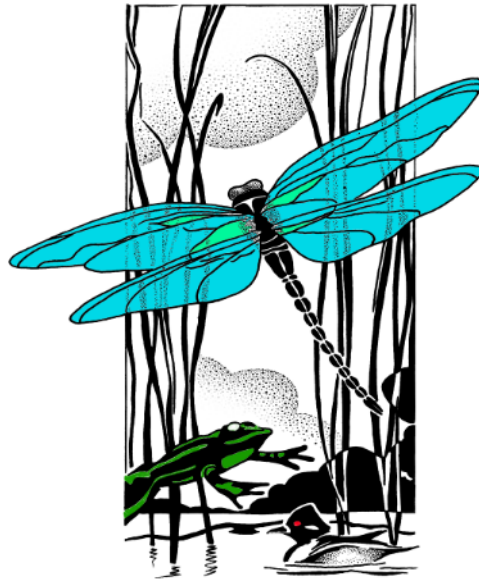# 2021

# Wetland Health Evaluation Program

Dakota County, Minnesota

# 2021 Wetland Health Evaluation Program Report
# Dakota County, MN



**Coordinated By:**
**Dakota County**
**14955 Galaxie Avenue**
**Apple Valley, MN 55124-8579**


**March 2022**


**Report**
**Prepared by:**


**Fortin Consulting, Inc.,**
**now Bolton & Menk, Inc.**

# Acknowledgements

# Table of Contents

# Executive Summary
# Dakota County Wetland Health Evaluation Program 2021

Dakota County began sponsoring the Wetland Health Evaluation Program (WHEP) in 1997. Since then, 200 wetlands have been monitored by many volunteers across the County. Health and safety measures due to the COVID-19 pandemic were still practiced in 2021; however, restrictions that limited the number of wetlands surveys, cross-check surveys, and team invertebrate identification, in 2020, were reevaluated and removed. In 2021, ten cities, one watershed management organization, and Dakota County Parks sponsored WHEP teams, monitoring 42 different wetlands. Two of these wetlands (B-14 and E-46) were monitored for the first time in 2021. Trained volunteers collect macroinvertebrate (insects and other small animals without backbones) that live in the wetland, and survey for vegetation (plants) present in the wetland. The invertebrates and vegetation are identified and documented. The data is used to calculate an Index of Biotic Integrity (IBI) that is used to estimate the health of each wetland.
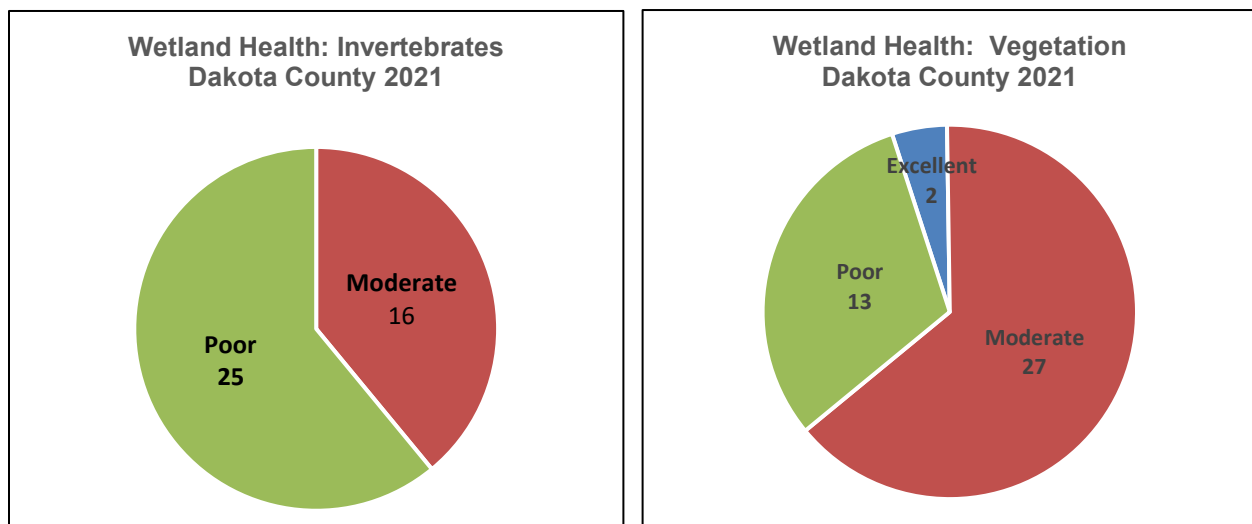


The results of the monitoring for 2021 showed a variety of wetland conditions. The Index of Biotic Integrity was used to determine wetland health ranging from poor to excellent. The majority of wetlands were in the moderate category for vegetation (66%). Two wetland sites rated excellent for vegetation: BB's Wetland (DC-6) and Lilypad Pond (DC-7). They scored 27 and 29, respectively. The majority of wetlands were in the poor category for invertebrate scores (61%). No wetland sites rated excellent for invertebrates in 2021. In general, water levels were low due to drought conditions, in 2021. This likely impaired invertebrate collection.

A trend analysis was conducted for each of the wetlands monitored in 2021 that had enough data to analyze trends. The overall trends are indicated as follows; however, the health of each wetland is unique and observed changes in health score trends are discussed with each wetland later in the report. For invertebrates, two wetlands appear to be improving, 11 are stable and only 1 is declining. For vegetation, one of the wetlands appears to be improving, 17 are stable, and 1 is declining. Several wetlands for each category had variable data over the years of their monitoring. Twenty wetlands did not have enough years of data to demonstrate a health trend.

Several analyses were done to try to identify some of the causes of wetland health conditions found. No significant relationships were found between IBI scores and wetland alterations.

**2021 Dakota County Wetland Health Trends***
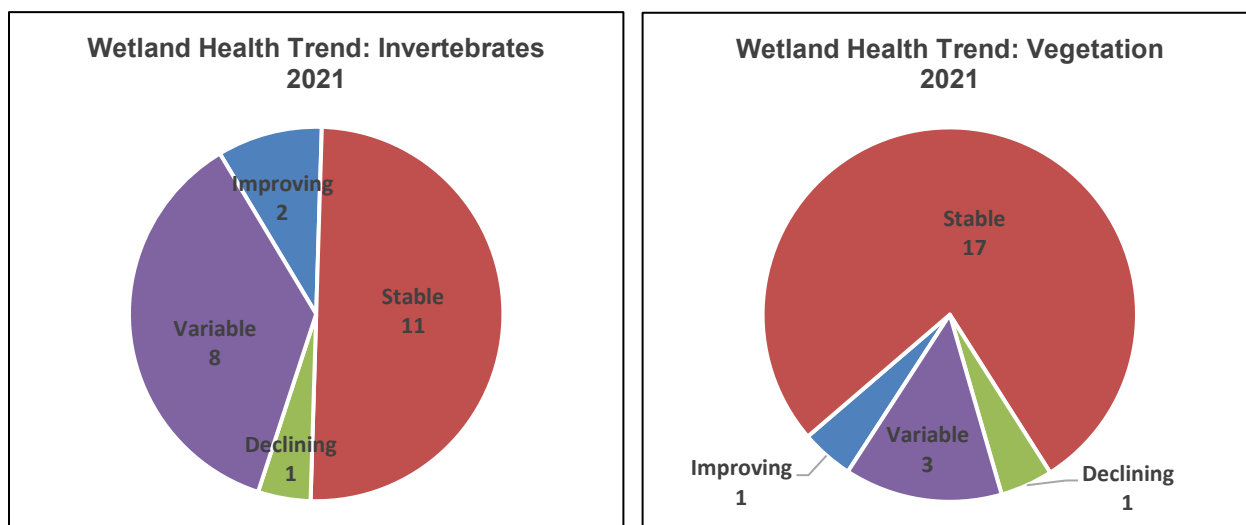


*excludes wetlands that did not have adequate data for trend analysis

In 2021, 166 Dakota County WHEP volunteers donated more than 2,432 hours in training, invertebrate sample collections and invertebrate identification, and vegetation surveys to capture and report this valuable biological data. The dedicated volunteers look forward to the science, environmental stewardship, and community gathering that WHEP demonstrates. It gives citizens an opportunity to study the wetlands in their communities and see the impacts of human disturbance on our wetlands, and it provides valuable data to the cities and County. The data collected by the WHEP volunteers can be used for many purposes such as, to help track changes in wetlands over time and relate to changes in the watershed, help identify high quality wetlands that may need protection, track changes in wetland health with restoration projects, evaluate the success of wetland creation or impacts of new stormwater input, and to help find invasive species that threaten the wetlands. WHEP is a great example of a successful cooperative program between citizens, cities, watersheds, counties, and state government.

# 1.0   Background

## The Wetland Health Evaluation Program (WHEP)

The Wetland Health Evaluation Program (WHEP) is a volunteer monitoring program for wetlands.  WHEP uses sampling methods and evaluation metrics developed by the Minnesota Pollution Control Agency (MPCA) to evaluate wetland health.  The metrics are based on species diversity and richness for both vegetation and macroinvertebrates.  Citizen teams, led by a trained team leader with education and/or work experience in natural resources, conduct the sampling.

WHEP got its start at the MPCA in the 1990s, when Mark Gernes and Judy Helgen were separately developing biological indexes to measure wetland health using grants from the US Environmental Protection Agency (US EPA). Mark's biological index was based on wetland plants, Judy's on invertebrates. Developing chemical standards for measuring pollution in wetlands seemed impossible then, so they pushed for the biological approach, as did US EPA.

Wetlands are generally not viewed as having the same status as streams and lakes.  The Wetland Conservation Act helps maintain the number and acreage of wetlands in Minnesota, but often the quality of the wetlands is not protected.  MPCA staff recognized that they could teach citizens how to evaluate wetlands and they could convince their local governments to protect the water quality as reflected by the diversity of organisms and plants that thrive in healthy wetlands.

JUDY HELGEN,
PROGRAM CO-FOUNDER

In 1996, the MPCA partnered with Minnesota Audubon, forming a large contract with them (with EPA funds) to help start WHEP. Audubon handled the logistics for the various training sessions and organization of the original teams of volunteers linked to six communities in Scott County. Mark and Judy provided the training and developed the guides for sampling protocols and identifications based on MPCA's more technical biological indexes.

MARK GERNES,
PROGRAM CO-FOUNDER
(DEMONSTRATING HIS "SEDGE
THREE-RANKED" POSE)

Wetland sampling efforts began in 1997 in Dakota County.  During 1998-2000, the program was managed by the Dakota Environmental Education Program.  During these years, the project was funded by various sources, including the US EPA grant, Minnesota Legislature (LCCMR grant), and participating cities.  Gradually, the number of cities participating in WHEP increased under the leadership of Charlotte Shover and Dan Huff, and now Paula Liepold at Dakota County. Up to thirteen cities/citizen teams have participated in the project in Dakota County. MPCA continues to provide the training, but the organization of teams and other logistics are handled by the County and communities.

Hennepin County joined the project in 2001, and began co-managing with Dakota County in 2002. Dakota County, the Vermillion River Watershed Joint Powers Organization, participating cities, and North Cannon River Watershed Management Organization provide funding for Dakota County WHEP. Today, the program is strong and thriving in Dakota County, setting an example for the nation in volunteer wetland monitoring.

## Why Monitor Wetlands?

Why are we sampling the plants and critters that live in wetlands? Many aquatic invertebrates (animals without a backbone that live in water) spend much or most of their life living in wetlands. Because these animals are exposed to the conditions within the wetland for a period of time, they serve as indicators of the health of the wetland. Some are more sensitive to pollution and habitat conditions than are others. Aquatic plants also respond to wetland conditions. Different plants are found in different water quality and bottom conditions. If we evaluate what is living in a wetland, we can assess its general condition. When the same wetlands are monitored over time, the data can also be used to track changes in wetland health.

The information collected by the WHEP volunteers can be used by decision makers to help identify the highest quality wetland resources and identify those that have been negatively impacted. More information is available to help with decisions regarding development, transportation corridors, and other areas that may affect our water resources. For example, wetlands ranked as excellent may receive more protection. Cities can use this information to evaluate the overall success of construction or restoration projects or to evaluate the impact of new stormwater inputs.

Citizen volunteers are an essential component to WHEP's success. Each season, volunteers are relied upon to provide important data on the health of wetlands in their communities. The data collected is used by the cities, counties, and the State of Minnesota to better plan and protect these environments.

Although ten million acres of wetlands remain, Minnesota has lost approximately 50 percent of its wetlands since it became a state. Throughout the country, wetlands are being lost due to agriculture, development, and road expansion. Wetlands play a vital role in ecosystems by filtering runoff for groundwater, absorbing rain and snowmelt before flooding, providing habitat for mammals, birds, amphibians, reptiles, and many other organisms, and creating beautiful views for our own recreation. Since the adoption of the Minnesota Wetland Conservation Act, Minnesota has worked to maintain no-net-loss of wetlands.

Everyone involved in Minnesota WHEP past, present, and future can be pleased with their contribution, and rewarded with increasingly healthier wetland ecosystems to enjoy for years to come.

## Wetland Types

Wetlands make up about 6.5 percent (24,501 acres) of the total area in Dakota County. Using the Circular 39 classification system, eight different wetland types are recognized in Minnesota. A description of each type and estimates of acreage are listed below. Two additional wetland categories are included in the total, riverine (between banks) and industrial/municipal (dike-related impoundments). WHEP focuses on the open water wetlands, types 3, 4 and 5.

**Type 1 – Seasonally Flooded Basin or Flat:** 5,995 acres
Seasonally Flooded Basins or Flats are fully saturated or periodically covered with water, usually with well-drained soils during much of the growing season.  The vegetation varies from bottomland hardwoods to herbaceous plants depending on the season and length of flooding.

**Type 2 – Wet Meadow:** 551 acres
Wet Meadow wetlands usually do not have standing water, but have saturated soils within a few inches of the surface during the growing season.  Grasses, sedges, rushes, and various broad-leaved plants dominate Wet Meadows.  Common sites include low prairies, sedge meadows, and calcareous fens.

**Type 3 – Shallow Marsh:** 12,491 acres
Shallow Marsh wetlands often have saturated soils and six inches or more standing water during the growing season.  Grasses, bulrush, spike rush, cattail, arrowhead, pickerelweed, and smartweed often grow in these wetlands.

**Type 4 – Deep Marsh:** 778 acres
Deep Marsh wetlands often have inundated soils and six inches to three feet or more standing water during the growing season.  Cattail, reed, bulrush, spike rush, and wild rice grow in these wetlands.  Pondweed, naiad, coontail, watermilfoil, waterweed, duckweed, water lily, and spatterdock can often be found in the open water areas.

**Type 5 – Shallow Open Water:** 1,213 acres
Shallow Open Water wetlands have standing water less than 10 feet deep.  These wetland types include shallow ponds and reservoirs.  Emergent plants are often found in these areas.

**Type 6 – Shrub Swamp:** 1,188 acres
Shrub Swamp wetlands are often covered with up to six inches of water, and the soils are usually completely saturated.  The water table is usually at or near the surface of these areas.  Alder, willow, buttonbush, dogwood, and swamp privet inhabit these areas.

**Type 7 – Wood Swamp:** 1,859 acres
Wood Swamp wetlands often have one foot of standing water, and the soils are completely saturated during the growing season.  The water table is usually at or near the surface of these areas.  Hardwood and coniferous swamps contain tamarack, northern white cedar, black spruce, balsam fir, balsam poplar, red maple, and black ash.

**Type 8 – Bogs:** 0 acres
Bogs are often supplied by the water table being at or near the surface of these areas.  The acidic peat soils are usually saturated. Heath shrubs, sphagnum mosses, sedges, leatherleaf, Labrador tea, cranberry, and cottongrass dominate bogs.

**Riverine**: 52 acres
Wetlands associated with rivers and found between the river banks.


**Municipal/Industrial:** 374 acres
Municipal/Industrial wetlands include diked areas.


**Total wetland area in Dakota County:** 24,501 acres


Many federal and state agencies are involved in wetland regulation, protection, and restoration. In Minnesota, the state wetland regulations are overseen by the Board of Water and Soil Resources and

Department of Natural Resources. To learn more about regulations and programs that affect or protect wetlands, visit www.bwsr.state.mn.us and click on wetlands. Many cities, watershed organizations and counties have adopted local administration of the state Wetland Conservation Act.

## Dakota County Wetland Monitoring



PAULA LIEPOLD

Dakota County is proud of the WHEP team leaders and volunteers for their significant contributions to training, assessing wetlands, reporting data, and building environmental awareness in their communities. We were pleased to return some program components that were scaled back in 2020 while continuing to follow COVID-19 safety protocols and procedures.

We greatly appreciate the investments made to keep WHEP in Dakota County a high-quality program. And we look forward to future WHEP seasons.
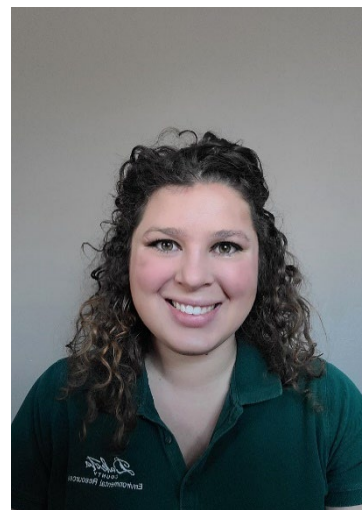


EMILY GABLE



JEFF KORPIK

Jeff Korpik is the Field Monitoring Coordinator for Dakota County WHEP. He has been involved in WHEP since 2007 as a volunteer, team leader, and field monitoring coordinator. Jeff stated, "2021 had its successes and challenges in WHEP. We had some great new team leaders that really engaged the volunteers as well as our many great veterans team leaders and volunteers. It was nice seeing some of the teams doing the lab work after a year off. I also got to see the St. Olaf biology labs, and as a college biology instructor, I am a bit jealous. Let's hope the 2022 season brings us good weather and a lot of good results.

# 2.0   Methods

## 2.1   Training

Training for citizen monitors is arranged by Dakota County and taught by technical experts from the MPCA and Fortin Consulting, now Bolton & Menk, Inc.  Both classroom and field sessions are held. In 2021, training was delivered virtually due to COVID-19 safety precautions.   Training is provided on vegetation plot selection/sampling and invertebrate sampling (dip netting and setting/retrieving bottle traps). Volunteers learn to identify the vegetation and macroinvertebrates during laboratory identification sessions which cover sampling protocol, key characteristics for invertebrate and plant identification, as well as hands-on identification of live and preserved specimens.     For a more detailed explanation of the methods used in WHEP, visit www.mnwhep.org.

### Minnesota Pollution Control Agency Experts

Part of the success of WHEP is due to the great assistance provided by the knowledgeable team of experts from the MPCA.  Mark Gernes and Michael Bourdaghs provide WHEP vegetation training and technical assistance. Joel Chirhart and John Genet provide WHEP macroinvertebrate training and technical assistance.

Mark Gernes commented, "WHEP is an opportunity for citizens to learn about wetland plants and bugs, build lasting friendships all while helping our local communities protect and manage water resources. As a watershed professional I value the contribution citizen scientists are able to make. Each year I look forward to recounts of citizen experiences in their local wetlands."

The MPCA staff support WHEP and have been very helpful in making WHEP a success.

MARK GERNES

MICHAEL BOURDAGHS

JOEL CHIRHART

JOHN GENET

## 2.2   Data Collection

In order to use the data to interpret the health or condition of the wetlands, a scoring process called the Index of Biological Integrity (IBI) is used.  Separate IBIs are calculated for plants and macroinvertebrates. Several measures, referred to as metrics, are used to calculate an IBI.  The IBI scores are categorized into poor, moderate or excellent.   Biological integrity is commonly defined as "the ability to support and

maintain a balanced, integrated, and adaptive community of organisms having a species composition, diversity and functional organization comparable to those of natural habitats within a region" (Karr, J. R. and D. R. Dudley. 1981. Ecological perspectives on water quality goals. Environmental Management 5: 55-68). Biological integrity is equated with pristine conditions, or those conditions with no or minimal disturbance (MPCA, https://www.pca.state.mn.us/water/tmdl-glossary). Each city participating in WHEP has identified "reference" wetlands, those that are believed to be minimally disturbed and represent the most pristine conditions within the city.

### *Vegetation Index of Biological Integrity (IBI)*

Vegetation is analyzed using a 100 square meter releve plot. All species within the sampling plot are identified to the genus level, and documented on the field data sheet. Vegetation is divided into categories based on their ecological function or relationship. The categories include nonvascular, woody, grass-like and forbs. The forbs are further subdivided into various submergent and emergent categories. The number and coverage of genera identified are then evaluated using the metrics developed by MPCA.

The methodology and evaluation for the vegetation IBI has remained relatively consistent throughout the project. However, the persistent litter metric calculation was revised in 2004 to reflect average cover values as compared to maximum cover values. In 2005 and again in 2015, minor changes to the data sheets were implemented to reduce the number of transcription errors. The scoring criteria were adjusted slightly to better represent vegetation diversity. Since 2018, Dakota County Parks has altered the vegetation survey protocol (see Dakota County Parks section 4.2). Previous changes in methodology have been documented in earlier summary reports.

### *Macroinvertebrate IBI*

Macroinvertebrates (small aquatic animals with no backbone) are analyzed by collecting samples using six bottle traps and two dip netting efforts combined to represent one sample. The invertebrates are then identified to the genera or "kind" level. Generally, the invertebrates evaluated are macroinvertebrates and include leeches, bugs and beetles, dragonflies and damselflies, caddisflies, mayflies, fingernail clams, snails, crustaceans and phantom midges. The number of genera identified is then evaluated using the metrics developed by MPCA.
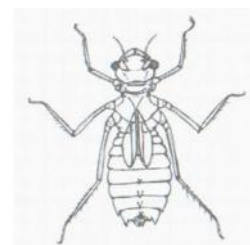
**DRAGONFLY**
**GRAPHIC: MPCA**

Several changes have been made to the data collection and metrics for the invertebrate IBI over the duration of the program. There were no modifications to the methods after 2004. Previous changes in methodology have been documented in earlier summary reports.

Blank data sheets and equipment lists can be found at www.mnwhep.org.

## 2.3    Cross-Checks and Quality Control

There are several safeguards included in WHEP to validate the data, including training, assistance in the wetland, team cross-checks, and third-party cross-checks. In typical years, each WHEP team is responsible for evaluating one wetland of another WHEP team as a means of providing a cross-check, providing a

second sample for the selected wetland to determine if two different samples provide similar results for the vegetation and invertebrate IBI; the Citizen Monitoring Coordinator (Jeff Korpik) assists teams and provides advice regarding proper sampling methods and sampling placement; and a third party technical expert (Fortin Consulting, now Bolton & Menk, Inc.) provides Quality Control (QC) review of the completed data sheets, and invertebrate and vegetation identification.

