to incorporate ecological, economic, and social benefits into its projects as opportunities allow. |
|  | Plan S9 | The District will seek to partner with cities, state agencies, and other entities to implement projects and programs to meet District goals. |
| **3.2.6** | **WATER RESOURCES** | |
|  | WATER QUALITY | |
| 3.2.6.1 | ***Goals*** | |
|  | WQual 1 | Protect, manage, and restore water quality of District lakes and creeks to maintain designated uses. |
|  | WQual 3 | Preserve and enhance habitat important to fish, waterfowl, and other wildlife. |
| 3.2.6.2 | ***Strategies*** | |
|  | HABITAT | |
|  | WQual S8 | The District will consider opportunities to incorporate habitat protection, restoration, or improvement elements in District water quality, flood control, and other projects. |
|  | WQual S9 | The District will partner with other entities to minimize the spread and reduce the adverse ecological impacts of aquatic invasive species. |
|  | WQual S10 | The District will manage non-native aquatic invasive macrophytes to improve water quality and/or habitat in accordance with an approved lake vegetation management plan or as part of a rapid response control project. |