# Pleasant Lake, Wright County
# 2019 Aquatic Vegetation Management Report

**Report by the Invasive Species Program -** Division of Ecological and Water Resources
Minnesota Department of Natural Resources

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## Project Details

**Lake:** Pleasant (DOW# 86025100)

**Lake Surface Area:** 597 acres

**Littoral Area**: 291 acres

**County**: Wright County

**Survey Type:** Point-intercept

**Date of Survey (most recent):** August 8, 2019

**Observer[s]**: MN DNR, Invasive Species Program (ISP): Chris Jurek, Emelia Hauck Jacobs, Emelia Holman and Henry Egland

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## Report Details

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## Summary

The purpose of this report is to provide an overview of aquatic plant distribution and the management of invasive aquatic plants in Pleasant Lake, Wright County between 2012 and 2019. Historical data on water quality, invasive aquatic plant management permits and point-intercept surveys are all summarized in this report. These summaries will guide future invasive aquatic plant control projects and can evaluate changes in native plant communities.

## Lake Description

Pleasant Lake is a 597 acre lake located two miles north of the town of Annandale, in Wright County, MN. The maximum depth of water in Pleasant Lake is 74 feet and 49% of the lake is littoral (water depth between 0 to 15 feet, where aquatic plants are most likely to grow). Water clarity during the summer averaged 10.8 feet in 2019. According to surveys from the Minnesota Pollution Control Agency (MPCA, 2019), Pleasant Lake is classified as a higher mesotrophic lake, based on its Trophic State Index (TSI) of approximately 47. Mesotrophic lakes are lakes with an intermediate level of productivity and are typically clear water lakes with some summer algal blooms. The three parameters that are factored into the trophic state index are total phosphorus (nutrients in the water), chlorophyll-a (measure of the amount of algae growing in the water) and Secchi depths (water transparency). For more information on water quality, go to Pleasant Lake's water quality data on the MPCA website (https://cf.pca.state.mn.us/water/cmp/resultDetail.cfm?siteid=86-0251-00-205)

## Management History

The lake has three invasive plant species: Starry stonewort (*Nitellopsis obtusa*), Eurasian watermilfoil (*Myriophyllum spicatum*), and curly-leaf pondweed (*Potamogeton crispus*). Both invasive taxa, Eurasian watermilfoil (2017) and Starry stonewort (2018) were recently introduced into the lake. Invasive aquatic plant management in Pleasant Lake has focused on Eurasian Watermilfoil, using the auxin-mimic herbicides, curly-leaf pondweed using endothall and most recently starry stonewort control using chelated copper and physical removal via scuba diving. Curly-leaf pondweed treatment acreage has remained under 15 acres, Eurasian

watermilfoil treatments have only been spot treatments and starry stonewort management had been limited to the north access. Pre-treatment survey data (i.e. point-intercept surveys or lake-wide delineations that can be repeatable), collected over time, would be a recommended course of action for analyzing plant abundance and distribution trends into the future

***Table 1-Invasive Plant Management Summary.*** Characteristics and history of partial lake invasive plant treatments for Pleasant Lake, Wright County (DOW#86025100), total acres: 218, Littoral acres: 113, 15% of Littoral acres: 17). Abbreviations are as followed: curly-leaf pondweed (CLP), Eurasian watermilfoil (EWM) and starry stonewort (SSW). Note: Total acres permitted does not reflect the actual treatment or known acreage of the taxa in the lake.

| Date | Target Species | Total Acres Permitted | Herbicide | Licensed Commercial Applicator |
|---|---|---|---|---|
| **2012** | CLP | 10 | Endothall | Lake Restoration |
| **2013** | CLP | 10 | Endothall | Lake Restoration |
| **2014** | CLP | 10 | Endothall | Lake Restoration |
| **2015** | CLP | 13 | Endothall | n/a |
| **2016** | CLP | 15 | Endothall | Lake Restoration |
| **2017** | CLP | 15 | Aquathol K | Lake Restoration |
| **2018** | CLP | 15 | Aquathol K | Lake Restoration |
| **2019** | CLP | 15 | Diquat | PLM |
| **2017** | EWM | 5 | 2, 4-D | Lake Restoration |
| **2018** | EWM | 1 | Triclopyr | PLM |
| **2019** | EWM | 1.4 | ProcellaCOR | PLM |
| **2018** | SSW | 1 | Cutrine Plus | Lake Restoration |
| **2019** | SSW | 1 | Cutrine Plus | Lake Restoration |

## Survey Objectives

A point-intercept survey was used to assess the distribution of aquatic plants in Pleasant Lake. The primary purpose for this type of survey is to 1) develop baseline knowledge of the current plant community in a lake, and over time, 2) compare year to year plant variation (in plant presence and spatial location), and 3) track invasive aquatic plants. Moreover, this survey will help the DNR and our partners to monitor native plant communities and evaluate possible