In 2021, Fortin Consulting (FCI), now Bolton & Menk, Inc., assisted MPCA in training sessions, provided quality assurance of data, and prepared the annual report. FCI has been working with Dakota County on the WHEP program since 2007.

Over the duration of the program, team cross-checks and third-party cross-checks have been conducted on a rotational basis. The technical expert reviews 10 percent of the vegetation plots and one invertebrate collection from each team. In 2021, Fortin Consulting cross-checked the vegetation plots of four wetlands: Burnsville's Sunset Pond Park (B-13), Dakota County Parks' Buck Pond (DC-2), North Cannon River WMO's Jordan Wetand (NC-3), and West St. Paul's Humboldt Pond (WSP-10). Fortin Consulting also reviewed the invertebrate samples



CONNIE FORTIN, CAROLYN DINDORF, KATIE FARBER, DOUG KLIMBAL, CARALIE RANDOLPH

from sites AV-1, B-6, DC-5, DC-7, E-11, F-9, H-6, L-8, MH-2, NC-1, R-2, SSP-3, and WSP-10. The purpose of the checks is to determine if the data being collected by the citizen team is accurate and complete, to verify and correct the samples, and to help the teams better interpret their data and strengthen their vegetation and invertebrate identification. The tables and graphs in Section 4.0 include the corrected data from the technical quality control checks. The official data scores are derived from the WHEP team's data incorporating any corrections made during the technical quality control checks (vegetation cross-check, and datasheet review) conducted by FCI.

## 2.4    Wetland Scores and Quality Ratings

Each metric, or measure, is evaluated based on the specimens identified and given a score of one, three or five points. The scores for each metric are then combined to get a total score for the IBI. Table 2-1 illustrates the scoring range for each IBI, the corresponding quality rating, and the scores in percent form.

**Table 2.1 Interpretation of site IBI scores.**

| INVERTEBRATE IBI SCORE INTERPRETATION | | | VEGETATION IBI SCORE INTERPRETATION | | |
|---|---|---|---|---|---|
| Point Scores | Quality Rating | Percent Score | Point Scores | Quality Rating | Percent Score |
| 6 – 14 | Poor | <50% | 7 – 15 | Poor | <46% |
| 15 – 22 | Moderate | 50 – 76 % | 16 – 25 | Moderate | 46 – 74% |
| 23 – 30 | Excellent | >76% | 26 – 35 | Excellent | >74% |

The ratings (poor, moderate, and excellent) are useful to give the wetland a qualitative description, which can make it easier to describe the overall quality of the wetland. A wetland described as having poor quality would have low species richness (number of species) and diversity and a large number of the species would likely be pollution tolerant. A wetland of excellent quality would have high diversity and species richness and would include species that are sensitive to pollution or human disturbance. It should be noted that the invertebrate and vegetation IBIs have slightly different ratings based on the scoring range. This is due, in part, to the number of metrics evaluated in each IBI: six for the invertebrate IBI and seven for the vegetation IBI.

Converting IBI scores to percentages allows for the ability to compare the site scores over several years. Thus, the trend in the vegetation or invertebrate IBI can be evaluated. Additionally, the percent scores allow comparison of the IBI results for a given year. This may be helpful to determine if the scores are consistent, and to determine if additional data collection or more intensive evaluation is necessary to characterize the wetland.

IBI point scores can be used to directly compare sites for a given year; however, they cannot be used to compare sites from year to year because:

- The 1998 invertebrate IBI was scored using seven metrics as compared to the six that have been used in 1999 until present.

- The ranges used to determine the quality rating have been modified since 1998 and numerous scoring sheet and metric modifications have been occurring as well.

- The total possible score is not the same for the two IBIs (vegetation IBI has seven metrics with a possible 35 point score while the invertebrate IBI has six metrics with a possible 30 point score).

## 2.5   Using the Data

Biological data can be difficult to interpret and use. Converting the data collected to metrics and indexes is helpful in interpreting and presenting the data. The methods used in WHEP allow one to identify wetland health conditions. However, they do not determine the cause of poor wetland health. Once a condition of poor wetland health is identified and confirmed, additional testing and analysis of the wetland may be necessary to further define the problem. For example, monitoring of nutrient and/or chloride may be appropriate. To identify the cause of poor wetland health, analysis of surrounding land use, stormwater inputs and other potential stressors is the next step.

For those wetlands identified as having excellent wetland health, local governmental organizations may choose to adopt requirements to provide protection to these wetlands in order to maintain wetland health. Where poor wetland health or declining trends are indicated, steps may need to be taken to help reverse the trend. Best management practices (BMPs), actions taken to reduce pollutant loading or stressors to the wetland, may need to be implemented within the wetland or in the surrounding watershed.

When BMPs are implemented, biological monitoring can be used to help track the impacts of the BMPs on the wetland. Continued monitoring can identify a change in trend or improvement in a wetland.

# 3.0 General Results and Recommendations

## 3.1 2021 Sampling Season Results

During the 2021 sampling season, thirteen citizen teams (Apple Valley, Burnsville, Dakota County Parks Team 1, Dakota County Parks Team 2, Eagan, Farmington, Hastings, Lakeville, Mendota Heights, North Cannon River Watershed Management Organization, Rosemount, South St. Paul, and West St. Paul) monitored 42 wetlands in ten cities in Dakota County, one watershed management organization, and Dakota County Parks. Thirteen of these wetlands were sampled twice through citizen cross-checks. Four wetland vegetation samples and thirteen invertebrate samples were checked for accuracy through the quality control check performed by Fortin Consulting, now Bolton & Menk, Inc.
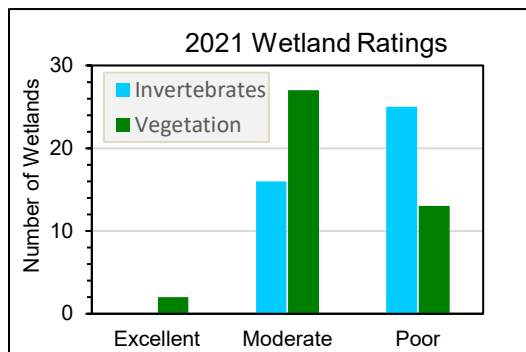


FIGURE 3.1.1 DAKOTA COUNTY WETLAND RATINGS

Figure 3.1.1 and Table 3.1.1 show the invertebrate and vegetation ratings for all the wetlands assessed during the 2021 sampling season. Based on invertebrate scores, 16 of the wetlands rated moderate and 25 rated poor. One wetland could not be surveyed for invertebrates due to low water levels. Invertebrate scores ranged from 8 to 22 out of a maximum of 30 points. Based on vegetation scores, 2 wetlands rated excellent, 27 rated moderate, and 13 rated poor. Vegetation scores ranged from 11 to 29 out of a maximum of 35 points.

Several of the sites showed different ratings for vegetation versus invertebrates. Eighteen of the wetlands showed agreeing ratings for vegetation versus invertebrates. Differing ratings per wetland may be the result of varying factors influencing the plant and invertebrate communities in each wetland. Possible factors affecting wetland quality are described in the next section. Appendix A lists the wetland scores separated per metric per wetland. Each metric can achieve a score of 1, 3, or 5.

**Table 3.1.1 Wetland Ratings by City Based on IBI Scores**

Values are listed as number of wetlands rated in each category for Invertebrates/Vegetation

| City | Poor | Moderate | Excellent |
|------|------|----------|-----------|
| Apple Valley (AV) | 3/1 | 1/3 | 0/0 |
| Burnsville (B) | 2/0 | 2/4 | 0/0 |
| Dakota County (DC) | 5/2 | 2/4 | 0/2 |
| Eagan (E) | 2/1 | 1/2 | 0/0 |
| Farmington (F) | 2/2 | 1/1 | 0/0 |
| Hastings (H) | 1/1 | 3/3 | 0/0 |
| Lakeville (L) | 2/0 | 0/2 | 0/0 |
| Mendota Heights (MH) | 0/0 | 2/2 | 0/0 |
| North Cannon River (NCR) | 1/0 | 1/2 | 0/0 |
| Rosemount (R) | 3/1 | 1/3 | 0/0 |
| South Saint Paul (SSP) | 1/2 | 1/0 | 0/0 |
| West Saint Paul (WSP) | 3/3 | 1/1 | 0/0 |
| **Totals** | **25/13** | **16/27** | **0/2** |

*Note: For an interpretation of scores, please see page 7.*

**Figure 3.1.2 2021 Invertebrate Scores.** Shows the distribution of wetland health ratings for each site monitored in 2021.



Dakota County
Wetland Health
Evaluation Program
Invertebrate Scores
2021

**Invertebrate Score**

- ○ Poor (6 - 14)
- ◉ Moderate (15 - 22)
- ● Excellent (23 - 30)

Copyright 2022, Dakota County
This drawing is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information, and data located in various city, county, and state offices and other sources, affecting the area shown, and is to be used for reference purposes only. Dakota County is not responsible for any inaccuracies herein contained. If discrepancies are found, please contact this office.
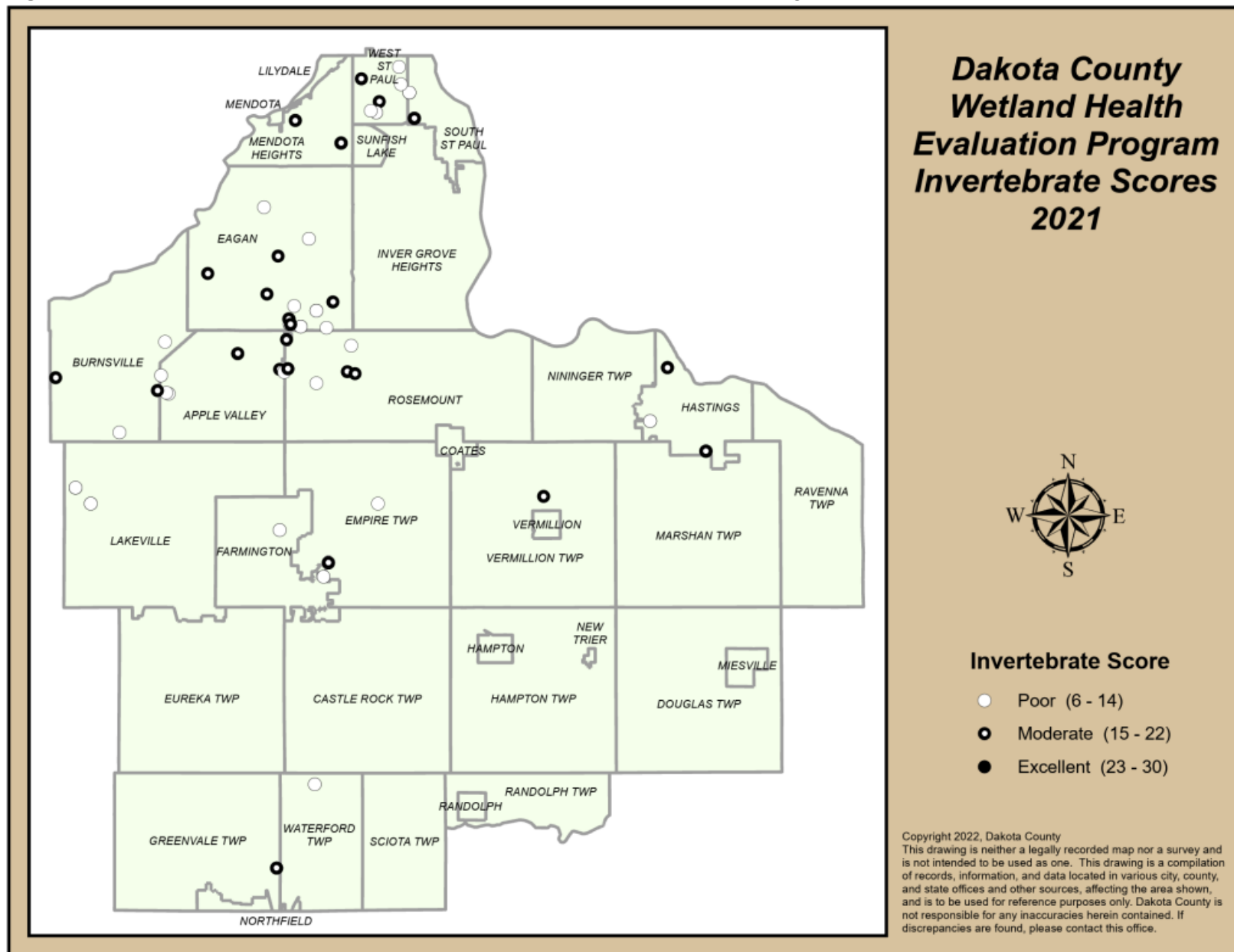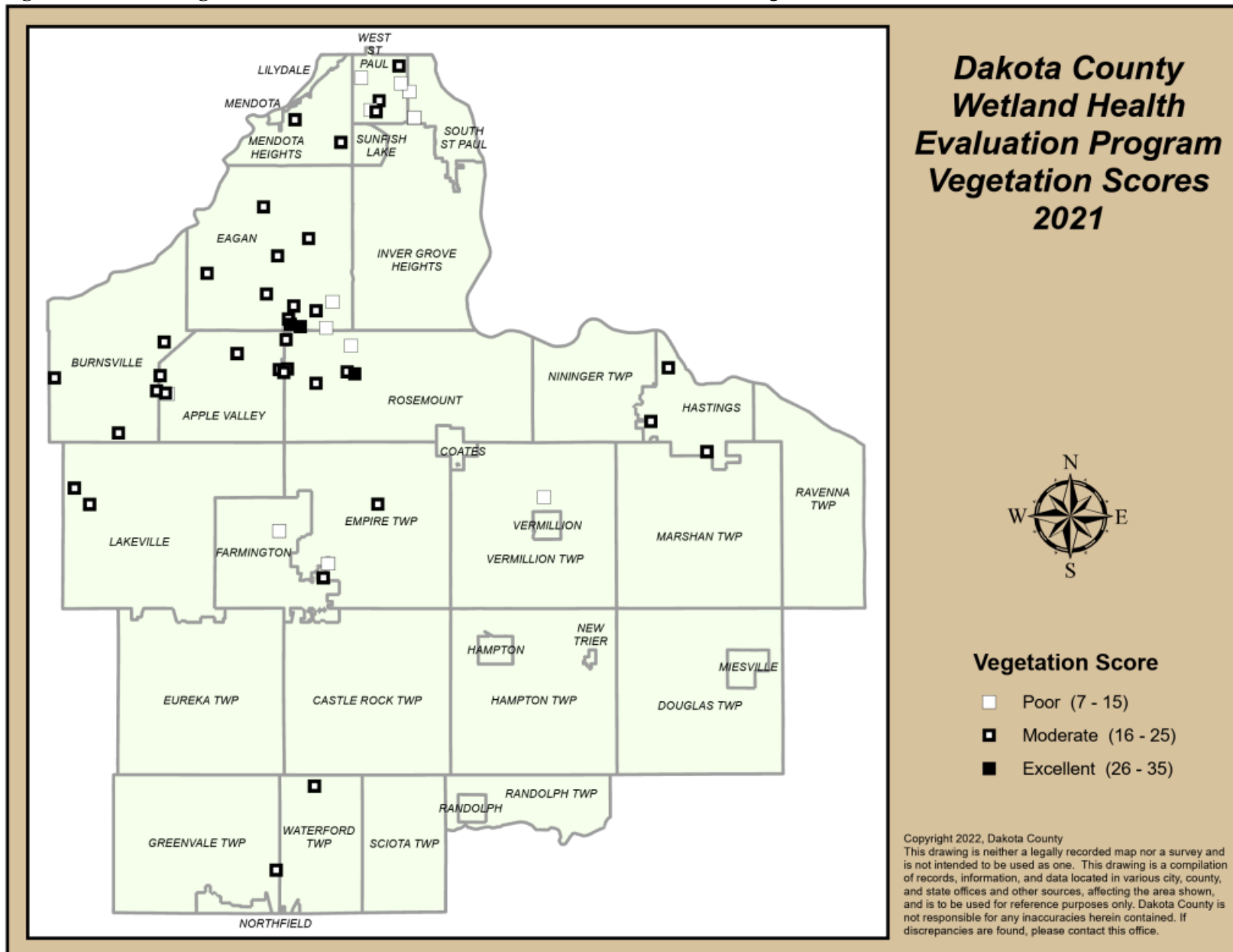
**Figure 3.1.3 2021 Vegetation Scores.** Shows the distribution of wetland health ratings for each site monitored in 2021.

In an attempt to help identify why there are differences in wetland quality, different factors that impact the wetlands were evaluated.

### 3.1.1 Aquatic Invasive Species and Wetland Health

Invasive species are non-native organisms that spread to ecosystems beyond their natural historic range, causing harm to economic, environmental, or human health. Aquatic invasive species (AIS) are invasive species more generally found in or near water. Invasive species are often aggressive, spread quickly, and take over areas. They impact native habitat and species diversity. They may be introduced to new areas by wind, water, animals, humans, and other means of transport.

Early detection of invasive species can greatly reduce their success and spread. New infestations or smaller populations of invasive species require less resources to control, and chances of eradication are improved. Once established, invasive species are very difficult and expensive to control, and eradication is unlikely. Detecting and reporting the presence of invasive species early in their introduction to a new area is key. WHEP provides an opportunity for aquatic invasive species to be detected and reported early so that control can be implemented before they take over a wetland.

Aquatic invasive species education and early detection tools have been incorporated into WHEP, preparing WHEP volunteers as early detectors. WHEP volunteers receive AIS training including a presentation highlighting AIS to watch for, identification tips and techniques, and how to record and report AIS to authorities. Hands-on identification practice of native and non-native species is also offered at the invertebrate and vegetation trainings to heighten species recognition, demonstrate comparisons of species, and improve identification skills. WHEP volunteers also receive AIS identification materials, including the AIS Identification Guide by the University of Minnesota CFANS, and the Aquatic Invasive Species Early Detectors: A How to Guide by Minnehaha Creek Watershed District. Each team receives AIS early detection field data sheets to record findings during each wetland visit.

Invasive species that have not yet been introduced to Minnesota or exist in limited distribution, but are known to thrive in neighboring states with similar climates and ecosystems are being targeted for early detection. Highlighted species in WHEP training include starry stonewort (*Nitellopsis obtuse*), Hydrilla (*Hydrilla verticillata*), Brazilian elodea (*Egeria densa*), brittle naiad (*Najas minor*), Carolina fanwort (*Cabomba caroliniana*), water chestnut (*Trapa* natans), flowering rush (*Butomus umbellatus*), yellow iris (*Iris pseudacorus*), non-native phragmites (*Phragmites australis*), water hyacinth (*Eichhornia crassipes*), water lettuce (*Pistia stratiotes*), and other invasive species already found in the wetlands. In Dakota County, flowering rush (limited number) has been found in Lake Byllesby, and yellow iris has been found in Lakeville at Kingsley Lake and Orchard Lake.

WHEP teams are expected to report the presence of invasive species in the wetlands that they monitor. Findings in 2021 were as predicted. Many of the WHEP wetlands have been found to contain invasive species. In 2021, a species of common reed grass (*Phragmites* sp.) was found in two WHEP wetlands Lakeville's DNR 387 (L-7) and Mendota Heights' Orchard Heights (MH-20); however, it was not verified as the invasive variety. Reed canary grass (*Phalaris arundinacea*) and purple loosestrife (**Lythrum salicaria**) are two common wetland invaders. Curly-leaf pondweed (*Potamogeton crispus*), Eurasian water-milfoil (*Myriophyllum spicatum*), and Chinese mystery snails (*Cipangopaludina chinensis*) were also observed in wetlands monitored in 2021. Reed canary grass was found in 23 of the wetlands, purple loosestrife was found in 6 of the wetlands, Eurasian water-milfoil was found in 4 of the wetland, curly-leaf pondweed was found in 1 of the wetlands, and Chinese mystery snails were found in 4 of the wetlands. It is possible that other invasive species exist in wetlands, but were not observed near monitoring sites at each

wetland. In addition, pondweeds and milfoils were found in several additional wetlands, but not specifically identified as the invasive species. Appendix B shows the history of invasive species presence in WHEP monitored wetlands.

An analysis of variance (ANOVA) was completed to determine if the differences in wetland health scores were affected by the presence of invasive species, and statistically significant. Differences in IBI scores for wetlands with invasive species present vs. not present were not statistically significant.

### 3.1.2 Natural versus Altered Wetlands

Wetlands were classified as natural, altered by stormwater input, or created based on information provided in the site identification form from city staff. The average score of each site was used. In the past, WHEP team leaders have commented that the created wetlands seem to exhibit poorer insect diversity. The site averages indicate that created, stormwater, and natural wetlands are scoring similarly (Appendix C). An analysis of variance (ANOVA) was completed to determine if the differences were statistically significant. Differences in IBI scores comparing natural, created, and stormwater wetlands were not statistically significant. In addition, an ANOVA comparing IBI scores for natural, created and stormwater, showed no statistically significant difference between the three scores.

The score range between the created, stormwater, and natural wetlands is similar. The most recent invertebrate scores for each wetland show the lowest invertebrate scores for created, stormwater, and natural wetland, respectively, are 11, 10, 8. The highest invertebrate scores, respectively, are 22, 24, 26. The lowest vegetation scores for created, stormwater, and natural wetlands, respectively, are 14, 9, 11. The highest vegetation scores, respectively, are 27, 29, 29.

Wetland health scores vary from year to year. In 2021, the wetland health was not affected by the type of wetland (created, stormwater, or natural). One would expect that natural wetlands would support the richest and most diverse invertebrate and plant communities. Stormwater altered wetlands tend to have a greater short-term bounce (increase or decrease in water level) and more frequent fluctuations than natural wetlands. They are also inundated with pollutants found in stormwater. Created wetlands likely receive stormwater and thus would have some of the same impacts as stormwater wetlands and would take time to colonize. These factors are also likely to affect the type and diversity of plants found in the wetlands. These results infer that the created wetlands are functioning similarly to the natural wetlands as far as the biological community. See Appendix C for detailed data.