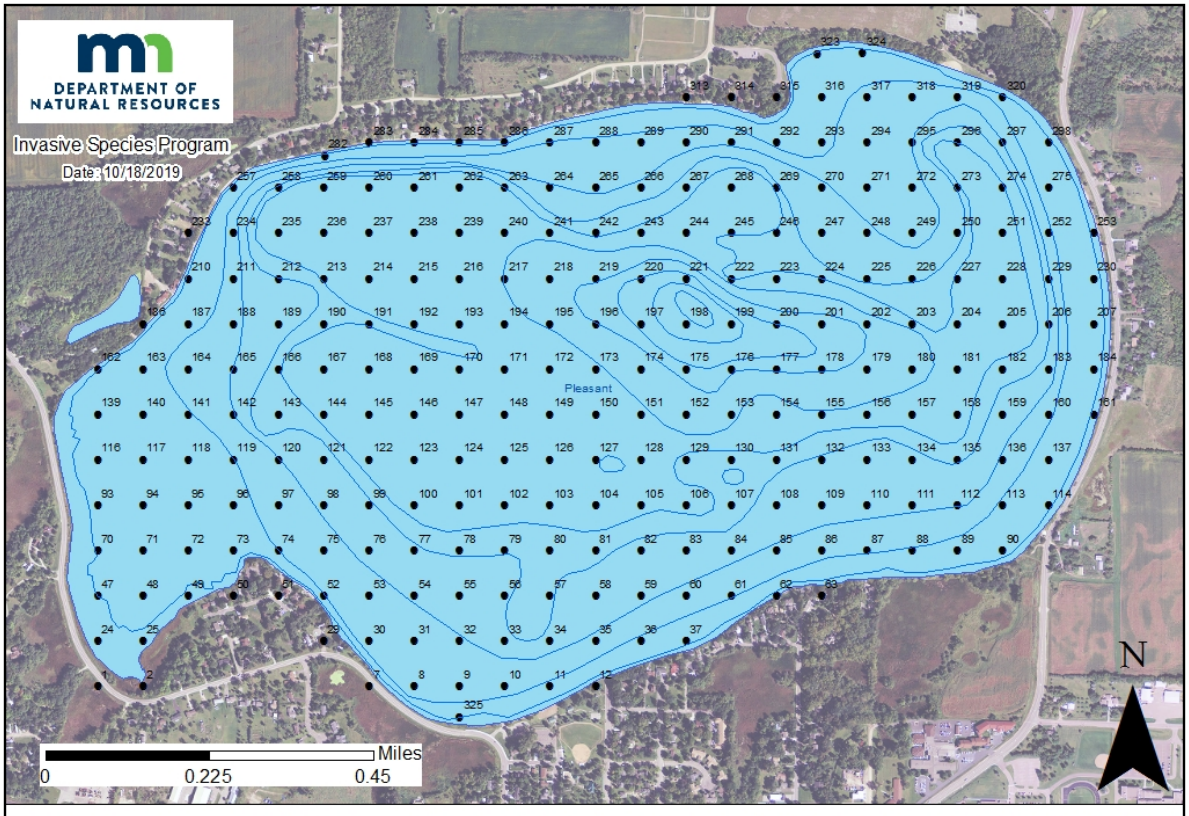
responses to invasive aquatic plant management via herbicide control. It is important to note that distributions and occurrences of aquatic plants may vary from year to year due to natural variations (water clarity, snow cover, water temperatures, and natural fluctuation in plant species) or human induced alterations, such as, herbicide and shoreline management activities.

## Survey Methods

In 2019, MN DNR surveyors used a point-intercept survey method developed by John Madsen in "Aquatic Plant Control Technical Note MI-02, 1999". Sampling points were placed 100 meters apart using a Geographic Information System. A total of 207 points were sampled within 20 feet (Figure 1). Plant samples were collected by throwing and dragging a double-sided rake along the lake bottom at each point. All plant taxa (submerged, floating-leaf, emergent and free floating) were recorded to species or genera during the survey following Crow and Hellquist (2000). Plant samples were assessed on the boat to determine species presence-absence and abundance. The abundance rake rating are as follows: 1: sparse, 2: common/ frequent/ occasional, and 3: abundant/matted (Table 2). Frequencies of occurrence percentages (i.e., how often a plant species was sampled in the lake) were calculated based on the littoral zone. Maximum depths were calculated at the 95$^{th}$ percentile for all vegetated sampling points.

***Table 2- Quantitative rake abundance ranking*** (0-3) used to estimate plant abundance for each species based on rake coverage and/or visual observation (MN DNR). A zero (0) ranking indicates no target plants were retrieved or observed in a sample.

| Abundance Ranking | Rake Coverage | Description |
|---|---|---|
| **1** |  | Sparse; plants covering <25% of the rake head |
| **2** |  | Common; plants covering 25%-75% of the rake head |
| **3** |  | Abundant; plants covering >75% of the rake head |




Pleasant Lake, Wright County (86025100)
MN DNR Point Intercept Survey, August 8, 2019

***Figure 1 – Point-intercept Survey Grid.*** Point-intercept survey grid for Pleasant Lake, Wright County (DOW#86025100). Point-intercept survey included 207 points, 100 meters apart.

## Survey Observations

The most recent aquatic vegetation point-intercept survey of Pleasant Lake (DOW #86025100) occurred on August 8, 2019. Plants were rooted to a maximum depth (95%) of 14 feet, with depths ranging from one to 20 feet. In the littoral zone (water depth from 0 to 15 feet, where aquatic plants are likely to be found), 96% of the points had submersed native vegetation (Table 3) with a mean submersed native taxa per point of 2.7. Pleasant Lake has up to 19 submersed native taxa (Table 4) and three non-native submerged taxa (starry stonewort, Eurasian watermilfoil and curly-leaf pondweed), comprising of 4% of the littoral area.

***Table 3- Point-intercept Metrics.*** Summary of point-intercept metrics for Pleasant Lake, Wright County (DOW#86025100). Shaded values were calculated from littoral depth range (0-15 feet).

| Metric | AUG 2019 |
|---|---|
| Surveyor | MN DNR |
| Total # Points Sampled | 139 |
| Depth Range of Rooted Veg (ft.) | 1 - 20 |
| Max Depth of Growth (95%) | 14 |
| # of Vegetated Points in Max Depth Range | 123 |
| # Points in Littoral (0-15 feet) | 133 |
| % Points w/ Submersed Native Taxa | 96 |
| Mean Submersed Native Taxa/ Point | 2.7 |
| # Submersed Native Taxa | 19 |
| % Points w/ Submersed Non- native Taxa | 4 |

Based on the 2019 point-intercept survey, the native plant community within the littoral area in Pleasant Lake was primarily dominated by coontail (*Ceratophyllum demersum*) at 71% of all sites in the littoral zone (Figure 2), followed by naiad species (*Najas* sp.), muskgrass (*Chara* sp) and northern watermilfoil (*Myriophyllum sibiricum*; Figures 3, 4 and 5). The only invasive aquatic plant found on our point-intercept was curly-leaf pondweed (7%; Figure 6).These aquatic plants are central to a healthy fish population, offering shelter and providing food and habitat to wildlife. Pleasant Lake has a diverse aquatic plant community with an average of 2.7 species per a sampling site and up to 19 species recorded in the lake. Figure 7 displays the spatial distribution and species richness (# of species per sample point) of all native submersed species from the most recent point-intercept survey. Pleasant Lake has very few emergent and

floating- leaf plants due to shoreline development. It would be recommended to restore the shoreline to prevent continued shoreline erosion, provide better habitat and food sources for wildlife, including waterfowl. Plants also absorb nutrients and reduce algae, thereby improving water quality.

***Table 4 - Plant Frequency of Occurrence.*** Percent frequency of occurrence for observed plant species within the littoral zone (0-15 feet) in Pleasant Lake, Wright County (DOW#86025100).

| Taxonomic Name | Common Name | AUG 2019 |
|---|---|---|
| **SUBMERSED NON-NATIVE** | | |
| *Potamogeton crispus* | curly-leaf pondweed | 4 |
| **SUBMERSED NATIVE** | | |
| *Ceratophyllum demersum* | coontail | 71 |
| *Chara* sp. | muskgrass | 38 |
| *Elodea canadensis* | Canadian waterweed | 4 |
| *Heteranthera dubia* | water star-grass | 2 |
| *Myriophyllum sibiricum* | northern watermilfoil | 35 |
| *Najas* sp. | naiad species | 33 |
| *Potamogeton gramineus* | variable pondweed | 2 |
| *Potamogeton illinoensis* | Illinois pondweed | 3 |
| *Potamogeton praelongus* | whitestem pondweed | 5 |
| *Potamogeton richardsonii* | clasping-leaved pondweed | 5 |
| *Potamogeton* spp. | narrow-leaf pondweed | 4 |
| *Potamogeton zosteriformis* | flat-stemmed pondweed | 16 |
| *Ranunculus* sp. | water crowfoot species | 2 |
| *Stuckenia pectinata* | sago pondweed | 8 |
| *Utricularia* sp. | bladderwort species | 13 |
| *Vallisneria americana* | wild celery | 8 |
| *Watermoss* sp. | watermoss | 1 |
| **FLOATING LEAF** | | |
| *Nuphar variegata* | yellow waterlily | 6 |
| *Lemna trisulca* | star duckweed | 10 |