### 3.1.3 Impervious Area in the Watershed

Data on percent impervious area (hard cover such as streets, parking lots and rooftops) in the watershed was compiled for each wetland based on the site identification forms submitted by each team sponsor. Wetlands with higher impervious areas in the watershed, likely receive more runoff and pollutants. Impervious areas ranged from 0 to 80% (Table 3.1.3). Studies have shown that stream degradation occurs at low levels of imperviousness (about 10%)[1]. A similar relationship may exist for wetlands too. Linear regressions have not shown any relationship between imperviousness and IBI scores. Watershed impervious area is likely a factor affecting wetland vegetation and invertebrate life, but there are other factors that are impacting these communities. Appendix D contains wetland and watershed data.

[1]Schueler, T. 2000. The Importance of Imperviousness, Article 1 in The Practice of Watershed Protection. Center for Watershed Protection. Ellicott City, MD.

### 3.1.4 Effect of Wetland Water Levels on Wetland Health

Wetland water levels fluctuate from year to year. They may fluctuate daily in response to rainfall and drought, as well. Water levels may affect site sampling placement. High water levels may push plots farther upland than normally placed. Water levels may also affect the species dominance and diversity. Wetter conditions may encourage more submergent and emergent species of vegetation. Drought, of course, may reduce the population of invertebrates. Water levels were measured by volunteer WHEP teams in 2021 within the vegetation plot sites. The lowest water level measured within the plots in 2021 was zero feet, the highest water level was 4.9 feet (1.5 m), and the average water level was 1.3 feet. A linear regression was completed to compare IBI scores to average plot depth. No significant relationship between IBI score and average plot depth was found for either invertebrates or vegetation. Results assume that vegetation and invertebrates sampling occurred in the same general vicinity of the wetland.

### 3.1.5 Winter Salt Watch

In 2021, Dakota County WHEP participated in Winter Salt Watch, a chloride monitoring program managed by Izaak Walton League of America (IWLA), in partnership with Minnesota Pollution Control Agency. The purpose is to measure chloride levels in surface waters and connect the data nationwide. IWLA provided Winter Salt Watch kits for the WHEP teams to measure chloride levels in each of the monitored wetlands in 2021.

Chloride is a water pollutant of concern. Salt applied to roads and walkways during Minnesota winters contains chloride. Stormwater readily transports chloride from the hard surfaces to the rivers, lakes, wetlands, and groundwater. Once dissolved in the water, there is no easy way to remove the chloride. Increased chloride levels in surface waters can be harmful to aquatic life and disrupt natural functions of surface waters. The State and Federal Chronic Water Quality Standard for Chloride is 230 mg/L [2]. This is about 1 teaspoon of salt in 5 gallons of water. Chloride levels exceeding this standard are toxic to fish, aquatic invertebrates, and amphibians.

WHEP teams collected chloride measurements in May/June (during invertebrate collection) using Hach Quantab Chloride titration test strips. The test strips are simply placed in a clean container of water from the wetland site for approximately ten minutes. The test strip and associated chart indicate the level of chloride present in the water. The Quantab strips are certified to have an accuracy of ± 10 percent (± 0.2 Quantab Units) [3].

Thirty-seven of the 42 wetlands were tested for chloride. See Appendix E for Winter Salt Watch results. A wide-range of chloride concentrations were observed. The majority of the wetlands measured less than 50 ppm. Four wetlands measured chloride levels exceeding the chronic standard: E-46, MH-20, R-4, and SSP-3. Figure 3.1.5 shows the comparison of chloride levels to the invertebrate and vegetation scores calculated in 2021. Only one sample was collected from each wetland. There is not enough data to analyze a trend or complete statistical analysis.

Although only one sample was collected from each wetland monitored, it is concerning that four exceeded the chloride standard. Chloride concentrations in the wetlands are likely to be higher during the winter and in the spring than what is found in May or June. Chloride will also be higher in the bottom of rather than at the surface where the samples were collected per the procedures of the test kit. A study on a shallow wetland in Madison, Wisconsin showed that ice thickening over the winter can increase chloride concentrations that are above natural background beyond the toxicity threshold for much of the winter.[4] Additional monitoring of the wetlands with elevated chloride concentrations would be helpful to determine if and for how long they are exceeding the chloride standard.

[2]Minnesota Pollution Control Agency. 2018.  TCMA Chloride TMDL – Applicable Water Quality Standards and Numeric Water Quality Targets.  stormwater.pca.state.mn.us
[3]Hach. 2020. What is the accuracy of the Quantab Chloride Titration Test Strips?  support.hach.com
[4]Hilary A. Dugan , Greta Helmueller, John J. Magnuson, Ice Formation and the risk of chloride toxicity in shallow wetlands and lakes. Limnology and Oceanography Letters 2, 2017, 150-158.

**Figure 3.1.5 Chloride Levels Compared to WHEP Invertebrate and Vegetation Scores**
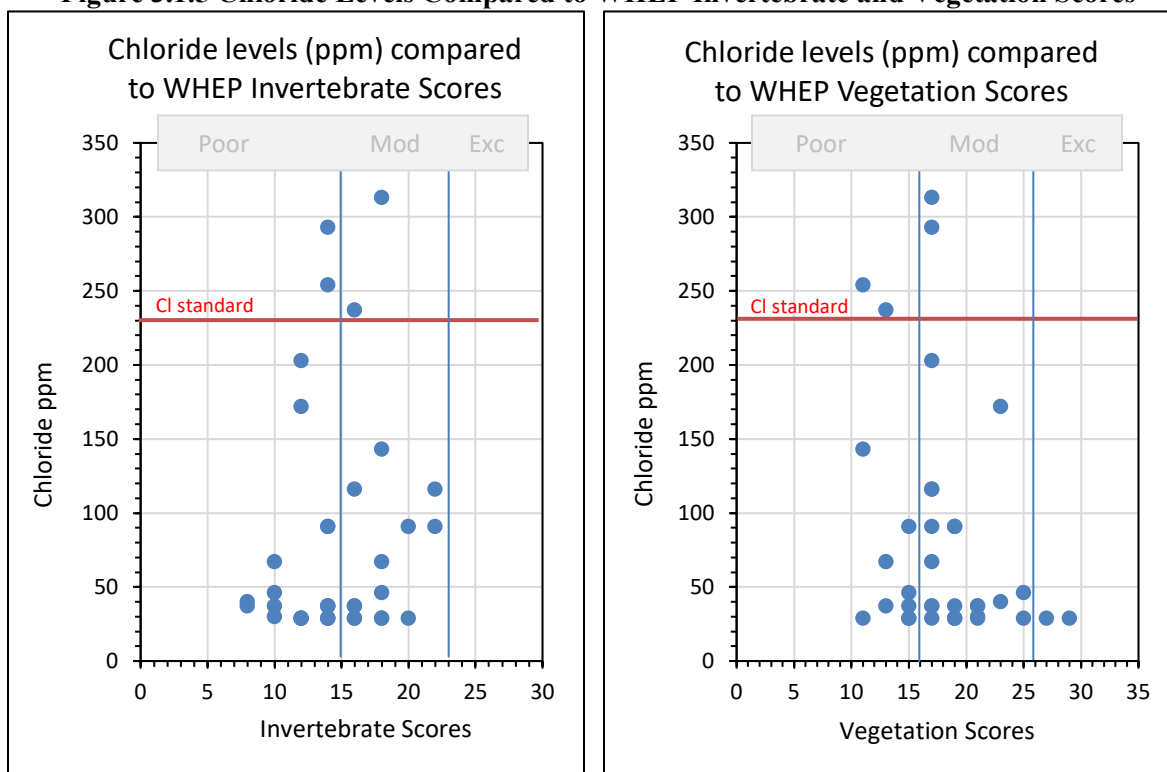


## 3.2    Is Volunteer Data Usable?

WHEP was designed with several layers of quality assurance and quality control to be able to identify and correct potential errors.  This was put into place to make sure the data collected is scientifically justifiable and will be used.  The WHEP protocol includes standard annual trainings; citizen monitoring leaders and team leaders that check on the team's collection methods, data entry, and metric calculations; cross-checks by other teams; and quality control checks by a professional consultant.  With all of these checks in place, data users can be assured that the data and information presented is acceptable.

### 3.2.1    2021 Cross-checks

In a typical year, each team is responsible for evaluating one wetland of another team (Table 3.2.1).  This citizen cross-check provides a second sample for the selected wetland. The purpose of this check is to determine if two different samples provide similar results for the vegetation and invertebrate IBI.  Large wetlands and wetlands with complex plant communities may have different site scores, depending on where the samples are collected.  The two samples are considered consistent if the IBI scores differ by six points or less.  The majority of the samples are consistent (Table 3.2.1 and Figure 3.2.1).  Invertebrate scores for B-1, F-9, and WSP-1 were inconsistent, differing by 12, 8, and 10 points, respectively.  Vegetation scores for site H-6, SSP-3, and WSP-1 were inconsistent, differing by 10, 8, and 8 points, respectively.  The varied scores may indicate a difference in sampling technique, a change in conditions between sample dates,

differences in identification accuracy, or some other cause. Below lists the obvious differences in scoring for those wetlands that were inconsistent. Data collected by the original citizen team is used for the individual wetland analysis in Section 4.0 of this report. Invertebrate scores between citizen team and cross-check team for site AV-1, MH-2, and NC-1 were identical. Vegetation scores between City team and cross-check team for sites B-1 and R-1 were identical. Many scores were close in comparison. A general explanation of differences between inconsistent scores are as follows:

Invertebrate cross-check score inconsistencies:
- *B-1:* The cross-check team identified a more diverse invertebrate community than the citizen team. This affected the Leech, Snail, and Total Invertebrate Taxa Metrics. The cross-check team also calculated a lower Corixidae ratio which affected the Corixidae Metric.
- *F*-9: The cross-check team identified a more diverse invertebrate community than the citizen team. This affected the Odonata and Snail Metrics. The cross-check team also calculated a lower Corixidae ratio which affected the Corixidae Metric.
- *WSP*-1: The citizen team identified a more diverse invertebrate community than the cross-check team. This affected the Leech, ETSD, Snail, and Total Invertebrate Taxa Metrics.

Vegetation cross-check score inconsistencies:
- *H*-6 The citizen team identified a more diverse vegetation community than the cross-check team. This affected the Vascular, Non-vascular, *Carex*, and Aquatic Guild Metrics.
- *SSP*-3: The cross-check team identified a more diverse vegetation community than the citizen team. This affected the Vascular, Non-vascular, and Persistent Litter Metrics.
- *WSP-1*: The citizen team identified a more diverse vegetation community than the cross-check team. This affected the Vascular, Aquatic Guild, and Persistent Litter Metrics.

**Table 3.2.1 Citizen cross-checks (those considered inconsistent are shown in bold)**

| Citizen Team | Cross-Check Team | Wetland Evaluated | Invertebrate Score Comparison | | Vegetation Score Comparison | |
|---|---|---|---|---|---|---|
| | | | **Citizen** | **x-check** | **Citizen** | **x-check** |
| Apple Valley | Lakeville | AV-1 | 16 | 16 | 17 | 19 |
| Burnsville | Mendota Heights | B-1 | **8** | **20** | 23 | 23 |
| Dakota County Parks Team 1 | Dakota County Parks Team 2 | DC-8 | 14 | 12 | 11 | 17 |
| Dakota County Parks Team 2 | NA | NA | NA | NA | NA | NA |
| Eagan | Rosemount | E-24 | 10 | 16 | 21 | 23 |
| Farmington | West St. Paul | F-9 | **18** | **26** | 13 | 15 |
| Hastings | South St. Paul | H-6 | 18 | 16 | **25** | **15** |
| Lakeville | North Cannon River WMO | L-8 | 10 | 8 | 21 | 19 |
| Mendota Heights | Burnsville | MH-2 | 22 | 22 | 17 | 15 |
| North Cannon River WMO | Apple Valley | NC-1 | 16 | 16 | 17 | 13 |
| Rosemount | Eagan | R-1 | 16 | 12 | 19 | 19 |
| South St. Paul | Hastings | SSP-3 | 14 | 12 | **11** | **19** |
| West St. Paul | Farmington | WSP-1 | **22** | **12** | **15** | **7** |

**Figure 3.2.1 Cross-check Comparisons of IBI Scores**



Invertebrates Cross-check 2021



Vegetation Cross-check 2021
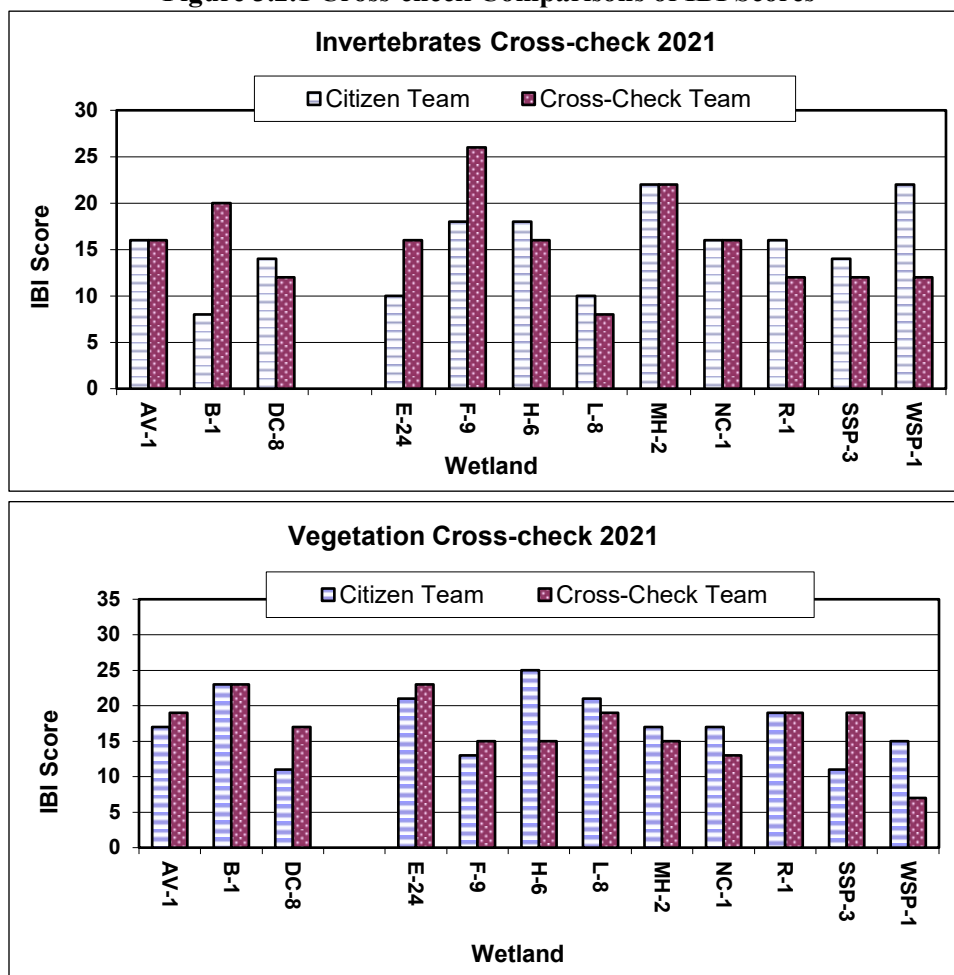
### 3.2.2   2021 Quality Control Checks

Quality control checks were conducted at four sites for vegetation and thirteen sites for invertebrates in 2021 (Figure 3.3.2) by Fortin Consulting, now Bolton & Menk, Inc.  The invertebrate check was conducted by reviewing one identified and preserved invertebrate sample per team.   The vegetation check was conducted by re-sampling the area marked off by the citizen team using the WHEP procedures and comparing results.  The quality control review was done independently of the citizen team. The following sites were checked as a measure of quality control: AV-1, B-6, DC-5, DC-7, E-11, F-9, H-6, L-8, MH-2, NC-1, R-2, SSP-3, and WSP-7 were reviewed for invertebrate identification accuracy; B-13, DC-2, NC-3, and WSP-7 were reviewed for vegetation identification accuracy.
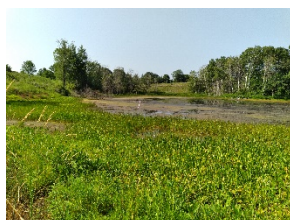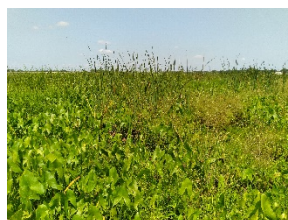


| B-13 | DC-2 | NC-3 | WSP-7 |

All team invertebrate and vegetation scores were found to be consistent with the quality control checks. Each WHEP team did very well in both their invertebrate identification and vegetation surveys. This shows that with a high-quality program that provides good training and oversight, citizen volunteers can collect good usable data.

**Figure 3.2.2 Quality Control Checks (IBI Score Comparison)**
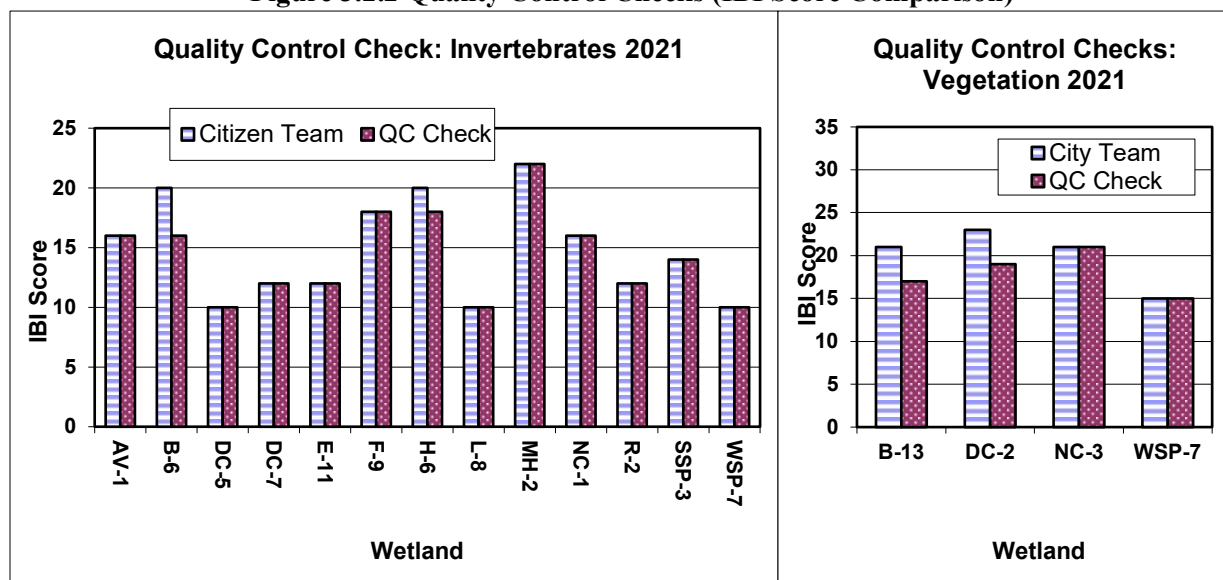


WHEP also provides review of the data sheets for scoring and data transfer errors. This review is conducted by Fortin Consulting, now Bolton & Menk, Inc. There were 6 transfer errors, 10 metric calculation errors, and 1 math error. The transfer errors were due to either the data collected was incorrectly transferred to their proper metrics or metric scores were not successfully transferred from one set of calculations to the next. Corrections affected the scores by zero to six points. Many of these errors could be prevented by double-checking the transfer and math work on the data sheets. The quality control checks are working well. Errors are identified and corrections are made as needed. Appendix F shows the data sheet review results.