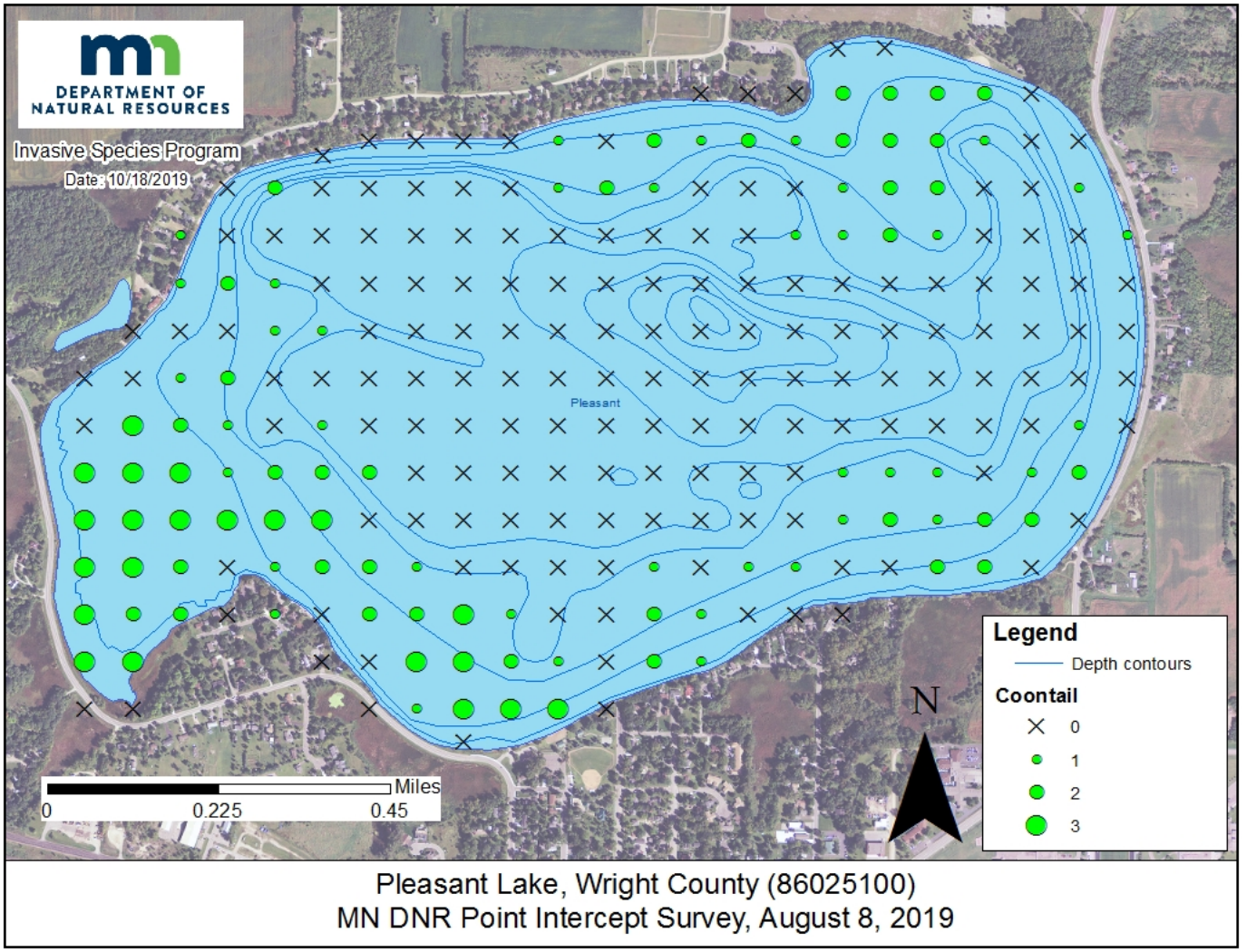



***Figure 2 – Coontail Distribution.*** Plant distribution from the 2019 point-intercept survey for coontail in Pleasant Lake, Wright County (DOW#86025100). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

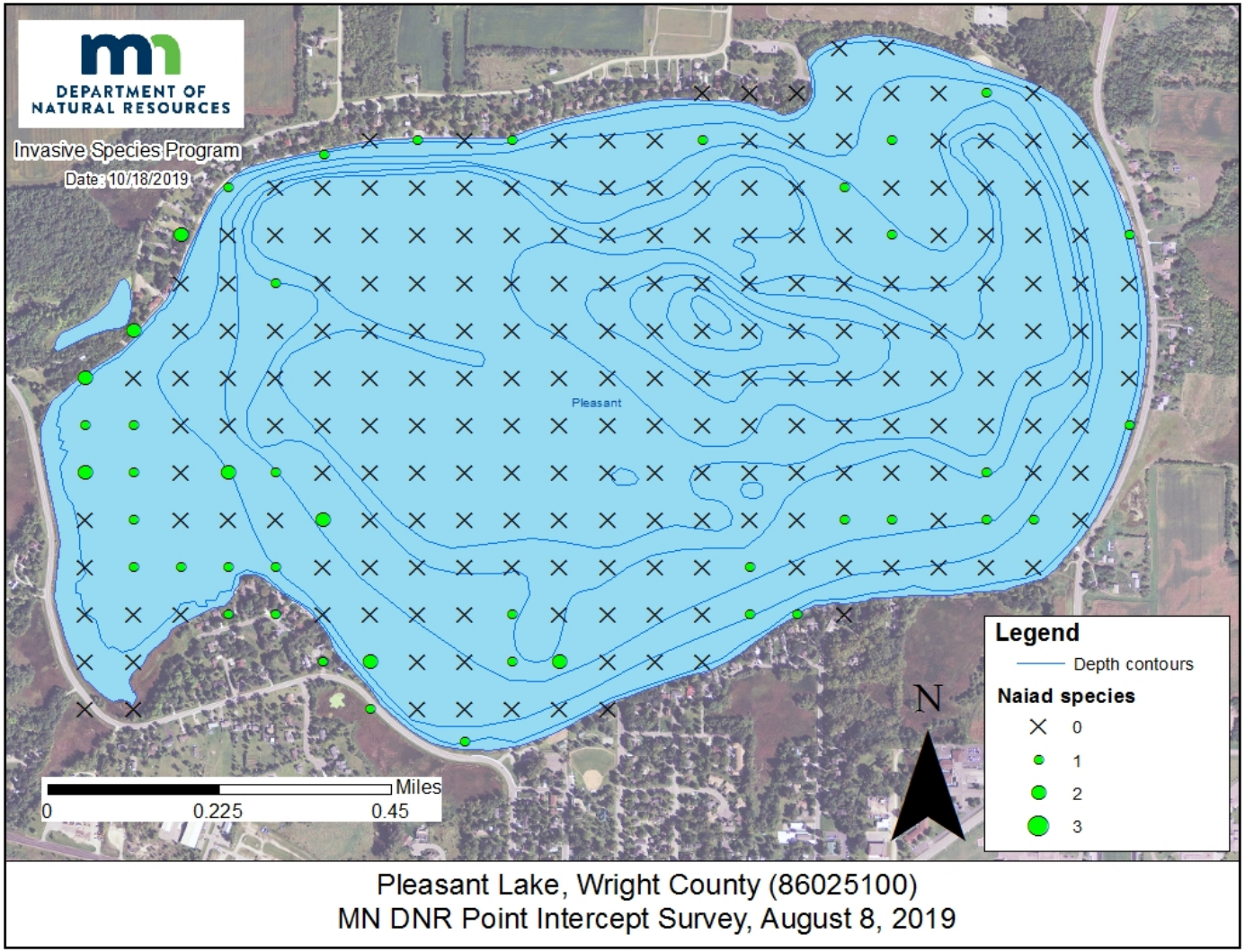



***Figure 3 – Naiad species Distribution.*** Plant distribution from the 2019 point-intercept survey for naiads in Pleasant Lake, Wright County (DOW#86025100). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