## 3.3 WHEP Historical Data

Since WHEP began in 1997, 200 wetlands have been sampled, but not all are sampled every year. Figures 3.3.1 and 3.3.2 provide an overall picture of wetland health in Dakota County based on the most recent sample collected for each wetland. The historical data can be found for each site since the start of the program at www.mnwhep.org. Section 4.0 includes the sites sampled in 2021 with an analysis of historical data, identifying sampling history and trends based on a trend analysis for those with adequate data. There is a spread in the distribution of poor, moderate and excellent ratings.
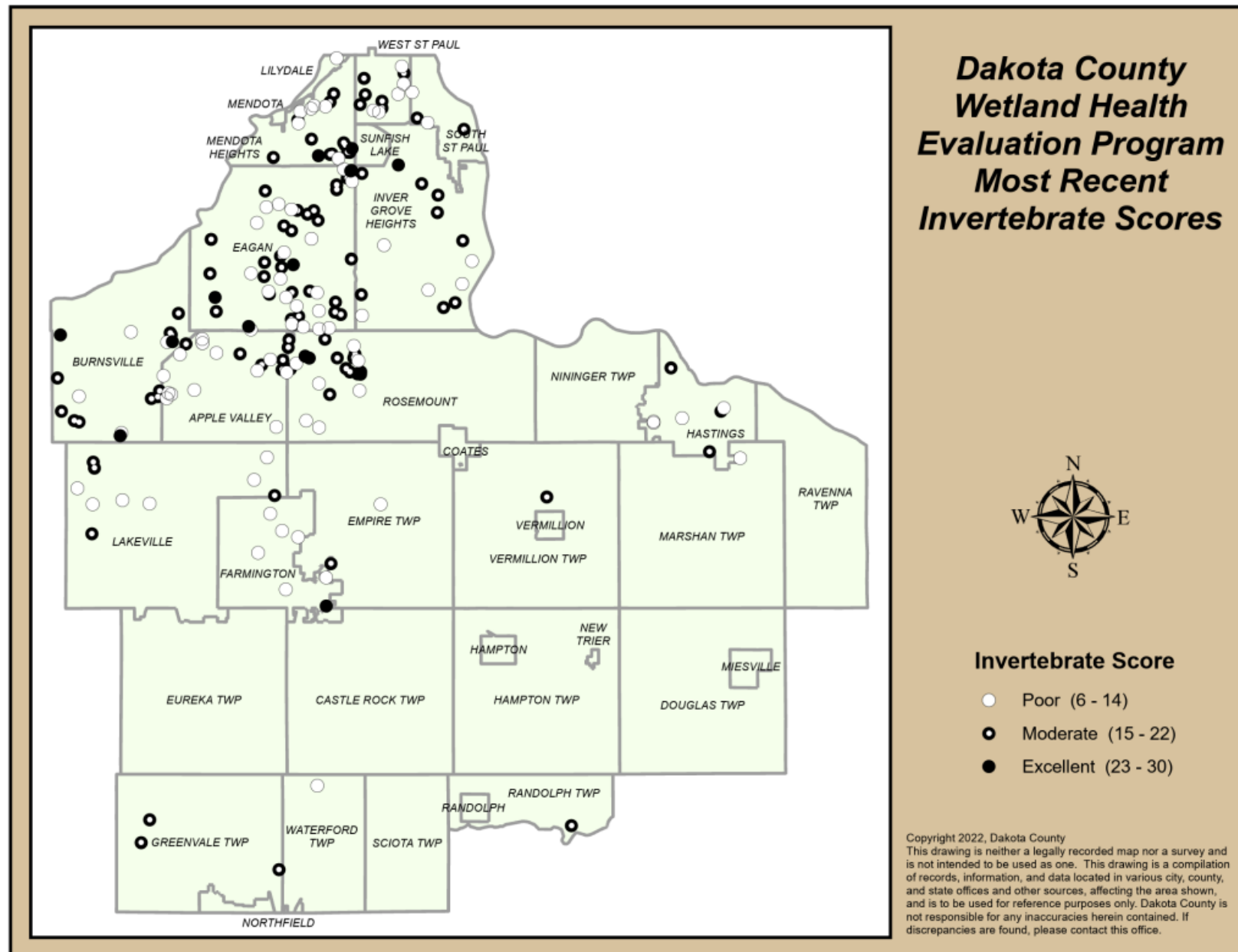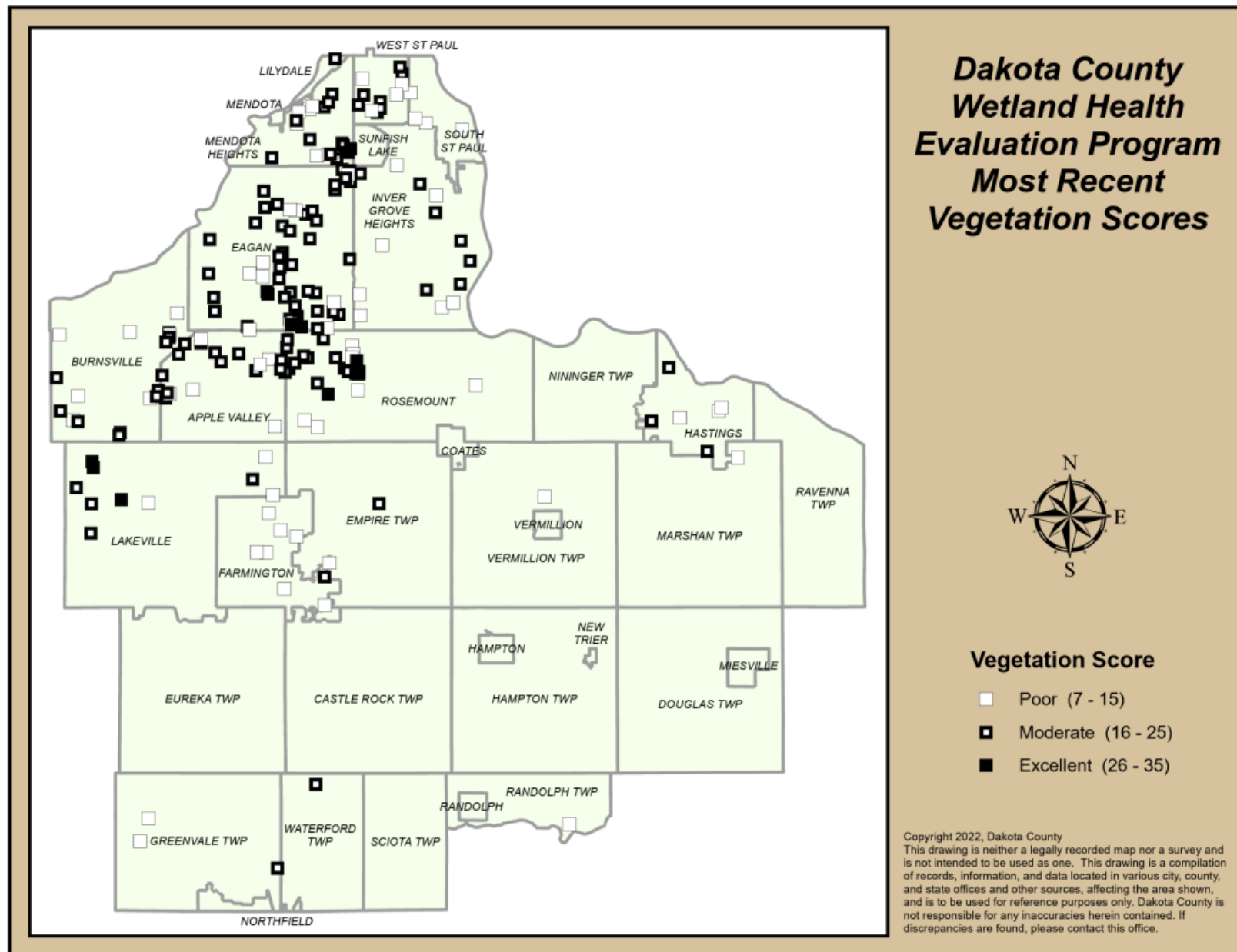
**Figure 3.3.1 Most Recent Invertebrate Scores**

**Figure 3.3.2 Most Recent Vegetation Scores**

# 4.0  Wetland Evaluations

## 4.1  Apple Valley Wetlands

Four wetlands were monitored within the City of Apple Valley in 2021. This is the 24th year the City has participated in WHEP! Twenty wetlands have been monitored in Apple Valley since the initiation of WHEP in 1997.

**Team Leader:** Tom and Cindy Taintor

**Team Members:** Brad Blackett, Kaylyn Haeg, Aashir Khan, Karen Levisen, Sheethal Marpaka, Amanda Mathiesen, Jim Platt, Maya Ricard, Noah Ricard, Rachel Ricard, Zane Siddiqui Jill Smook.
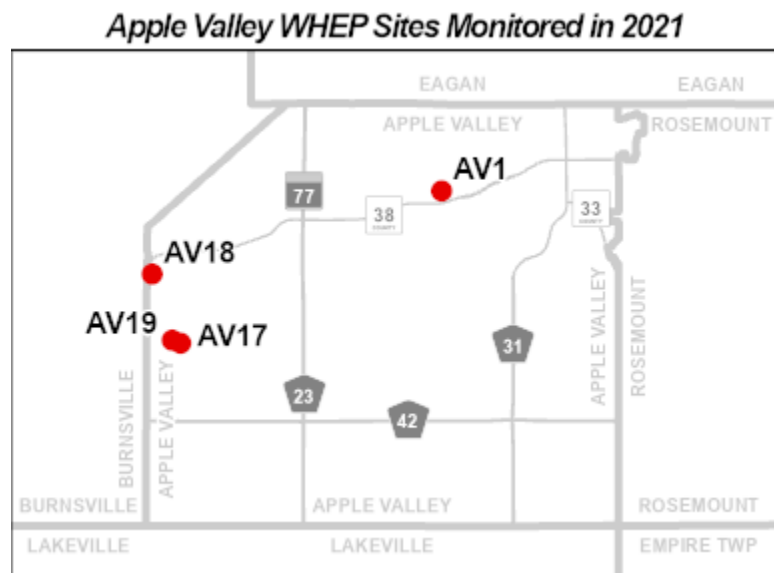


TOM AND CINDY TAINTOR

This is Tom Taintor's second year as team leader of the Apple Valley WHEP team.  Tom and Cindy agree, "Tom was lured into WHEP a few years ago as our team photographer, and now is the official team leader. We enjoyed being able to visit 5 ponds with a great crew this summer. There were some challenges with the low water levels, but at one pond it created a muddy shoreline which was covered with tracks from several different types of animals: birds, deer, a turtle? We might not have known our pond was so busy except for the tracks in the mud. We saw ducks and geese, as usual, and new this year was a green heron seen at the same pond on consecutive visits. One sharp-eyed volunteer spotted a Barred owl roosting in a tree near one of the ponds. It's fun to see these larger animals living by "our ponds", as well as the little things we find in our nets and traps. It was a banner year for tadpoles in the bottletraps.

"We appreciate the support of the City of Apple Valley, via Samantha Berger and Jessica Schaum. They are always encouraging, they provide storage for the gear in the off season, and they brought snacks for lab day. And we appreciate all of our volunteers that make WHEP possible.

SAMANTHA BERGER

Samantha Berger is entering her third year coordinating the WHEP program. In 2021, she visited the lab to see all the different critters that the volunteers collected and really enjoyed learning from them and their overall enthusiasm. She commented, "The City utilizes the WHEP program to help track how wetlands are being impacted, specifically when the wetland may be near road construction projects. By evaluating the wetland before and after projects, we get an idea of how our projects may impact nearby wetlands. This information will be useful as the City continues to reconstruct roadways and install new stormwater management practices to treat stormwater runoff, which may have previously discharged into areas, such as wetlands, untreated. The City looks forward to learning more about these wetlands and how they change and react over time and whether the wetland health will increase as new stormwater and restoration projects are installed."

## Apple Valley General Wetland Health

Figure 4.1 presents an overall view of wetland health for all of the 2021 monitoring sites in Apple Valley based on the IBI scores for invertebrates and vegetation presented as a percent. Figure 4.1 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate and vegetation scores that differ by ten percent or less are considered consistent. Based on the IBI scores, a wetland health rating is assigned as excellent, moderate, or poor. The Apple Valley wetlands exhibited poor to moderate wetland health based on invertebrate and vegetation data. The invertebrates and vegetation scores for AV-17 were inconsistent, differing by 16 percent.

**Figure 4.1 Apple Valley site scores (percent) for the 2021 sampling season**
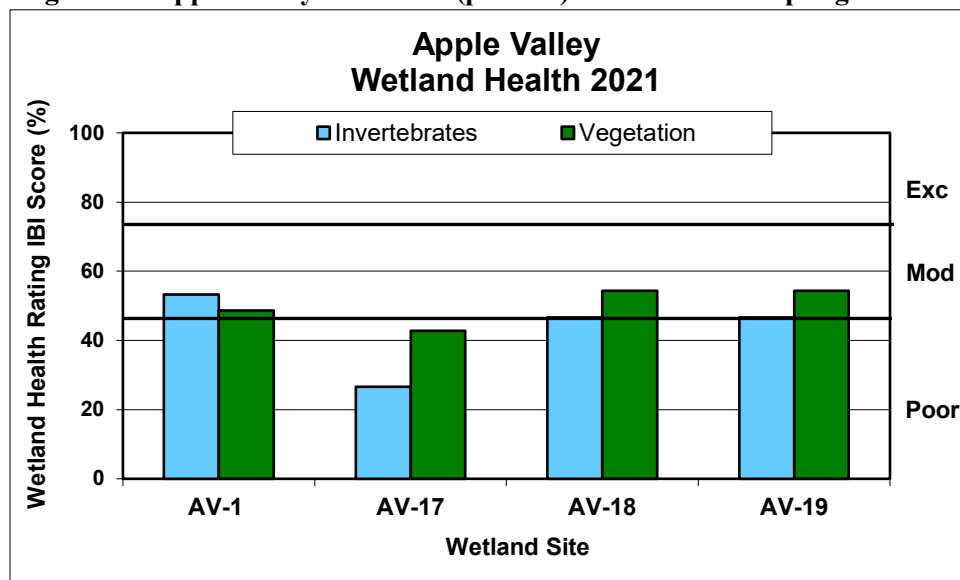
## 4.1.1 Hidden Valley (AV-1)

Hidden Valley (AV-1), also known as EVR-P53, is a 2.0- acre, type 4 wetland within the Vermillion River Watershed. It drains locally to a wetland known as EVR-53, and then through a series of wetlands and lakes. The wetland watershed is 21 acres with 15 acres of direct drainage, and is 35 percent impervious. It has two inlets along the southern border, one equalizer pipe along the eastern border, and one outlet along the western border. This wetland is part of the City's stormwater management plan, and is designated as a Manage 2 wetland with a goal to continue monitoring over time. Wetlands assigned to this category are characterized by high or exceptional restoration potential but are not located in public or open space.





JIM PLATT SETTING BOTTLE TRAPS

The wetland is located within a privately-owned residential development and is surrounded by homes and dense lines of deciduous trees such as oak, box elder, and ash. A steep slope extends down to the wetland. Dense stands of cattails, reed canary grass, and willows line much of the wetland edge. Historic aerial photos taken from the Dakota County website show an increase in open water/ponding depth. An adjacent County trail (North Creek Greenway) was constructed in 2016. Infiltration BMPs were included during the trail construction and native seed was used to establish any areas that were disturbed adjacent to the wetland.

## Wetland Health

**Site Observations:** The wetland slope is steep from the road to the wetland, but gentle at the water's edge. The wetland substrate is mucky with a solid bottom. There is a large vegetative buffer between the homes and the wetland. Drought conditions resulted in very low water levels and exposed wetland bottoms in 2021. Cattails (*Typha* sp.), reed canary grass (*Phalaris arundinacea*), and other emergent forbs near the shoreline were excluded from the vegetation releve in order to reach open water. Duckweed (*Lemna* sp. and *Spirodela* sp.), water-meal (*Wolfia* sp.) covered the surface of the water. Dense populations of pondweed (*Potamogeton*



MAYA AND NOAH RICARD

*sp.*) and coontail (*Ceratophyllum* sp.) dominated the water column. Smartweed (*Polygonum* sp.) and arrowhead (*Sagittaria* sp.) were also present. Species of leeches, dragonflies, damselflies, caddisflies, snails, trueflies, crustaceans, and beetles and bugs were collected.

**Table 4.1.1 Hidden Valley (AV-1) Wetland Health based on Index of Biotic Integrity (IBI)**

| 2021 Data (AV-1) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (16) | Moderate (17) |
| **Cross-check Rating (IBI score)** | Moderate (16) | Moderate (19) |
| **Trend 1998-2021** | Variable | Variable |

**Figure 4.1.1 Invertebrate and vegetation trends for Hidden Valley (AV-1)**
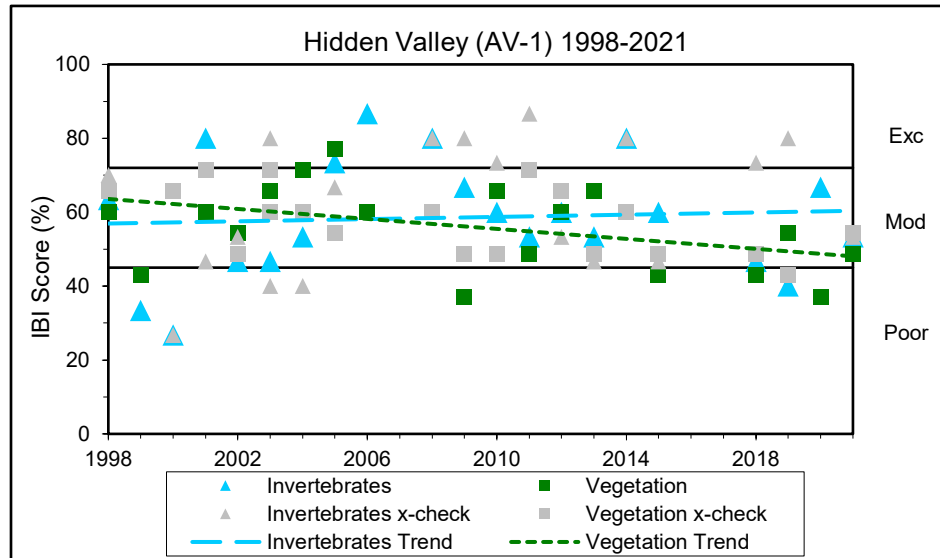


**Site Summary:** Hidden Valley has been surveyed 21 times since 1998. The invertebrate and vegetation health scores were consistent in 2021, and indicated moderate wetland health. Both the invertebrate and vegetation scores have been variable over the years fluctuating between excellent and poor. The extreme fluctuations may be due to factors such as changes in water level and plot placement. In 2021, drought conditions resulted in very low water levels exposing much of the wetland bottom. AV-1 was cross-checked by another team in 2021. Though wetland scores between the teams were very consistent, the plot placement during vegetation survey resulted in very different vegetation species representation, with the City team identifying more submergent and floating species and the cross-check team including more emergent grasses and forbs. Overall, the invertebrates trend appears to be stable, if not improving slightly, while the vegetation trend appears to be declining.

## 4.1.2 Alimagnet Lift Station Chain, AL-P9.1 (AV-17)

Alimagnet Lift Station Chain (AV-17), also known as AL-P9.1, is a 0.25-acre, type 3 wetland within the Vermillion River Watershed. The wetland watershed includes approximately 7 acres of direct drainage. The watershed has 20 percent impervious surface. There is one inlet near the southeast corner of the wetland and no formal outlets. This wetland is part of the City's stormwater management plan, and is designated as a Manage 2 wetland with a goal to review wetland status, determine vegetative health and look for erosion.

The surrounding area is residential and includes impacts and disturbances typical to residential areas. A large wooded area buffers the wetland.



### Wetland Health

**Site Observations:** The wetland is near a park path surrounded by trees and shrubs. The wetland slope is gentle and the substrate is very mucky. There are many dead fallen trees in the water. The surface of the water is covered with duckweed (*Lemna* sp.). Pondweed (*Potamogeton* sp.) was the only submergent vegetation observed. Spike-rush (*Eleocharis* sp.), bulrush (*Scirpus* sp.), cut grass (*Leersia* sp.), arrowhead (*Sagittaria* sp.), Joe-pye weed (*Eupatorium* sp.) were represented in the releve. Species of leeches, snails, and fingernail clams, and beetles and bugs were collected.



RACHEL RICARD

**Table 4.1.2 Alimagnet Lift Station Chain (AV-17) Wetland Health based on IBI**

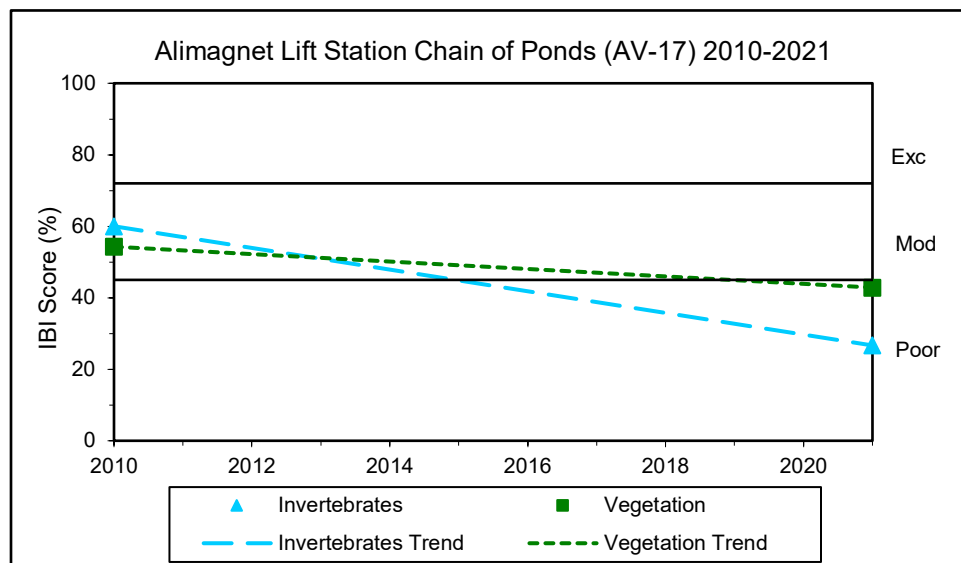| 2021 Data (AV-17) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (8) | Poor (15) |
| **Trend 2010-2021** | Not enough data | Not enough data |

**Figure 4.1.2 Invertebrate and vegetation trends for Alimagnet Lift Station Chain (AV-17)**



**Site summary:** This is the second time that this wetland has been monitored since 2010. The invertebrate and vegetation scores were inconsistent, though both scored health ratings of poor. More data is necessary to determine a reliable health trend.

## 4.1.3 Sunset Park Pond (AV-18)

Sunset Park Pond (AV-18), also known as AL-P8, is a 1.0-acre, type 4 wetland within the Vermillion River Watershed. The wetland watershed includes approximately 252 acres, of which 43 acres drains directly. The watershed has 30 percent impervious surface. There are four inlets along the northeast side of the wetland. There are also two outlets; one large pipe at the west corner of the wetland and one draintile pipe in the southwestern area of the wetland, as part of the City's new iron-enhanced sand filters (IESF) project. This wetland is part of the City's stormwater management plan, and is designated as a Manage 2 wetland with a goal to monitor wetland health following a development project.



The area surrounding the wetland is residential and parkland. In 2019, a new iron-enhanced sand filter was installed. The project was identified in a subwatershed assessment for Alimagnet Lake. The goal is to reduce the pollutants, such as phosphorous, from entering into Alimagnet Lake. When water levels rise in the wetland, the water seeps through the gabion wall into the sand filter areas. The iron-enhanced sand combines with dissolved phosphorous to remove it from the water column, then discharges via a drain tile into the lake, cleaner than before. The buffer around the pond was impacted by the IESF project, and is establishing nicely.

## Wetland Health

**Site Observations:** The wetland slope is gentle and the substrate very mucky.  The water levels were very low in 2021.  Coontail (*Ceratophyllum* sp.) and waterweed (*Elodea* sp.) dominated the vegetation plot.  Duckweed (*Lemna* sp.) and water-meal (*Wolffia* sp.) covered the surface of the water.  Pondweed (*Potamogeton* sp.), duckweed (*Spirodela* sp.), smartweed (*Polygonum* sp.), spike-rush (*Eleocharis* sp.), cut grass (*Leerisa* sp.), and goldenrod (*Solidago* sp.) were also present.  Algae and mystery snails infested the shoreline.   Species of leeches, damselflies, snails, trueflies, crustaceans, and bugs and beetles were collected.  Tadpoles and fish were also found in bottle traps.



CINDY TAINTOR, NOAH RICARD, AND KAREN LEVISEN WORKING

### Table 4.1.3 Sunset Park Pond (AV-18) Wetland Health based on IBI

| 2021 Data (AV-18) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (14) | Moderate (19) |
| **Trend 2010-2021** | Not enough data | Not enough data |

### Figure 4.1.3 Invertebrate and vegetation trends for Sunset Park Pond (AV-18)
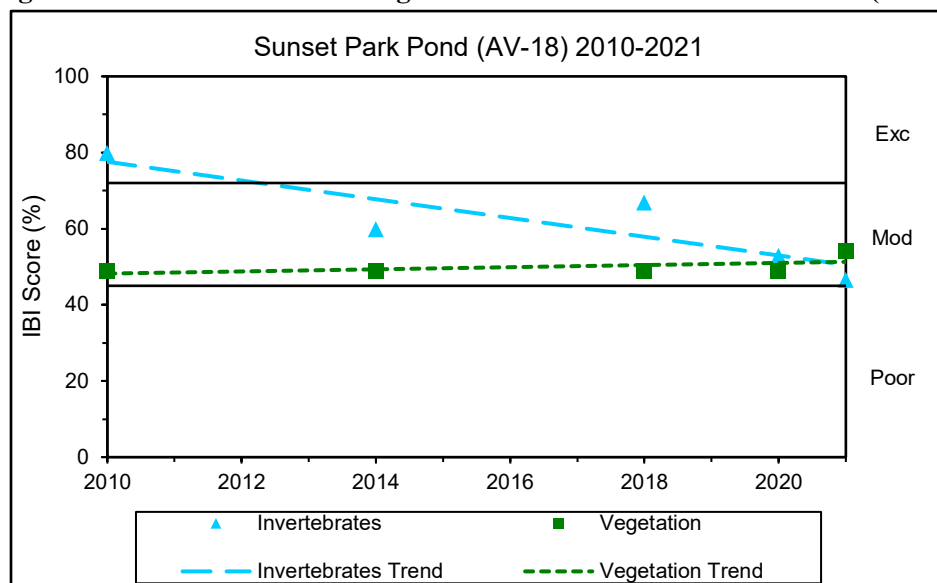


**Site summary:**  This is the fifth time that AV-18 has been monitored since the initial survey in 2010.  The invertebrate and vegetation scores are consistent, even though the invertebrates score indicates poor wetland health and the vegetation score indicates moderate wetland health.  The vegetation health trend is already displaying stable health scores; however more data would help assess a more reliable health trend.  Water

levels were very low in 2021 and could have impaired invertebrate collection. Tadpoles and fish were found in the bottle traps which could have impacted the invertebrate collection, as well.

## 4.1.4 Alimagnet Lift Station Chain, AL-P9.3 (AV-19)

Alimagnet Lift Station Chain (AV-19), also known AL-P9.3, is a 0.25-acre type 3 wetland located within the Vermillion River Watershed. The wetland watershed is 28.5 acres and includes 25 percent impervious surface. There are no inlets. There is one outlet on the west side of the wetland. This wetland is part of the City's stormwater management plan, and is designated as a Manage 2 wetland with a goal to monitor wetland health and determine vegetative health and erosion.

The surrounding area is residential and park, and includes a large wooded buffer. Stormwater flows through an adjacent pond to the southeast before overflowing into wetland.

**Wetland Health**

**Site Observations:** The wetland slope is gentle, and the substrate is mucky. Duckweed (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) cover the surface of the wetland. A dense population of pondweed (*Potamogeton* sp.) made up the submergent vegetation. Arrowhead (*Sagittaria* sp.), bur-reed (*Sparganium* sp.), spike-rush (*Eleocharis* sp.), bulrush (*Scirpus* sp.), and several grasses and emergent forbs were also present. Leeches, damselflies, snails, trueflies, crustaceans, and bugs and beetles were collected.

APPLE VALLEY VOLUNTEERS SORTING INVERTEBRATES

**Table 4.1.4 Alimagnet Lift Station Chain (AV-19) Wetland Health based on IBI**

| 2021 Data (AV-19) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (14) | Moderate (19) |
| **Trend 2010-2021** | Not enough data | Not enough data |

**Figure 4.1.4 Invertebrate and vegetation trends for Alimagnet Lift Station Chain (AV-19)**
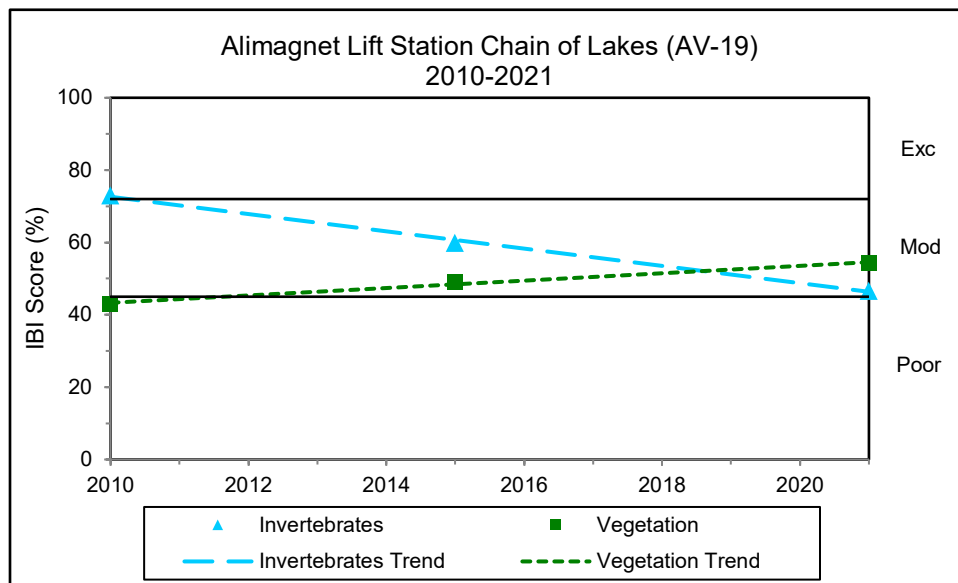


**Site summary:** This is the third time that AV-19 has been monitored through WHEP. The invertebrate and vegetation scores were consistent; however, the invertebrate score indicates poor health while the vegetation score indicates moderate health. Low water levels and the presence of tadpoles, fish, and crayfish in the bottle traps may have impacted the invertebrate score in 2021. More years of monitoring will help determine a more reliable health trend.

## 4.2    Burnsville Wetlands

Four wetlands were monitored within the City of Burnsville in 2021. This is the 24th year the City has participated in WHEP! Seventeen wetlands have been monitored in Apple Valley since the initiation of WHEP in 1997.

**Team Leader:** Caitlin Hughes-Parry

**Team Members:** Don Ackerman, Sarah Buresch, Alec Erickson, Stacy Erickson, Hannah Gershone, Sophie Gronbeck, Chelsea Ibsen, Val Kivett, Sally McNamara, Thomas Ward, Penny Warren, and Elena Yudovina.

This was Caitlin's first year leading the Burnsville team. She expressed, "The amazing Burnsville WHEP Team of volunteers made my second year as a WHEP volunteer and first year as a team leader an incredible season! We were a group of mostly novices, but due to the dedication of a handful of core volunteers and the
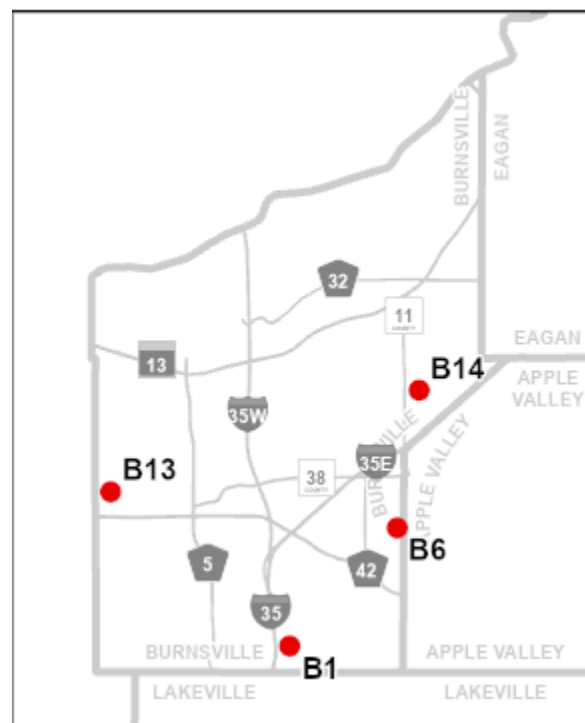
much-appreciated guidance of our single returning team member and the WHEP program staff, we learned a LOT and were able to collect and evaluate data for five wetlands. As we spent sweltering summer evenings and weekends tromping purposefully through some of Dakota County's stickiest ponds, the smiles of my team members never faded. We were rewarded as we identified the diversity of life, both flora and fauna, that we discovered in our local wetlands and we all finished the 2021 season with a much deeper and more nuanced appreciation of the life all around us."


CAITLIN HUGHES-PARRY

Linnea Wier is the city contact for the Burnsville WHEP team. Her role is to select wetlands for evaluation, provide team support as needed and help recruit volunteers.

"Thank you to the volunteers who, over the last 24 years have dedicated their time to the Burnsville WHEP team. The data they collect provide us a snapshot of wetland quality over time, which is important considering the environmental value of wetlands and the risks they face in the urban environment. Being able to track wetland health helps us identify positive and negative trends and better plan for the future.


LINNEA WIER

Through the volunteer component of the program, WHEP has helped connect many Burnsville residents over the years with a chance to discover new parks, learn new skills, and get outdoors! I appreciate the commitment of 2021's volunteer team, and the leadership of team leader Caitlin. Thank you for all of your hard work this year."

## Burnsville General Wetland Health

Figure 4.2 presents an overall view of wetland health for all of the 2021 monitoring sites in Burnsville based on the IBI scores for invertebrates and vegetation presented as a percent. Figure 4.2 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate and vegetation scores that differ by ten percent or less are considered consistent. Based on the IBI scores, a wetland health rating is assigned as excellent, moderate, or poor. The Burnsville wetlands exhibited poor to moderate wetland health based on invertebrate and vegetation data. The invertebrates and vegetation scores for B-1 were inconsistent, differing by 39 percent.


VAL KIVETT AND CHELSEA IBSEN

**Figure 4.2 Burnsville site scores (percent) for the 2021 sampling season**
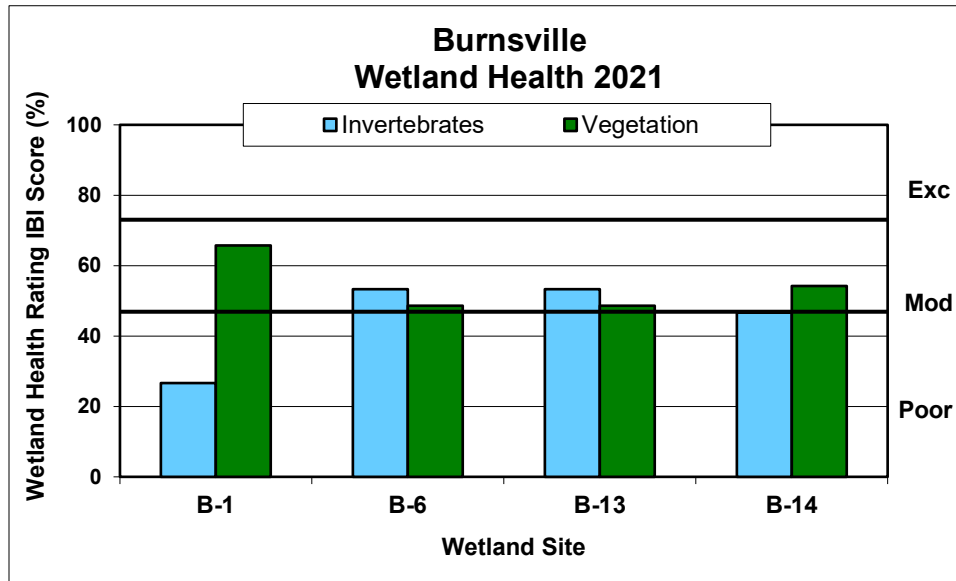


## 4.2.1 Crystal Lake West (B-1)

Crystal Lake West (B-1) is a one-acre, type 3 wetland located in the CL6 Drainage Area of Crystal Lake subwatershed within the Black Dog Watershed Management Organization. The CL6 Drainage area is 444.5 acres, and is five percent impervious. There are no inlets or outlets in the wetland. The wetland is part of the wetland management plan and is designated as an Improvement Class. The goal for the wetland is to improve its quality. The wetland has invasive species problems, including reed canary grass. There is some recreational vehicle disturbances (mostly in the winter). The wetland is very close to a bay on the west side of Crystal Lake, and is within a large, naturally vegetated, City-owned park called Crystal Lake West Park.

**Wetland Health**

**Site Observations:** The wetland slope is gentle. The wetland substrate is very mucky. Water levels were very low due to drought conditions in 2021. The wetland is adjacent to busy Crystal Lake. A walking trail leads to the wetland. The wetland is difficult to access due to dense shrub growth around the shoreline. The open water is covered in white water lily (*Nymphaea* sp.). Coontail (*Ceratophyllum* sp.) and bladderwort (*Utricularia* sp.) dominated the vegetation plot. Duckweed (*Lemna* sp. and *Spirodela* sp.), arrowhead (*Sagittaria* sp.), spike-rush (*Eleocharis* sp.), and cut grass (*Leersia* sp.) were also present. Some emergent forbs near the shoreline were excluded from the vegetation releve in order to reach open water. Species of leeches, dragonflies, snails, trueflies, crustaceans, and beetles and bugs were collected.

**Table 4.2.1 Crystal Lake West (B-1) Wetland Health based on Index of Biotic Integrity (IBI)**

| 2021 Data (B-1) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (8) | Moderate (23) |
| **Cross-check Rating (IBI score)** | Moderate (20) | Moderate (23) |
| **Trend 1999-2021** | Variable | Declining |

**Figure 4.2.1 Invertebrate and vegetation trends for Crystal Lake West (B-1)**
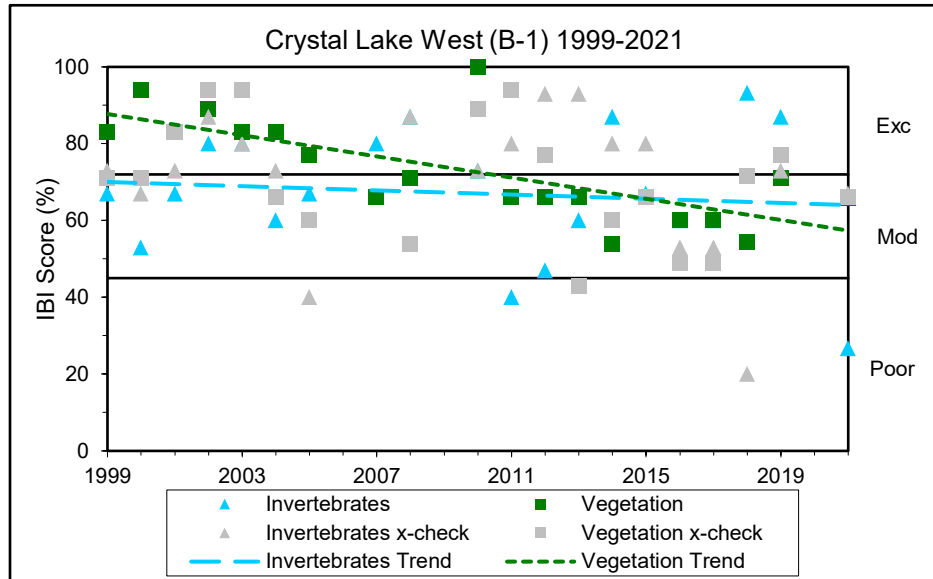


**Site Summary:** Crystal Lake West has been surveyed 20 times since 1999. The invertebrate and vegetation health scores were very inconsistent in 2021. The invertebrate score indicates poor wetland health while the vegetation score indicates moderate wetland health. Invertebrate scores have been variable over the years fluctuating between excellent and poor. The extreme fluctuations may be due to factors such as changes in water level and plot placement. In 2021, drought conditions resulted in very low water levels which likely impaired wetland scores. Fish in the bottle trap may have impacted invertebrate collection, as well. B-1 was cross-checked by another team in 2021. Vegetation scores between the teams were very consistent, and the vegetation community recognized by each team were nearly identical. The invertebrate scores between the teams were very inconsistent, differing by 40 percent. The cross-check team commented that they redid the dipnet sample hoping to collect a larger diversity and invertebrate community representation than their initial effort. This could explain the difference in invertebrate scores.



ELENA YUDOVINA AND STACY ERICKSON

## 4.2.2 Alimagnet Dog Park (B-6)

Alimagnet Dog Park (B-6) is a 3.5 acre, type 3 wetland located within the Lake Alimagnet subwatershed within the Vermillion River Watershed. The wetland watershed is 25 acres with 10 percent impervious surface. There is one inlet on the west side of the wetland and no outlets. The wetland is part of the City's stormwater management plan. It is designated as an Improvement Class wetland and is managed for aesthetics, recreation, education, and science.
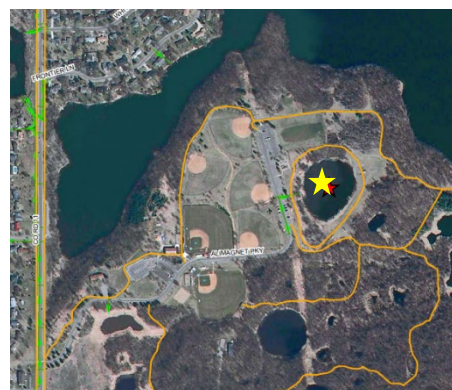


B-6 is located within the Alimagnet Dog Park. A gravel trail completely surrounds the wetland. In the fall of 2015, erosion work was done in part of the "beach area", including dirtwork and placement of small boulders. The dog park is part of the City's Alimagnet Park. Stormwater runoff, invasive species (including reed canary grass), sediment/shoreline disturbance by dogs, and dog feces are disturbances of concern for the area.



ALEC ERICKSON, SALLY MCNAMARA, AND SARAH BURESCH

### Wetland Health

**Site Observations:** The wetland slope is gentle. The wetland substrate is slightly mucky. Some logs have fallen into the wetland. Water-meal (*Wolffia* sp.) is the only floating plant observed. Coontail (*Ceratophyllum* sp.), waterweed (*Elodea* sp.), pondweed (*Pondweed* sp.), and water-nymph (*Najas* sp.) domintated the vegetation plot. Cattail (*Typha* sp.), bur-reed (*Sparganium* sp.), smartweed (*Polygonum* sp.), and spike-rush (*Eleocharis* sp.) were also present. Species of leeches, dragonflies, caddisflies, trueflies, snails, crustaceans, and bugs and beetles were collected.

**Table 4.2.2 Alimagnet Dog Park (B-6) Wetland Health based on IBI**

| 2021 Data (B-6) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (16) | Moderate (17) |
| **Trend 2000-2021** | Stable | Stable |

**Figure 4.2.2 Invertebrate and vegetation trends for Alimagnet Dog Park (B-6)**
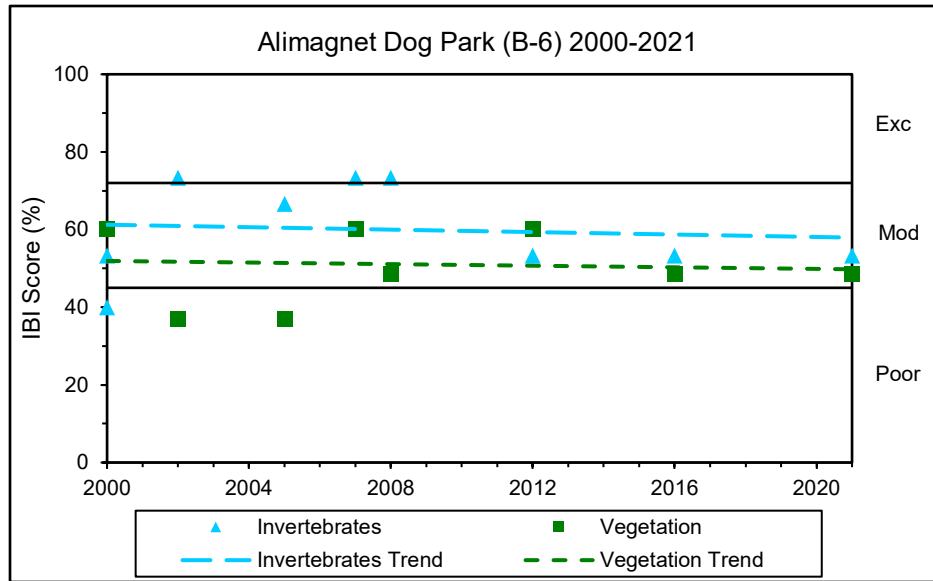


**Site summary:** This is the eighth time that this wetland has been monitored since 2000. The invertebrate and vegetation scores were consistent, both scoring moderate wetland health in 2021. The health trends appear stable, especially the last three surveys; however, prior scores indicated different wetland health and invertebrate and vegetation scores were routinely inconsistent. More data will help to determine a more reliable health trend.

## 4.2.3 Sunset Pond (B-13)

Sunset Pond (B-13) is a 48-acre, type 3 wetland located within the SP1 drainage area of Sunset Pond subwatershed (2,488 acres) of the Black Dog Watershed. The SP1 drainage area is 402 acres with approximately 40 percent impervious surface. The wetland has eight inlets around the wetland. There is one outlet on the north end. The wetland is part of the City's stormwater management plan and wetland management plan. It is designated as an Improvement Class wetland and is being managed to maintain the wetland without degrading its existing functions, values, and wildlife habitat. Its functions include flood and stormwater attenuation and water quality protection. Its values include flood protection, sediment control, nutrient removal, open space, and aesthetics.



The entire shoreline is owned by the City and maintained as a natural park. A heavily-used trail circles the wetland. Invasive species (narrow-leaf cattail and reed canary grass), stormwater inflow, sediment pollution, and encroachment of natural areas by neighboring properties into the conservation easement are all disturbance concerns. Herbicide treatment and controlled burns are used as measures of weed control and management in the surrounding upland buffer. A conservation easement exists on the neighboring private properties that restrict structures and requires natural vegetation buffers.

## Wetland Health

**Site Observations:** The wetland slope is gentle. The wetland substrate is very mucky. A 10 to 30 meter wide ring of cattails surrounds the perimeter of the wetland. A walking trail runs parallel to the shoreline, and a gazebo is adjacent to the sampling area. Duckweed (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) cover the entire surface of open water. Coontail (*Ceratophyllum* sp.), water-milfoil (*Myriophyllum* sp.), pondweed (*Potamogeton* sp.), and water-nymph (*Najas* sp.) dominated the vegetation plot. Cattail (*Typha* sp.) was included in the vegetation plot. Reed canary grass (*Phalaris arundinacea*) and purple loosestrife (*Lythrum salicaria*) were also present. Dragonflies, caddisflies, snails, crustaceans, and beetles and bugs were collected.