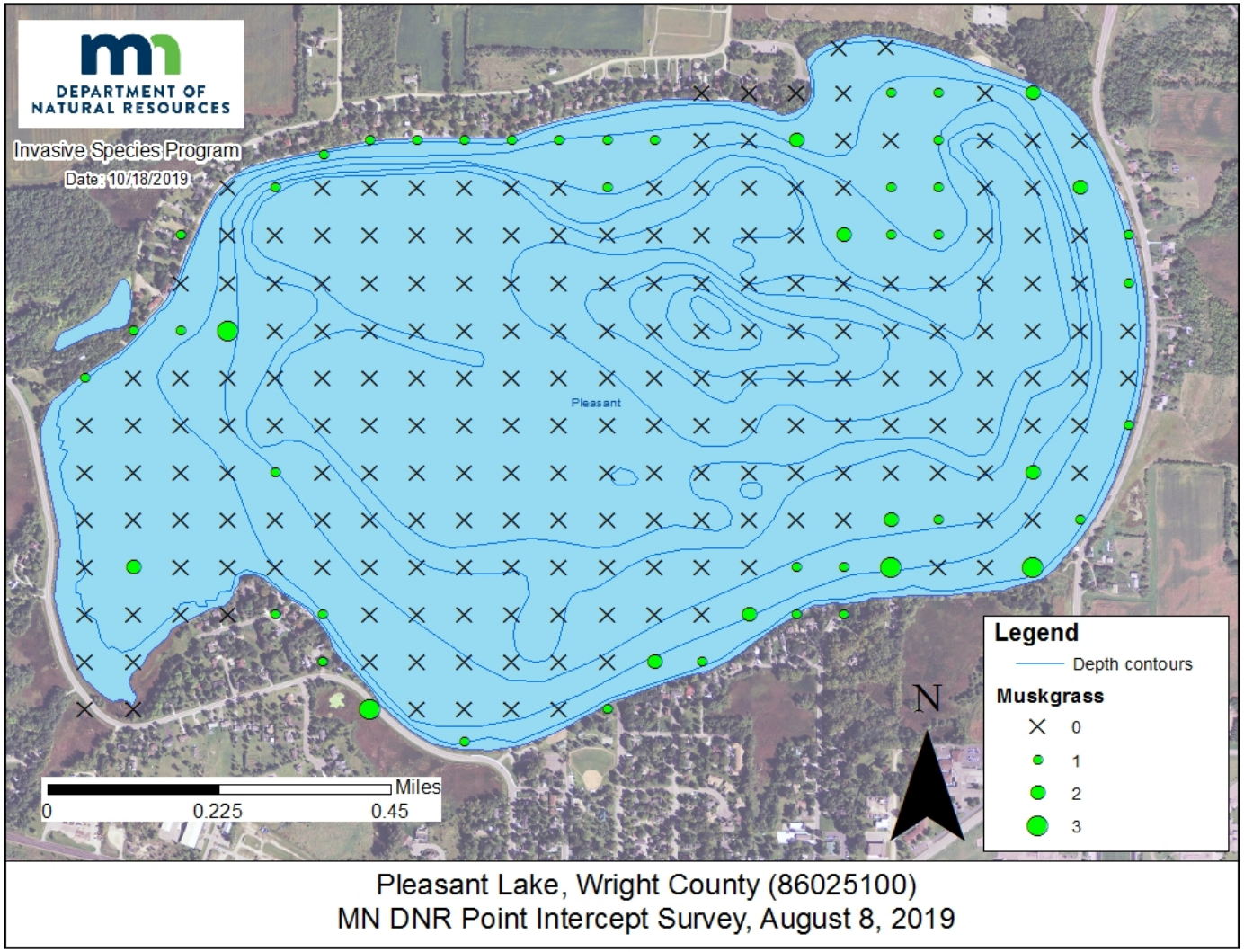



***Figure 4 – Muskgrass Distribution.*** Plant distribution from the 2019 point-intercept survey for muskgrass in Pleasant Lake, Wright County (DOW#86025100). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