**Table 4.2.3 Sunset Pond (B-13) Wetland Health based on IBI**

| 2021 Data (B-13) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (16) | Moderate (17) |
| **Trend 2009-2021** | Not enough data | Not enough data |

**Figure 4.2.3 Invertebrate and vegetation trends for Sunset Pond (B-13)**
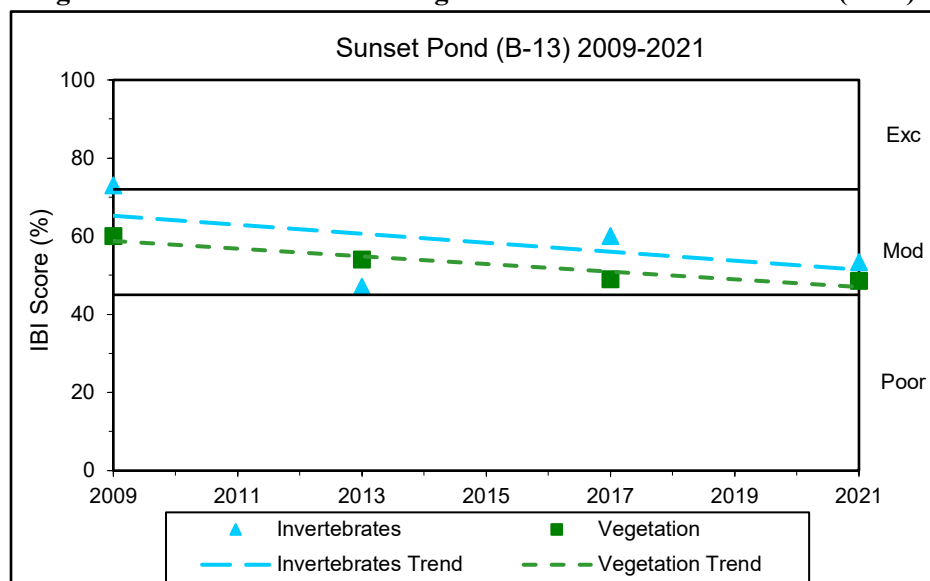


**Site summary:** This is the fourth time that Sunset Pond has been monitored since the initial survey in 2009. The invertebrate and vegetation scores are consistent, and indicate moderate wetland health. The health trends appear fairly stable, though the initial surveys in 2009 indicated better wetland health. More data would help determine a more reliable health trend. This wetland was cross-checked by Fortin Consulting in 2021, and confirmed the vegetation observed by the team.

## 4.2.4 Terrace Oaks (B-14)

Terrace Oaks (B-14) is a 1.73-acre wetland located within the Terrace Oaks Park drainage area of the Minnesota River Watershed. The Terrace Oaks Park watershed is 15 acres with no impervious surface. There are no inlets or outlets in the wetland. The wetland is part of the City's wetland management plan. It is designated as an Improvement Class wetland and is being managed to maintain and protect the current vegetation quality and health.



Legend
WHEP_Sites

The wetland is in a depression surrounded in an area with rolling hills. Multiple large sections of Terrace Oaks Park adjacent to the wetland drainage area have been restored to oak savanna habitat, and additional restoration in the northeast section of the park will begin in 2022. During the restoration, large-scale invasive species and weedy tree removal occurred. Cover crop and grass seed mix was used to quickly establish ground cover following vegetation removal. The potential for erosion and herbicide exposure during restoration is of concern.



TOM WARD AND STACY ERICKSON

### Wetland Health

**Site Observations:** The wetland slope is gentle. The wetland substrate is very mucky. The wetland is very small. Due to drought conditions, part of the wetland is dry. Yellow water lilies (*Nuphar* sp.) and duckweed (*Lemna* sp. and *Spirodela* sp.) cover much of the open water. A dense population of coontail (*Ceratophyllum* sp.) dominates the water column. Smartweed (*Polygonum* sp.), cut grass (*Leersia* sp.), and slender Riccia (*Riccia fluitans*) were also present. Many leeches, as well as trueflies, crustaceans, and beetles and bugs were collected.

**Table 4.2.4 Terrace Oaks (B-14) Wetland Health based on IBI**

| 2021 Data (B-14) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (14) | Moderate (19) |
| **Trend 2021** | Not enough data | Not enough data |

**Site summary:** This is the first time that this particular Terrace Oaks wetland has been monitored. There are others within Terrace Oaks that have been monitored over the years. The invertebrate and vegetation scores are consistent, though the invertebrates score indicates poor wetland health while the vegetation score indicates moderate wetland health. Low water levels in 2021 may have impacted the scores, and more years of data would help determine a reliable health trend.

## 4.3 Dakota County Parks Wetlands

Two teams monitored eight wetlands for Dakota County Parks in 2021. This is the seventh year that Dakota County has monitored wetlands with WHEP. Ten wetlands have been monitored for the Parks Department since 2015.

**Team Leaders:**
Marianne McKeon Buck (Team 1) and
Jennifer Kanz and Jamie Everhart (Team 2)

**Team 1 Members:**
Scott Boyd, Matilda Boyd, PJ Ebensteiner, Pat Graham, Rachel Hansen, Ben Hoover, Doris Ikier, and David Leard

**Team 2 Members:** Amanda Drigans, Philip Hernick, Bill Larson, Mike Lynn, Doug Mitchell, and Danielle Ungurian



Dakota County WHEP Sites Monitored in 2021
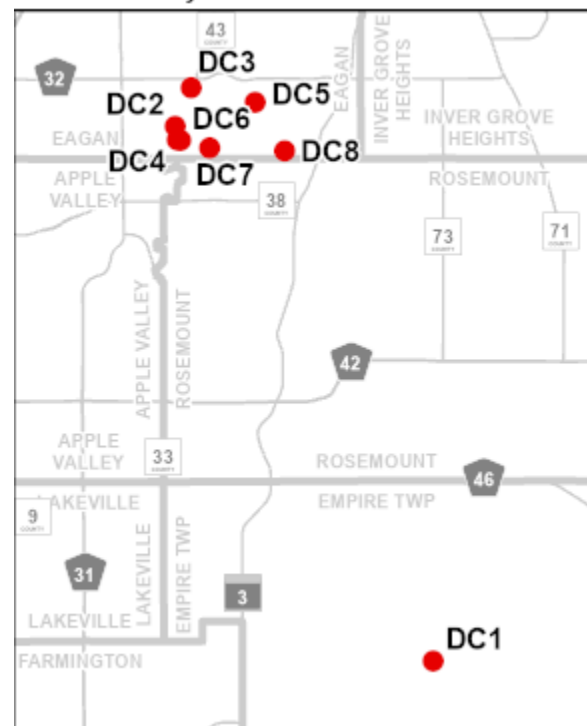
Marianne McKeon Buck led the Dakota County Parks Team #1 in 2021. Marianne has been involved in WHEP since 2007 and was Eagan's team leader for many years.

Jennifer Kanz and Jamie Everhart co-led the Dakota County Parks Team #2 in 2021. It was the first year as team leaders for both of them.

Chris Klatt is Dakota County Parks' WHEP contact. He stated, "Dakota County Parks' mission is to enrich lives by providing high quality recreation and education opportunities in harmony with natural resource preservation and stewardship. We're currently maintaining over 1,000 restored acres and actively restoring an additional 900 acres within the County Park system. To ensure we're having a positive impact on wetland plant communities, thereby enhancing their habitat value, we're committed to ongoing monitoring of our restorations. We are grateful for the opportunity WHEP provides to engage volunteers to study the health of the wetlands in Lebanon Hills Regional Park, both to inform the success of past restoration efforts, and inform future needs to improve water and habitat quality in our Parks."



CHRIS KLATT

## Vegetation Protocol Modified

In 2019, the Dakota County Parks Department modified the WHEP vegetation protocol in order to better understand species richness, abundance, and distribution. The traditional WHEP protocol is to identify vegetation to the genus level. The modified protocol requires that the vegetation be identified to the species.

Team members set up a 100 m² vegetation plot and surveyed the vegetation within the plot, as outlined in the traditional WHEP protocol.  The key difference is specifying the plants to the species level of identification.  The shared genus of species could then be easily transferred into the WHEP metrics to calculate a vegetation health score.

In addition, to surveying the vegetation plot, Dakota County WHEP volunteers may have conducted an optional 20-minute meander survey.  This was to be completed after the 100 m² plot sampling. Meander surveys involve walking "randomly" through a wetland site and noting each species found. Meander surveys are useful in difficult terrain or irregularly-shaped sites, and are particularly useful for locating small habitat features that fall outside of the plot site. The meander should be conducted on the edges of the plot sample area. The meander should be completed only if there is enough time after the normal plot sampling has been completed.

These modifications came after a trial of the Rapid Floristic Quality Assessment (rFQA) was completed in the Dakota County Parks wetlands in 2018.  Modifications of the WHEP protocol in 2019 were made in hopes that moderately trained and/or experienced naturalists are able to complete the surveys.


## Dakota County Parks General Wetland Health

Figure 4.3 presents an overall view of wetland health for all of the 2021 monitoring sites in Dakota County Parks based on the IBI scores for invertebrates and vegetation presented as a percent.  Figure 4.3 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled.  Invertebrate and vegetation scores that differ by ten percent or less are considered consistent.  Based on the IBI scores, a wetland health rating is assigned as excellent, moderate or poor.  The wetland health scores ranged from poor to excellent.  Wetlands DC-7 and DC-8 exhibited excellent wetland health based on vegetation data. This is the second consecutive year of high vegetation scores for DC-7.  Invertebrate and vegetation scores were inconsistent for DC-5, DC-7, and DC-8.  Dry wetland beds caused by drought conditions interrupted invertebrate collection for DC-3.

**Figure 4.3 Dakota County Parks site scores (percent form) for the 2021 sampling season**
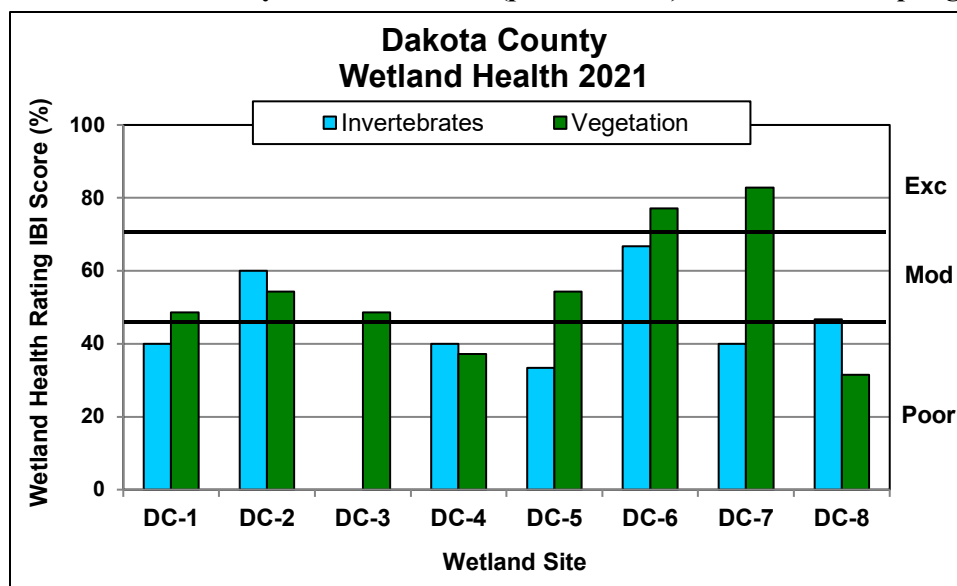
## 4.3.1 Empire Lake (DC-1)

Empire Lake (DC-1) is a 25.1-acre, type 5 wetland located in the Vermillion River Watershed. The subwatershed is 6 square miles and 5 percent impervious. Empire Lake is the man-made result of impounding an unnamed tributary stream to the Vermillion River. This dike was built in 1965. Some improvements have been made to the dike since the original construction, and it was reconstructed with an outlet in 2019.

Empire Lake is located within Whitetail Woods Regional Park. The watershed includes agricultural fields, natural areas, and gravel mining. The adjacent woodland is highly disturbed by invasive buckthorn which was removed during restoration activities between 2015-2019. Upstream wetlands to the north and west of this site were not completely restored during previous restoration efforts, such that continuous monitoring will be needed to observe differences during and after those activities. A Natural Resources System Management Plan was completed for the Park in 2020. A water quality survey was completed on this lake in 2009 measuring healthy phosphorus levels. Secchi disk measurements also indicate higher water clarity.



### Wetland Health

**Site Observations:** The wetland slope is steep, and water levels drop-off quickly to waist-deep. The wetland substrate is solid. Algae covers much of the water surface. Small representations of several plants are present including duckweeds (*Lemna* sp. and *Spirodela* sp.), water-meal (*Wolffia* sp.), coontail (*Ceratophyllum* sp.), water plantain (*Alisma* sp.), cattail (*Typha* sp.), sedges (*Carex* sp.), bulrush (*Scirpus* sp.), reed canary grass (*Phalaris arundinacea*), dogwood (*Cornus* sp.), willows (*Salix* sp.), and a few upland plants. Leeches, damselflies, caddisflies, snails, trueflies, crustaceans, and truebugs were collected.

**Table 4.3.1 Empire Lake (DC-1) Health based on Index of Biotic Integrity**

| 2021 Data (DC-1) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (12) | Moderate (17) |
| **Trend 2015-2021** | Not enough data | Not enough data |

**Figure 4.3.1 Invertebrate and vegetation trends for Empire Lake (DC-1)**
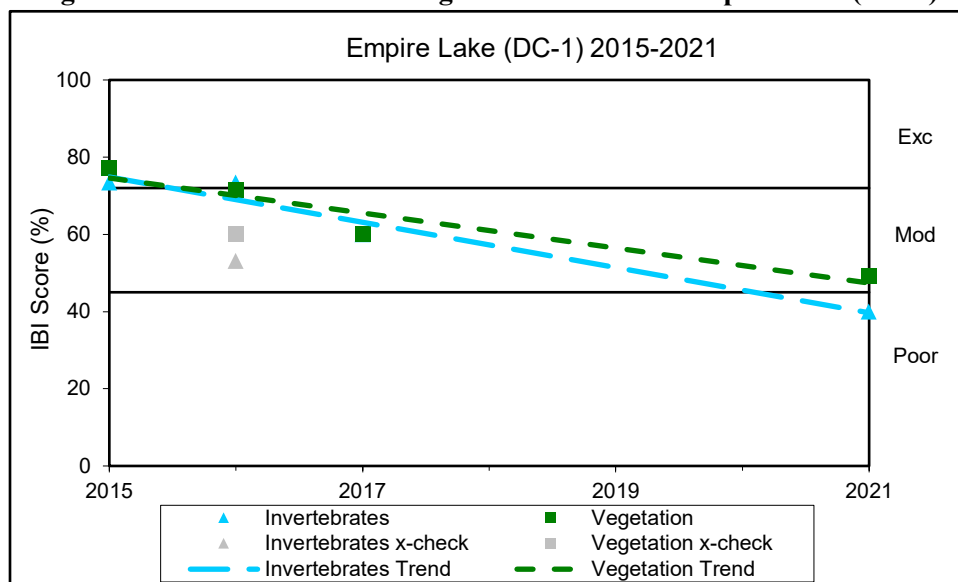


**Site summary:** This is the fourth time that Empire Lake has been monitored by WHEP. The invertebrate and vegetation scores were consistent; however, the invertebrate score indicates poor wetland health while the vegetation score indicates moderate wetland health. Both scores are poorer than data collected in past surveys. More years of data will help determine a more reliable wetland health trend.

## 4.3.2  Buck Pond (DC-2)

Buck Pond (DC-2) is a 1.6-acre, type 3 wetland located in the Lower Minnesota River watershed. The pond's watershed is approximately 12 acres with zero impervious surface. It is a small, round pond/wetland located near the center of Lebanon Hills Regional Park. It's an isolate terrene basin, within 700-1200 feet of larger lakes to the east and south. It is classified as "shallow marsh" and a "freshwater emergent wetland". The wetland and surrounding area were recently restored. Previously, the wetland was surrounded by smooth brome-dominated uplands and overgrown savanna/woodland, which have now been restored to native prairie vegetation. Prior to restoration, the wetland was dominated by reed canary grass (*Phalaris arundinacea*), and deposition from the surrounding land had caused build-up in the wetland covering the native seed bank. Historically, the area was likely grazed and/or farmed.
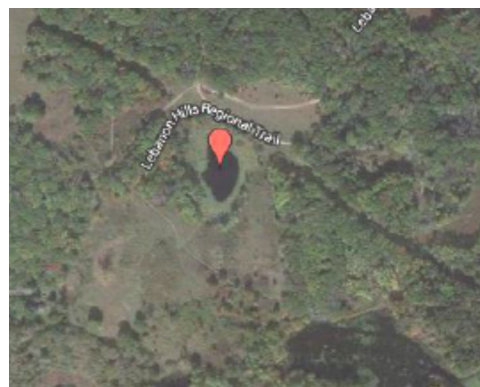
Dakota County began implementing major ecological restoration of this wetland in December 2015 and continued through June 2018. In December of 2015, the wetland was scraped 1.5 feet deep from the wetland edge in hopes that it would remove the rhizomatous root system of reed canary grass, and expose and reestablish the native wetland seed bank. Prior to the scrape, there was very low plant diversity within the basin and very little native emergent vegetation; however, following the scrape in June 2016, the native

seedbank began emerging during the growing season. Data collected before, during, and after the restoration document the effects of the project on the wetland.

## Wetland Health

**Site Observations:** The wetland slope is gentle. The wetland substrate is mucky, but firm. The water level is low, and the vegetation plot was placed to best represent the wetland vegetation species. Algae covered much of the open water. Arrowhead (*Sagittaria* sp.) dominated the wetland. Coontail (*Ceratophyllum* sp.), pondweed (*Potamogeton* sp.), and water-shield (*Brasenia schreberi*) were observed in open water. Willows (*Salix* sp.), sedges (*Carex* sp.), spike-rush (*Eleocharis* sp.), cut grass (*Leersia* sp.), reed canary grass (*Phalaris arundinacea*), beggar-ticks (*Bidens* sp.), and smartweed (*Polygonum* sp.) were also present. Leeches, dragonflies, snails, fingernail clams, crustaceans, and bugs and beetles were collected.

**Table 4.3.2 Buck Pond (DC-2) Health based on Index of Biotic Integrity**

| 2021 Data (DC-2) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (18) | Moderate (19) |
| **Trend 2015-2021** | Stable | Stable |

**Figure 4.3.2 Invertebrate and vegetation trends for Buck Pond (DC-2)**
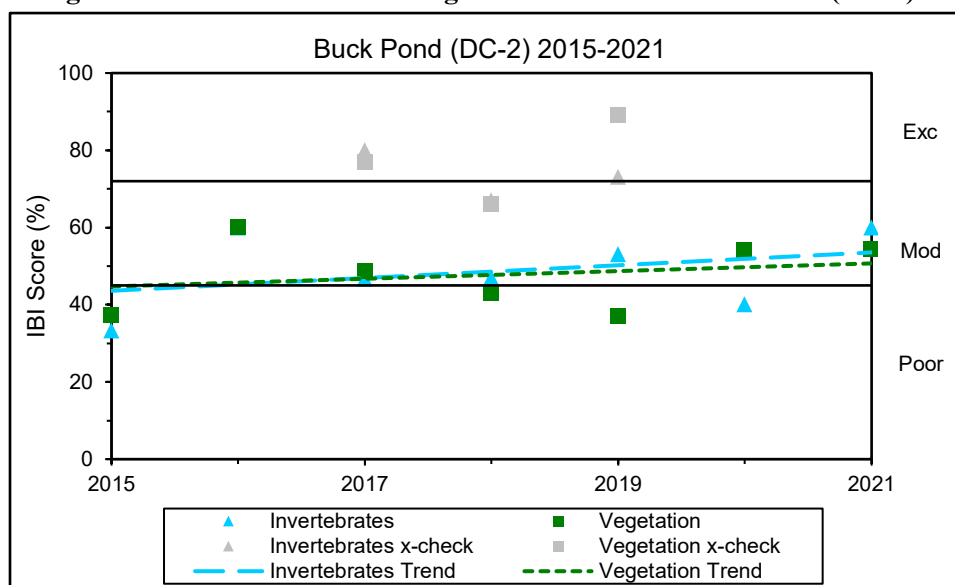


**Site summary:** This is the seventh consecutive year that Buck Pond has been monitored by WHEP. The invertebrate and vegetation scores were consistent, both scoring moderate wetland health. Both health trends appear stable. This wetland was cross-checked by Fortin Consulting in 2021, and confirmed the vegetation observed by the team.

### 4.3.3 Tamarack Swamp (DC-3)

Tamarack Swamp (DC-3) is a 7.7-acre, type 3 wetland located in the Lower Minnesota River watershed. The wetland's watershed is approximately 40 acres with zero impervious surface. No large-scale alterations to the historic hydrology of the swamp have been detected, and efforts have been made throughout the history of the park to protect this unique feature from human impact. It receives runoff from surrounding land, and there is a small outlet that runs into Holland Lake that was restored in 2020 and only flows during high water periods.
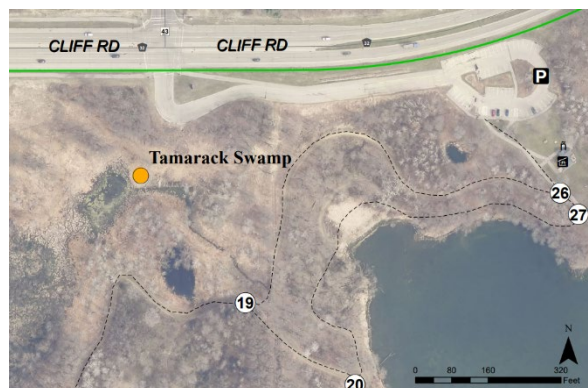
This remnant tamarack swamp, located in Lebanon Hills Regional Park, is the southernmost example of tamarack swamp remaining in Minnesota. Surrounding the swamp are oak woodland and oak forest plant communities. The natural area is comprised of a matrix of glacial moraine hills, plains and kettle hole lakes and ponds. The dominant land cover types pre-settlement would have been primarily oak forest, shallow lakes and wetlands, and prairie/savanna.