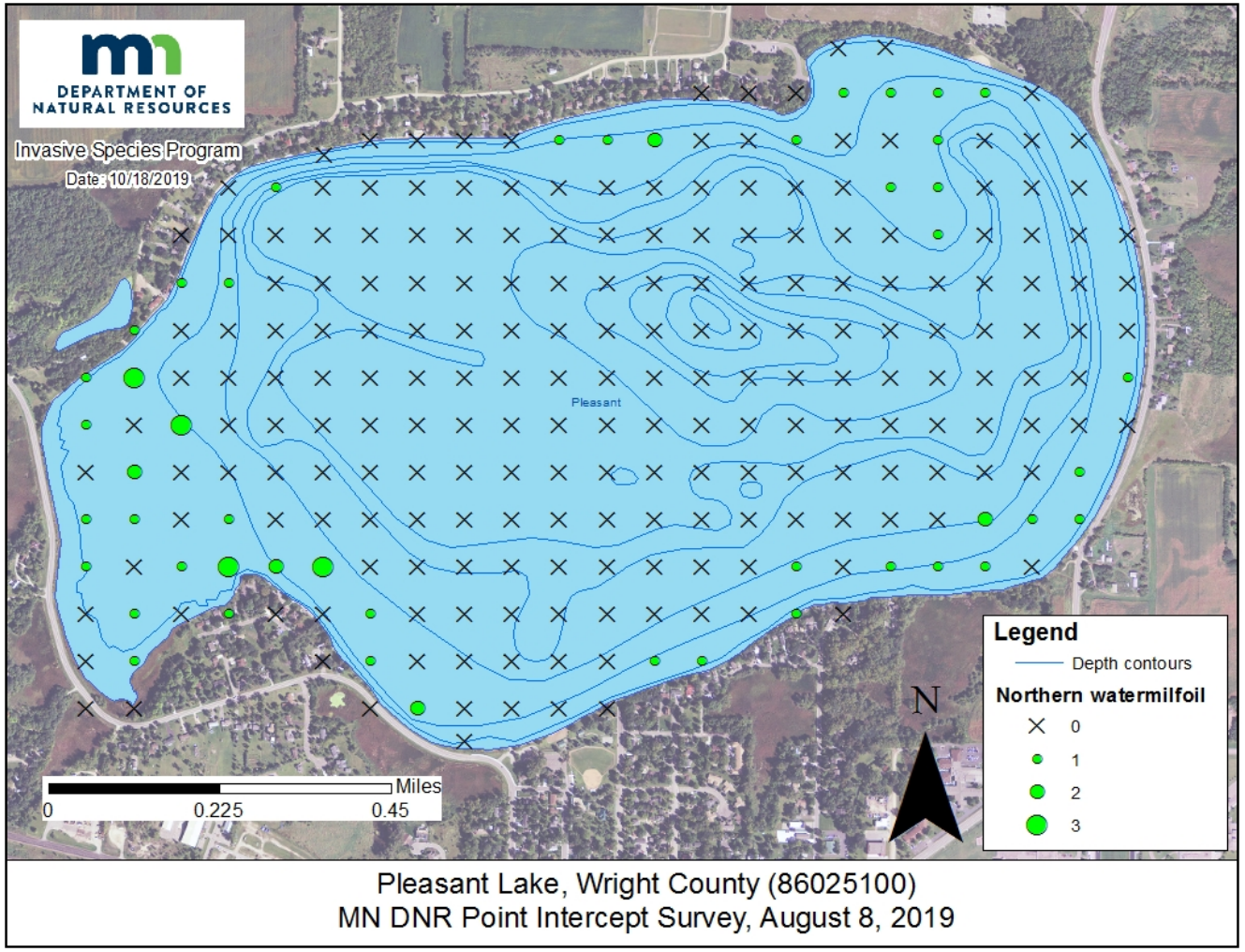



***Figure 5 – Northern watermilfoil Distribution.*** Plant distribution from the 2019 point-intercept survey for northern watermilfoil in Pleasant Lake, Wright County (DOW#86025100). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants.

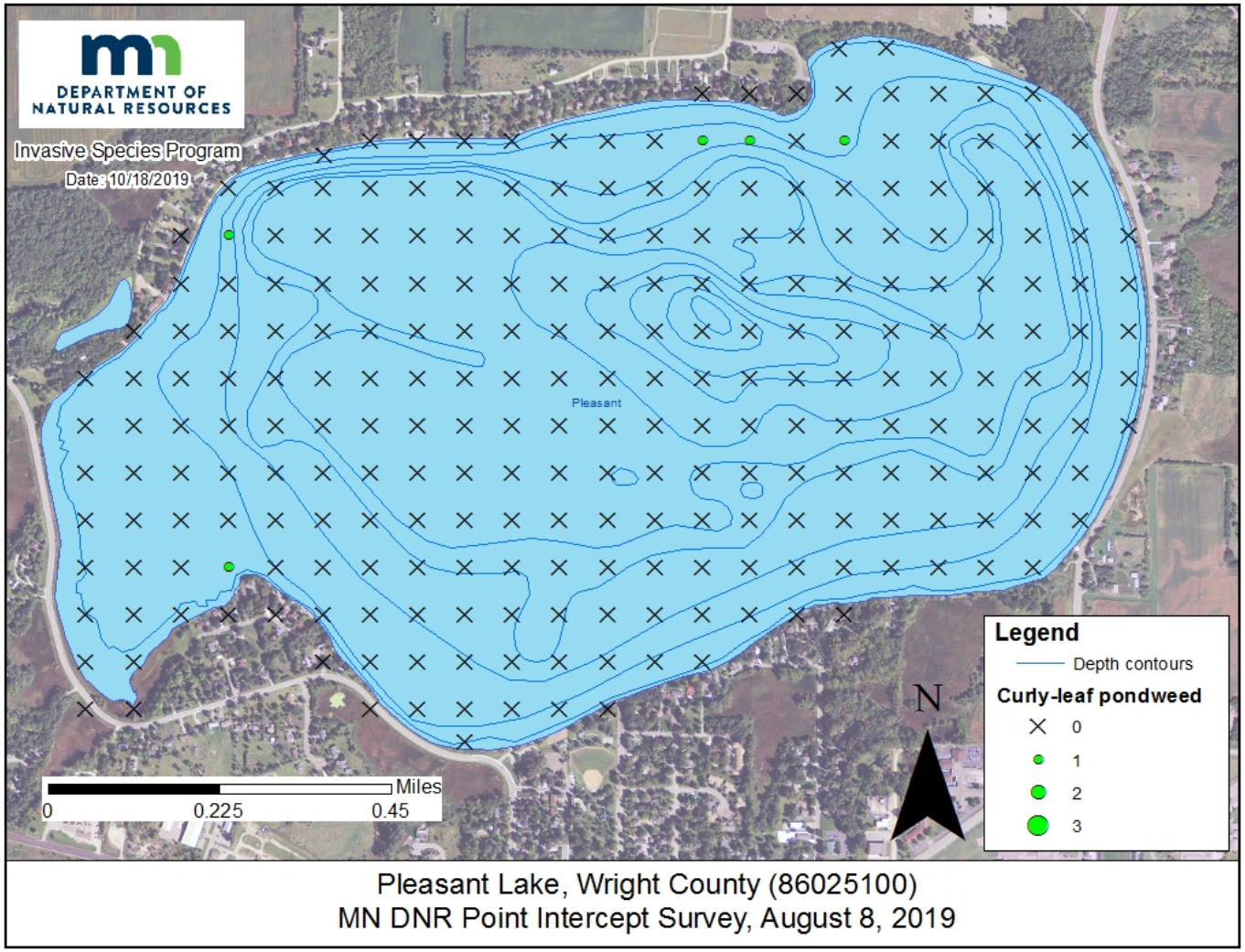



***Figure 6 – Curly-leaf pondweed Distribution.*** Curly-leaf pondweed distribution maps from the 2019 point-intercept survey in Pleasant Lake, Wright County (DOW#86025100). Densities ranged from 0 to 3 at each point, with 3 indicating dense plant presence and 0 indicating no plants. Eurasian watermilfoil was only found at one site and was considered very dense.