Dakota County Natural Resource Department's primary goal is to create conditions in this wetland that favor tamarack regeneration through the removal of shrubs and invasive herbaceous species within the swamp, and to buffer the swamp by removing invasive species from the adjacent plant communities with the swamp watershed. Monitoring will give the County baseline data and on-going data collection in the following years. The monitoring will help determine the effectiveness of the restoration efforts of Tamarack Swamp. Minnesota County Biological Survey surveyed the park, including the Tamarack Swamp, and found the swamp to be of moderate biological diversity significance. This wetland has also been monitored by MPCA for the past decade.

**Wetland Health**

**Site Observations:** The wetland slope is gentle, and the wetland substrate is mucky/muddy. Water levels were low, and open water was difficult to find; though the substrate was saturated. No floating or submergent vegetation were observed. Willows (*Salix* sp.), sedges (*Carex* sp.), spike-rush (*Eleocharis* sp.), bulrush (*Scirpus* sp.), manna-grass (*Glyceria* sp.), and cut grass (*Leersia* sp.) were represented in the vegetation plot. The team commented that the vegetation diversity differed across the large wetland. Invertebrate samples were not taken because there was no accessible open water.

**Table 4.3.3 Tamarack Swamp (DC-3) Health based on Index of Biotic Integrity**

| 2021 Data (DC-3) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | NA | Moderate (17) |
| **Trend 2016-2021** | Stable | Stable |

**Figure 4.3.3 Invertebrate and vegetation trends for Tamarack Swamp (DC-3)**
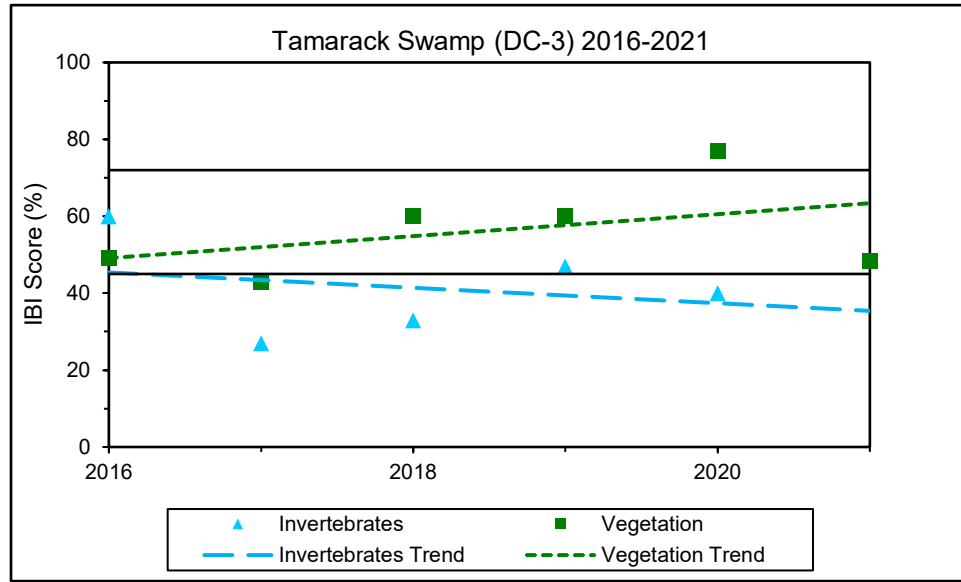


**Site summary:** This is the sixth consecutive year that Tamarack Swamp has been monitored by WHEP. The vegetation score indicates moderate wetland health. An invertebrate sample was not taken due to low water in 2021. Despite the excellent vegetation score in 2020, the vegetation trend appears stable so far. The invertebrate scores also appear stable. More years of data will help determine a more reliable wetland health trend.

## 4.3.4 Jensen Lake East (DC-4)

Jensen Lake (DC-4) is a 50-acre, type 5 wetland located in the Lower Minnesota River watershed. The pond's watershed is approximately 330 acres with seven percent impervious surface. The watershed in this area of the south metro has been greatly changed/altered with the building of roads, commercial industry, and residential areas. The general water flow is still in the same direction; however, altered with the addition of Pilot Knob Road culverts and overall landscape altering. There is a culvert running under Pilot Knob Road that connects two small ponds on either side of the road. The pond adjacent to Jensen Lake was created to collect sediment, salt, and fertilizers from entering into Jensen Lake. When this pond reaches a certain depth, the excess water flows into Jensen without these contaminants. Jensen Lake drains into Sedge Pond in the northeast corner. There are raingardens that filter runoff from the Jensen Lake Trailhead parking lots, as well as, native plantings downslope of these infiltration basins.

Historically, the land north of Jensen Lake was agriculture and pastured land. The woodland surrounding Jensen Lake was most likely grazed with cattle. The Natural Resource Department is in the process of restoring 175 acres in the surrounding adjacent acres in Lebanon Hills. The north woodland slope of Jensen

Lake was identified by the MN DNR as a high quality Mesic Oak Forest.  The north and east woodlands are more degraded with invasive species like buckthorn and honeysuckle which will be removed and treated with the completion of the restoration of this area.  Baseline data is wanted to monitor the change over time in this natural area as the land is restored and maintained to the proper native plant community.  Along with vegetation surveys, turtle visual and trapping surveys, and insect surveys, Dakota County would like the invertebrate and plant survey information that WHEP supplies to monitor this restoration area.  The goal is to minimize invasive species and maximize the cover of native species.

**Wetland Health**

**Site Observations:**  The wetland slope is gentle. The wetland substrate is very mucky, and made traversing the wetland difficult. Coontail (*Ceratophyllum* sp.) was prevalent in the water column. Some duckweed (*Lemna* sp.) floated on the water surface. Cattail (*Typha* sp.), flatsedge (*Cyperus* sp.), cut grass (*Leersia* sp.), reed canary-grass (*Phalaris* arundinacea), smartweed (*Polygonum* sp.), and beggar-ticks (*Bidens* sp.) were also present. Leeches, dragonflies, snails, fingernail clams, trueflies, crustaceans, and bugs and beetles were collected.

**Table 4.3.4 Jensen Lake East (DC-4) Health based on Index of Biotic Integrity**

| 2021 Data (DC-4) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (12) | Poor (13) |
| **Trend 2016-2021** | Stable | Stable |

**Figure 4.3.4 Invertebrate and vegetation trends for Jensen Lake East (DC-4)**
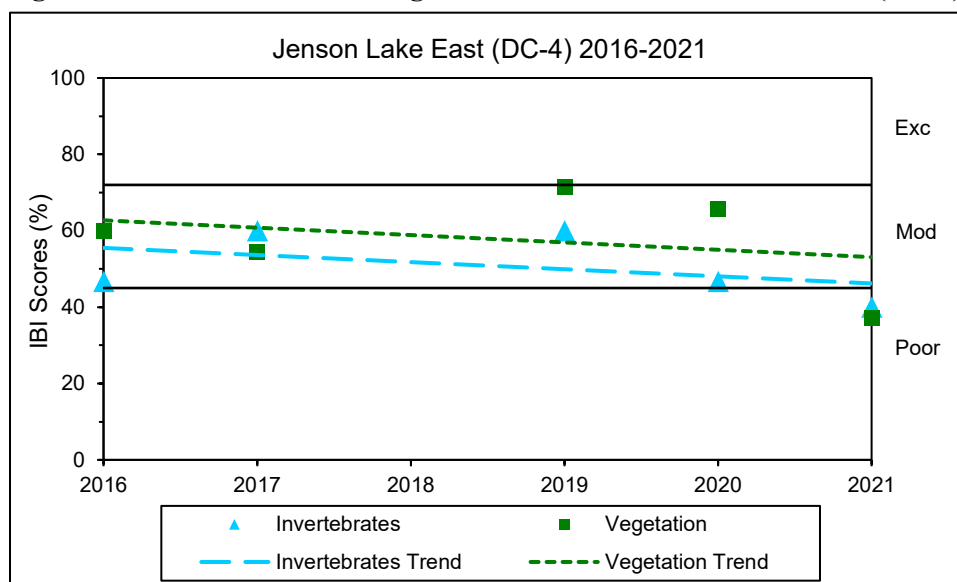


**Site summary:** This is the fifth year that Jensen Lake East has been monitored by WHEP since 2016.  The invertebrate and vegetation scores were consistent with each other; both indicating poor wetland health.  The invertebrate data appears fairly stable, while the vegetation data has been variable.  More years of monitoring are needed to determine reliable wetland health trends.

## 4.3.5 Wood Pond (DC-5)

Wood Pond (DC-5) is a 0.8-acre, type 3 wetland located in the Lower Minnesota River watershed. The pond's watershed is approximately 22 acres with no impervious surface. Water flows into Wood Pond from Cattail Pond and seeps from the surrounding area. The water eventually drains into Schultz Lake. Wood Pond is near a restored and maintained prairie. Historically, the area was used for grazing.



**Wetland Health**

**Site Observations:** The wetland slope is gentle. The wetland substrate is solid. It is a wooded area with a small stream-fed pond. The water levels receded between the invertebrate and vegetation surveys. Waterweed (*Elodea* sp.), coontail (*Ceratophyllum* sp.), duckweed (*Lemna* sp.), white water lily (*Nymphaea* sp.), three-way sedge (*Dulichium arundinaceum*), reed canary grass (*Phalaris arundinacea*), arrowhead (*Sagittarea* sp.), smartweed (*Polygonum* sp.), and several upland forbs and woody plants were present in vegetation releve. Leeches, dragonflies, snails, fingernail clams, crustaceans, trueflies, and bugs and beetles were collected.

**Table 4.3.5 Wood Pond (DC-5) Health based on Index of Biotic Integrity**

| 2021 Data (DC-5) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (10) | Moderate (19) |
| **Trend 2018-2021** | Not enough data | Not enough data |

**Figure 4.3.5 Invertebrate and vegetation trends for Wood Pond (DC-5)**
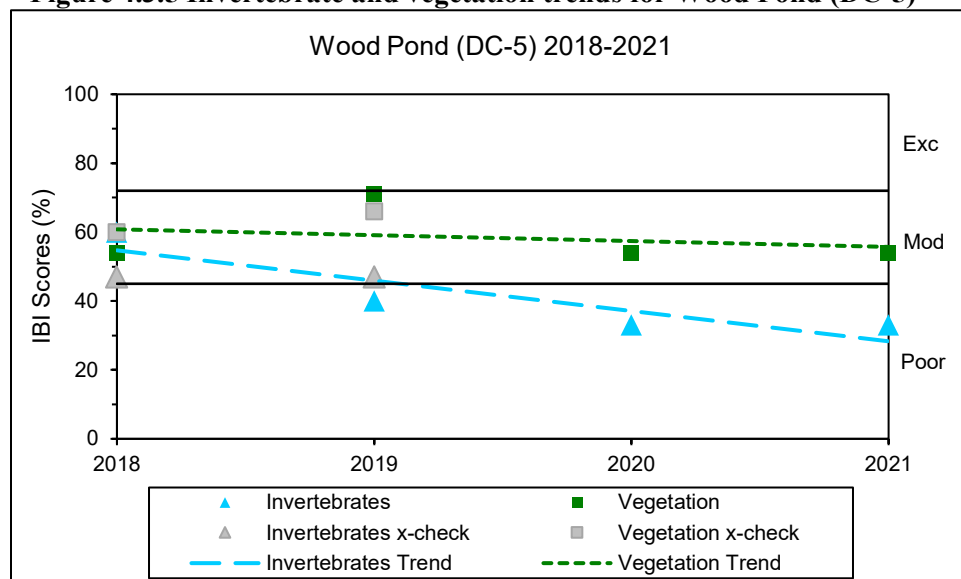
**Site summary:** This is the fourth consecutive year that Wood Pond has been monitored by WHEP. The invertebrate and vegetation scores were inconsistent with each other, differing by 19 percent. The invertebrates health score was poor while the vegetation health score was moderate. The invertebrate and vegetation scores are the same as 2020. Early on, both health trends appear stable. More years of monitoring is needed to determine reliable wetland health trends.

## 4.3.6  BB's Wetland (DC-6)

BB's Wetland (DC-6) is a 1.2-acre, type 5 wetland located in the Lower Minnesota River watershed. There is a natural inlet on the west end of the wetland, as well as a natural overflow/outlet on the west end.



This wetland is within Lebanon Hills Regional Park. There is very little disturbance, with natural oak forest surrounding the wetland. This wetland is significant due to the presence of Blanding's turtles that live in the area throughout most of the year. The County Parks have been tracking a female Blanding's turtle in the vicinity of the wetland. The wetland management goal is to maintain high quality vegetative cover conducive to turtle habitat. The overall strategy is to continue monitoring for the presence of invasive species and determine stability of native plant cover.

**Wetland Health**

**Site Observations:**  The wetland slope is gentle, and the wetland substrate is mucky. A hiking trail runs along the northern portion of the wetland. White water lily (*Nymphaea* sp.) and duckweed (*Lemna* sp.) cover most of the water surface. There was no submergent vegetation within the vegetation releve. Bur-reed (*Sparganium* sp.), sedges (*Carex* sp.), bulrush (*Scirpus* sp.), smartweed (*Polygonum* sp.), sweet flag (*Acorus* sp.), beggar-ticks (*Bidens* sp.), reed canary grass (*Phalaris arundinacea*), and several upland forbs and woody species were present. Leeches, dragonflies, snails, trueflies, crustaceans, and bugs and beetles were collected.

**Table 4.3.6 BB's Wetland (DC-6) Health based on Index of Biotic Integrity**

| 2021 Data (DC-6) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (20) | Excellent (27) |
| **Trend 2018-2021** | Not enough data | Not enough data |

**Figure 4.3.6 Invertebrate and vegetation trends for BB's Wetland (DC-6)**
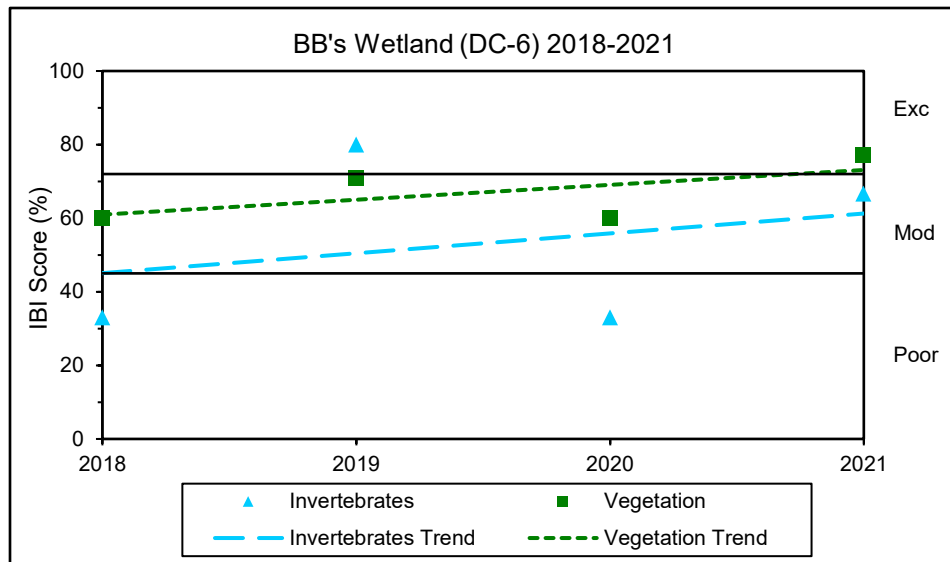


**Site summary:** This is the fourth consecutive year that BB's Wetland has been monitored by WHEP.  The invertebrate and vegetation scores were inconsistent with each other, differing by 10 percent.   The invertebrate score indicates moderate wetland health, and the vegetation score indicates excellent wetland health.  Early on, the vegetation health trend appears stable, while the invertebrates health trend is variable.  More years of monitoring are needed to determine reliable wetland health trends.

## 4.3.7  Lilypad Pond (DC-7)

Lilypad Pond (DC-7), formerly known as E-29, is a 2.35-acre wetland located in the Lower Minnesota River watershed.  It is delineated as a type 3 (shallow marsh) and type 5 (shallow open water) wetland.  Water flows into Lilypad Pond from Dakota Lake on the north side.  A natural outflow/outlet exists on the west end of the wetland.



This wetland is within Lebanon Hills Regional Park.  There is very little disturbance, with natural oak forest surrounding the wetland.  The portion of the wetland defined as shallow marsh includes excellent vegetative diversity.  It is considered high quality with a management goal to protect and maintain health.  The portion of the wetland defined as shallow open water (i.e. shallow lake) is considered moderate quality with a management goal to protect the area from reed canary grass and cattail invasion.

## Wetland Health

**Site Observations:**  The wetland slope is moderate, and the wetland substrate is mucky with a solid base.  Sedges (*Carex* sp.) and reed canary grass (*Phalaris arundinacea*) dominated the vegetation releve.  Small

populations of many other species of vegetation were also represented, including: coontail (*Ceratophyllum* sp.), pondweed (*Potamogeton* sp.), white water lily (*Nymphaea* sp.), duckweeds (*Lemna* sp. and *Spirodela* sp.), burreed (*Sparganium* sp.), cattail (*Typha* sp.), iris (*Iris* sp.), beggars-tick (*Bidens* sp.), and several other upland forbs and woody species.  Leeches, dragonflies, damselflies, snails, fingernail clams, crustaceans, and bugs and beetles were collected.

**Table 4.3.7 Lilypad Pond (DC-7) Health based on Index of Biotic Integrity**

| 2021 Data (DC-7) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (12) | Excellent (29) |
| **Trend 2010-2021** | Not enough data | Not enough data |

**Figure 4.3.7 Invertebrate and vegetation trends for Lilypad Pond (DC-7)**
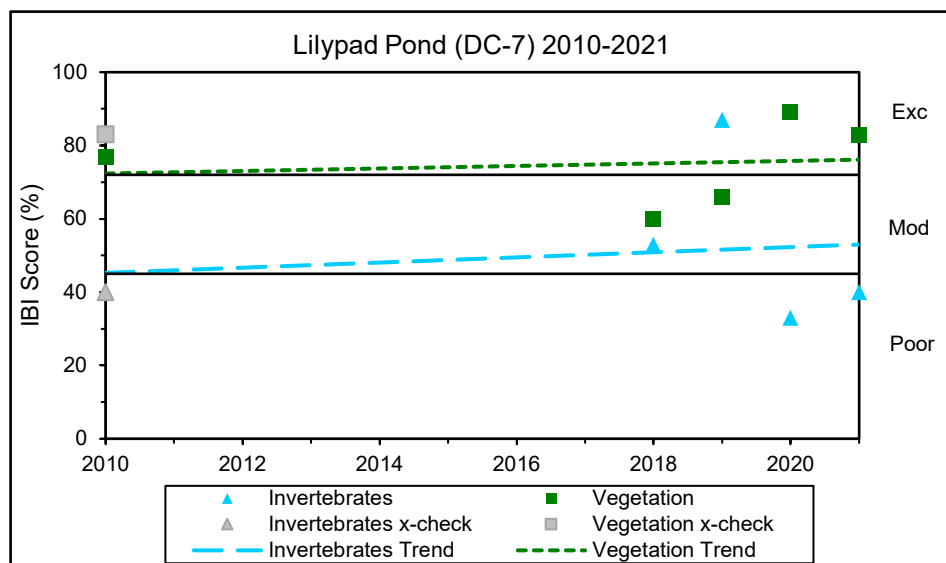


**Site summary:** This is the fifth year that Lilypad Pond has been monitored by WHEP.  It was first monitored in 2010 by the Eagan Team.  The invertebrate and vegetation scores were very inconsistent with each other, differing by 43 percent.  Invertebrate data indicates a poor wetland health.  The vegetation data indicates excellent wetland health.  Data scores for 2020 and 2021 are similar and consistent with each other.  The water was deep enough to require a 5 x 20 square meter plot.  Vegetation diversity is high; however, little submergent and floating vegetation presence may impact invertebrate habitat potential.  Bullheads have been observed in this waterbody which may also impact invertebrate populations.  More years of monitoring are needed to determine reliable wetland health trends.

## 4.3.8 Star Pond East (DC-8)
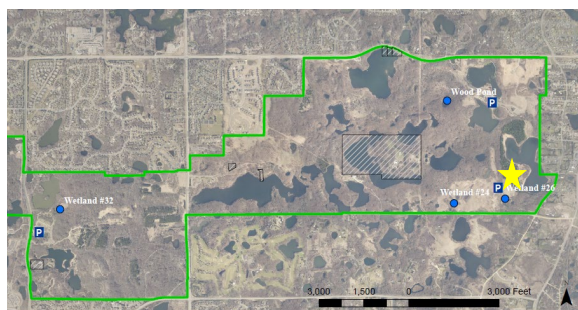


Star East (DC-8) is a 0.7-acre, type 3, wetland located in the Lower Minnesota River watershed. Water flows into the wetland from Star Pond West on its south side. There is a natural outlet on the east side of the wetland.

This wetland is within Lebanon Hills Regional Park. It is surrounded by quaking aspen and a restored prairie. It is considered a high quality wetland. The wetland management goal is to maintain a high-quality wetland, and to continue to monitor for changes in vegetation quality and presence/cover of invasive species.

**Wetland Health**

**Site Observations:** The wetland slope is gentle, and the wetland substrate is mucky. There is very little vegetation present. The water level is low in June during invertebrate collection, and is even drier in July during vegetation surveys. A ring of cattails (*Typha* sp.) and reed canary grass (*Phalaris arundinacea*) surround the wetland. Only traces of coontail (*Ceratophyllum* sp.) and duckweed (*Lemna* sp.) were represented in vegetation releve. Small populations of emergent grasses, forbs, and woody plants were also present, including sedges (*Carex* sp.), bulrush (*Scirpus* sp.), smartweed (*Polygonum* sp.), and bugleweed (*Lycopus* sp.) Leeches, fingernail clams, true flies, crustaceans, and bugs and beetles were collected.