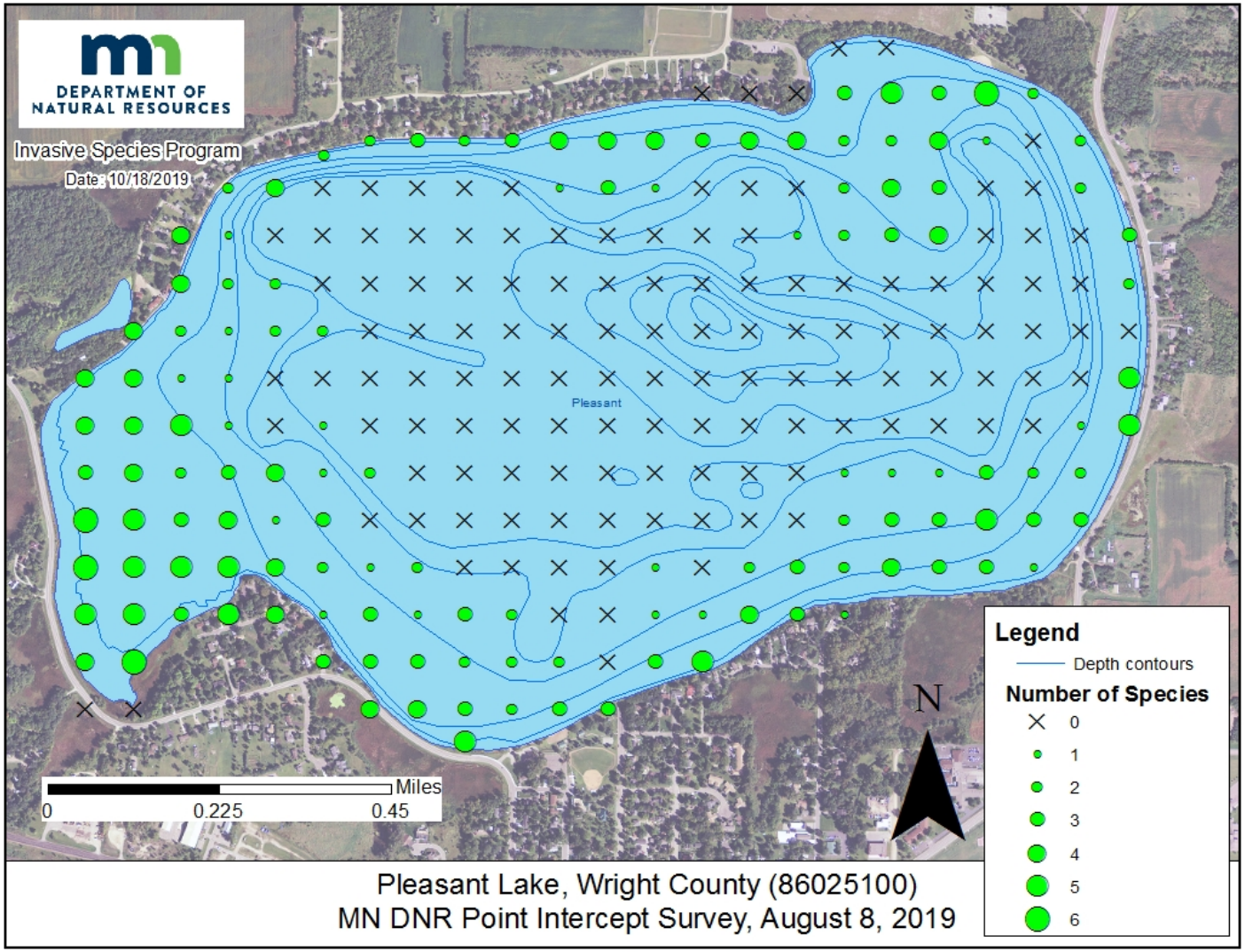



***Figure 7 –Species Richness Distribution.*** Number of species per a sampling point based on 2019 point-intercept survey in Pleasant Lake, Wright County (DOW#86025100).

## Literature Cited

Crow, G.E. and C.B. Hellquist. (2000). *Aquatic and wetland plants of Northeastern North America*. (Vols. 1 & 2). Madison, WI: The University of Wisconsin Press.

Madsen, J. (1999). *Point-intercept and line intercept methods for aquatic macrophytes management.* APCRP Technical Notes Collection (TN APCRP-M1-02). Vicksburg, MS: U.S. Army Engineer Research and Development Center.