**Table 4.3.8 Star Pond East (DC-8) Health based on Index of Biotic Integrity**

| 2021 Data (DC-8) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (14) | Poor (11) |
| **Cross-check Rating (IBI score)** | Poor (12) | Moderate (17) |
| **Trend 2010-2021** | Not enough data | Not enough data |

**Figure 4.3.8 Invertebrate and vegetation trends for Star Pond East (DC-8)**
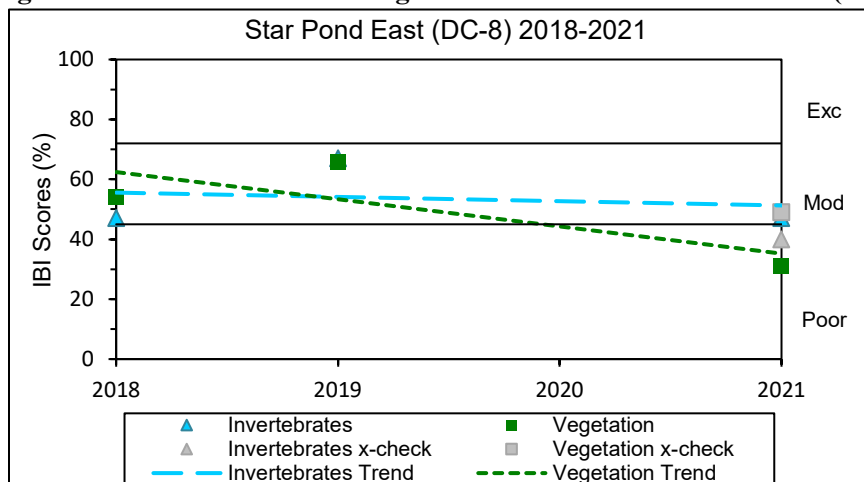
**Site summary:** This is the third year that Star Pond East has been monitored by WHEP since 2018. The invertebrate and vegetation scores were inconsistent with each other, differing by 16 percent; however, both indicate poor wetland health. Water levels were low in 2021 and may have affected both invertebrate and vegetation presence. This wetland was cross-checked by another team in 2021. The invertebrate data was similar between teams. The vegetation representation between teams was slightly different perhaps due to differences in plot placement. The cross-check team found a few more emergent plants. More years of monitoring are needed to determine reliable wetland health trends.

## 4.4 Eagan Wetlands

Three wetlands were monitored within the City of Eagan in 2021. The City has 24 years of data! Forty-five wetlands have been monitored in Eagan since the initiation of WHEP in 1997.

**Team Leader**: Hannah Figura

**Team Members:** Ruthie Corcoran, Nicole Deziel, Mary Eller, Chris Figura, Craig Harnagel, Joe Krech, Diane Lazarus, Randi Martin, Jennifer McGovern, Lily McGovern, Godan Nambudiripad, Godhun Nambudiripad, Ashwin Nambudiripad, Deepa Nambudiripad, Mark Niznik, Angie Renner, Donald Sclafer, Cathy Schuldt, Lindsay Siu, Greg Svendsen, and Trent Young



Eagan WHEP Sites Monitored in 2021
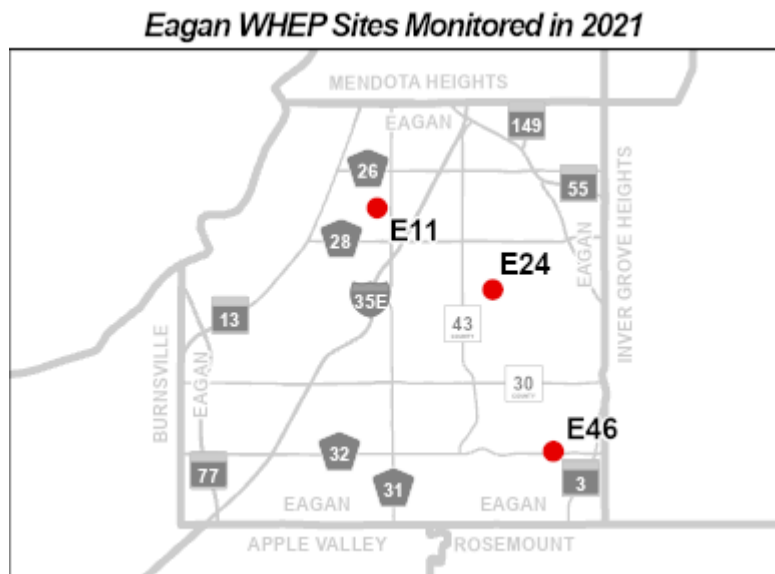
This is Hannah Figura's second year leading the Eagan WHEP team. She is currently a sophomore at University of Wisconsin – Stevens Point where she is majoring in Water Resource Management. She commented, "This season was much different than the last. More volunteers and less water! The addition of saline tests and return of the invertebrate labs gave us a greater variety of experiences, while the dry summer at times kept us scrambling to find a wetland with any standing water at all. I continue to be so impressed by our returning volunteers and the knowledge they bring while so openly accepting and encouraging the newcomers on the team. Hope to see everyone again next year!"

HANNAH FIGURA

Eric Macbeth has managed Eagan's water resources programs since 1999, to protect and improve surface waters and prevent stormwater pollution. Eagan has four full-time Water Resources staff including Specialist Jessie Koehle who joined the City in 2007 with a fisheries and aquatic science background. Together they select WHEP sampling sites, communicate with the WHEP team leader, and provide local support as needed. Eric and Jessie appreciate WHEP volunteers' time and effort spent understanding Eagan's wetlands in more detail, and recognize the importance of having informed and caring residents who want to help protect local wetlands. Eagan WHEP data provide qualitative and interesting information and can help identify areas of special concern and historical perspective on wetland health. Eagan's hundreds of natural waterbodies provide most residents daily opportunities to appreciate surface waters around them; WHEP helps strengthen our community's appreciation of these resources and enhance public support of our programs.

JESSIE KOEHLE AND ERIC MACBETH

## Eagan General Wetland Health

Figure 4.4 presents an overall view of wetland health for all of the 2021 monitoring sites in Eagan based on the IBI scores for invertebrates and vegetation presented as a percent. Figure 4.4 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate and vegetation scores that differ by ten percent or less are considered consistent. Based on the IBI scores, a wetland health rating is assigned as excellent, moderate or poor. Three wetlands were monitored in the City of Eagan in 2021. The Eagan wetlands exhibited poor to moderate wetland health based on invertebrate and vegetation data. The invertebrates and vegetation scores for all three wetlands were inconsistent in 2021, differing by 26, 27, and 16 percent.

**Figure 4.4 Eagan site scores (percent form) for the 2021 sampling season**
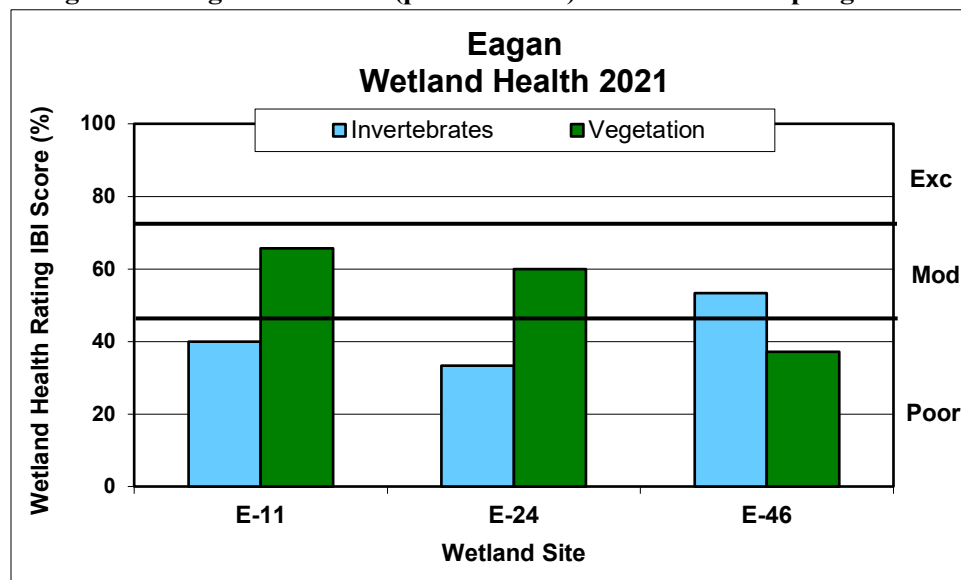
## 4.4.1 Central Park Pond (E-11)

Central Park Pond (E-11), also known as Pond CP-4, near Eagan Community Center, is a 3.0-acre, type 4 wetland within the Eagan-Inver Grove Heights Watershed. The immediate local drainage is 56.5 acres with 30 percent impervious surface. There are five inlets: two on the northern shoreline, one in the southeast corner of the wetland, and two on the southern shoreline. There is one outlet on the western shoreline. The wetland is part of the City's stormwater management plan, and is Unclassified by the City. The management goal is to protect the wetland from stormwater impacts, manage the wetland in compliance with all regulations and according to community values and priorities, and enhance the function, value, and ecological diversity, as opportunities arise.

The surrounding area is mostly wooded with walking paths nearby. The wetland currently receives stormwater runoff from surrounding wooded area as well as Unisys parking lot to the north of the Community Center property, as well as some runoff from Central Parkway to the south. A smaller area in the southeast corner has a berm across to help slow down stormwater flow from Central Parkway.

**Wetland Health**

**Site Observations:** The wetland slope is gentle, and the substrate is very mucky. Coontail (*Ceratophyllum* sp.), pondweed (*Potamogeton* sp.), and water-milfoil (*Myriophyllum* sp.) dominated the vegetation releve. Arrowhead (*Sagittaria* sp.), water plantain (*Alisma* sp.), duckweeds (*Lemna* sp. and *Spirodela* sp.), water-meal (*Wolffia* sp.), smartweed (*Polygonum* sp.) and several other emergent species were present. Reed canary grass (*Phalaris arundinacea*) and purple loosestrife (*Lythrum salicaria*) exist in this wetland. Species of leeches, dragonflies, damselflies, snails, fingernail clams, true flies, crustaceans, and beetles and bugs were collected.

MARK NIZNIK, CRAIG HARNAGEL, ASHWIN NAMBUDIRIPAD, GODAN NAMBUDIRIPAD, LINDSAY SIU, AND MARY ELLER

**Table 4.4.1 Central Park Pond (E-11) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (E-11) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (12) | Moderate (23) |
| **Trend 2000-2021** | Not enough data | Not enough data |

**Figure 4.4.1 Invertebrate and vegetation trends for Central Park Pond (E-11)**



Central Park Pond (E-11) 2000-2021
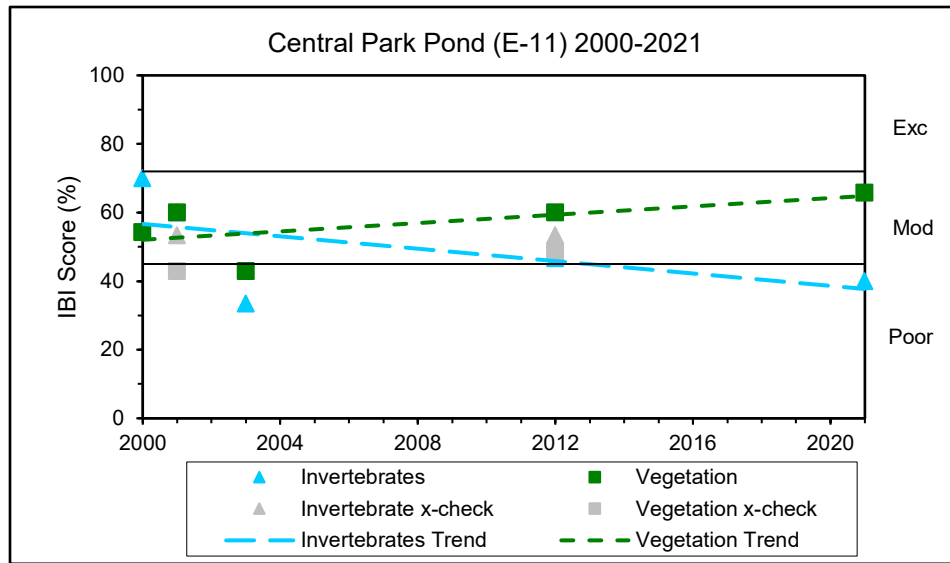
**Site summary:** This is the fifth time that E-11 has been surveyed since 2000. The invertebrates and vegetation scores were inconsistent, differing by 26 percent. The invertebrates score indicates poor wetland health while the vegetation score indicates moderate wetland health. More years of data will help determine a more reliable wetland health trend.

## 4.4.2 Pond JP-42 (E-24)

Pond JP-42 (E-24), is a 2.8-acre, type 4 wetland within the Eagan-Inver Grove Heights Watershed. The wetland's watershed includes 7 acres of direct drainage and also receives water from 11 acres of nearby streets via a stormwater basin to the northwest. The watershed includes approximately 25 percent impervious surface. There is one inlet on the western shoreline and one outlet in the far southeast corner of the wetland. It is part of the City's stormwater management plan, and is designated as a Class W1 - Protect wetland. The management goal is to protect the wetland from disturbances such as aquatic invasive species or stormwater.



The surrounding area is residential. The southern shoreline is wooded with many oak trees. A vegetated buffer exists between the wetland and a walking path that winds around the west and north shoreline. There are a few trees on the northern shore, but they are sparse; there are no trees on western side of wetland. A stormwater pond northwest of the wetland receives immediate street runoff from the north, but overflow enters JP-42. In 2012 and 2013, an existing golf course in the area was developed as part of the Stonehaven townhome development, which increased the amount of impervious surface in the wetland watershed.

## Wetland Health

**Site Observations:** The wetland slope is gentle. The wetland substrate is very mucky. Duckweed (*Lemna* sp. and *Spirodela* sp.), water-meal (*Wolffia* sp.), and yellow water-lily (*Nuphar* sp.) cover the open water. Coontail (*Ceratophyllum* sp.) and pondweed (*Potamogeton* sp.) dominate the water column. Smartweed (*Polygonum* sp.), bugle weed (*Lycopus* sp.), blue vervain (*verbena hastata*), flatsedge (*Cyperus* sp.), spike-rush (*Eleocharis* sp.), bulrush (*Scirpus* sp.), cut grass (*Leersia* sp.), and reed canary grass (*Phalaris arundinacea*) were also present. Leeches, caddisflies, snails, trueflies, and bugs and beetles were collected.



RUTHIE CORCORAN, MARK NIZNIK, AND HANNAH FIGURA

**Table 4.4.2 JP-42 (E-24) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (E-24) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (10) | Moderate (21) |
| **Cross-check Rating (IBI score)** | Moderate (16) | Moderate (23) |
| **Trend 2007-2021** | Not enough data | Not enough data |

**Figure 4.4.2 Invertebrate and vegetation trends for JP-42 (E-24)**
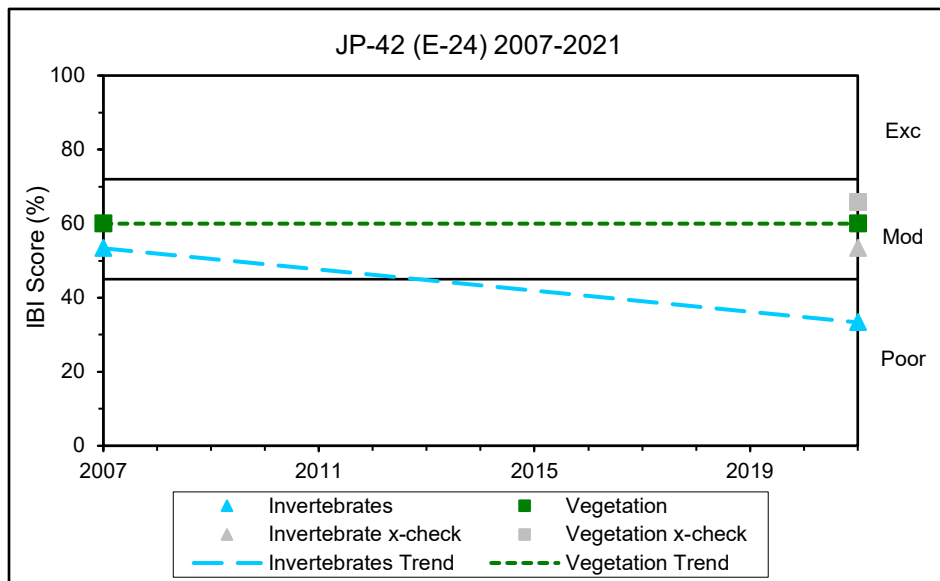


**Site summary:** This is the second time that E-24 has been surveyed for WHEP since 2007. The invertebrate and vegetation scores were inconsistent, differing by 27 percent. The invertebrates score indicates poor wetland health while the vegetation score indicates moderate wetland health. There were many tadpoles and adult frogs trapped in the bottle traps which may have impacted the invertebrate score. The vegetation score is the same as the original in 2007. This wetland was also cross-checked by another team. The invertebrates scores between the two teams were inconsistent, differing by 20 percent. The

cross-check team collected fingernail clams, a larger diversity of snails, and a healthier proportion of Corixids which enhanced the invertebrate health score. More years of data will help determine more reliable health trends.

## 4.4.3 Pond LP-65 (E-46)

Pond LP-65 (E-46) is a 1.7-acre, type 4 wetland, within the Eagan-Inver Grove Heights Watershed. The wetland's watershed includes 9.2 acres of direct drainage and has approximately 30 percent impervious surface. There are two inlets: one about halfway along the northwest shoreline and one in the southeast corner of the wetland. There is one outlet in the far southeast corner of the wetland. It is part of the City's stormwater management plan, and is designated as a Class W3 – Priority A wetland. The management goal is to protect the wetland from stormwater impacts, maintain compliance with all regulations and according to community values and priorities, and enhance the function, value, and ecological diversity, as opportunities arise.



The wetland is located in the northwest corner of Cliff Road and Dodd Road in Eagan. The surrounding area is residential. Lebanon Hills Regional Park is southwest of the wetland. An upcoming expansion of segments of Cliff Road may impact this wetland.

**Wetland Health**



**Site Observations:** The wetland slope is steep. The wetland substrate is mucky. A dense stand of cattail (*Typha* sp.) crowds the wetland. Duckweed (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) cover the open water. Pondweed (*Potamogeton* sp.), smartweed (*Polygonum* sp.), jewelweed (*Impatiens* sp.), and clearweed (*Pilea* sp.) are also present, along with some woody species. Leeches, snails, trueflies, crustaceans, and beetles were collected.

DIANNE LAZARUS AND HANNAH FIGURA

**Table 4.4.3 Pond LP-65 (E-46) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (E-46) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (16) | Poor (13) |
| **Trend 2021** | Not enough data | Not enough data |

**Site summary:** This is the first time that LP-65 has been surveyed for WHEP. The invertebrates and vegetation scores were inconsistent, differing by 16 percent. The invertebrate score indicates moderate wetland health while the vegetation score indicates poor wetland health. Though crowded with vegetation, the diversity of plant and invertebrate species was low in 2021. More years of data will help determine more reliable health trends.

## 4.5 Farmington Wetlands

Three wetlands were monitored within the City of Farmington in 2021. The City has 23 years of data! Nine wetlands have been monitored in Farmington since the initiation of WHEP in 1997.

**Team Leader**: Rick Schuldt

**Team Members**: Rollie Greeno, Josiah Hakala, Chan Harries, Denise Hennigar, Katie Koch-Laveen, Jason Martin, and Marcia Richter.


Farmington WHEP Sites Monitored in 2021
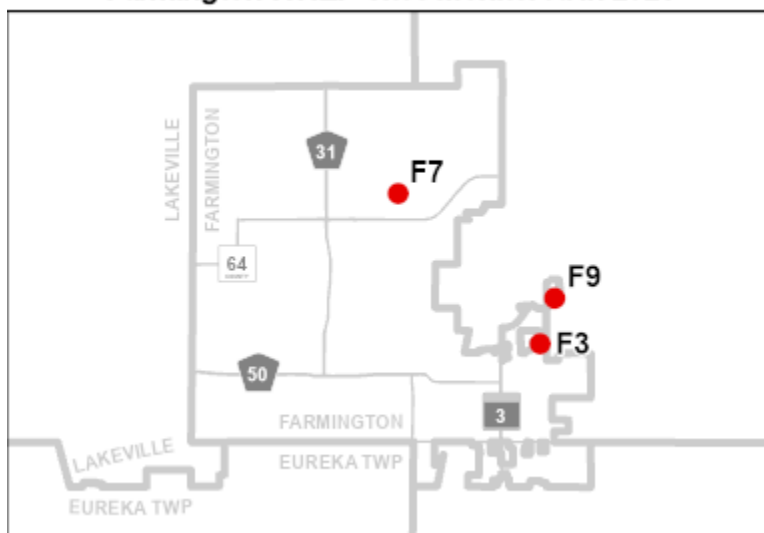

RICK SCHULDT

Rick Schuldt has been involved with the Farmington WHEP team for the past 11 years and has been the team leader for five years. He spent a career with the US Fish and Wildlife Service and brings a biological background to the team. As a field biologist, stationed in Marquette, Michigan, he spent 15 years with the Sea Lamprey Control Program. He worked in all facets of the program including assessment of chemicals used to eradicate sea lampreys from Great Lakes tributaries in the US and Canada. The focus was to determine any impacts of the chemicals on nontarget biota in the streams. The final years of his career were spent in the Service's Regional Office at Fort Snelling as a manager. He admits, "The field experience was much more enjoyable."

Rick observed, "The lack of rain throughout this past summer made for a very challenging year. Water depths reached levels not seen in the past decade or more. The very warm, low water at Autumn Glen (F-7) made for barely enough water to cover the bottle traps and not enough to support aquatic vegetation during our surveys. By August the wetland changed to a parched, cracked substrate with no water. The weather also put a strain on the sampling crew. As is normal for the summer season we were all busy with vacations and travel but also some medical issues limited the number of team members available for sampling on any given night. Special thanks to those who helped to complete the sampling on time."

The City commented, "Farmington is a growing community and expects to continue to grow in the future, the WHEP program is used to monitor wetland areas where there will be future development. We can then look back and compare the pre-construction conditions to post construction development. This


DENISE HENNIGAR AND JASON MARTIN RETRIEVING BT'S

helps us understand the impacts of development on our natural resources and if there are any additional best management practices (BMPs) we need to implement in order to better protect them. By utilizing dedicated volunteers, the City is able to gather additional detailed information for key wetlands. WHEP is a great partnership that helps get citizens involved along with providing detailed information on the state of the City's wetlands."

## Farmington General Wetland Health

Figure 4.5 presents an overall view of wetland health for all of the 2021 monitoring sites in Farmington based on the IBI scores for invertebrates and vegetation presented as a percent. Figure 4.5 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate and vegetation scores that differ by ten percent or less are considered consistent. Based on the IBI scores, a wetland health rating is assigned as excellent, moderate or poor. Scores for the three wetlands indicate poor to moderate wetland health. Invertebrate and vegetation health scores were inconsistent for F-3 and F-9, differing by 16 percent and 23 percent, respectively.

**Figure 4.5 Farmington site scores (percent) for the 2021 sampling season**
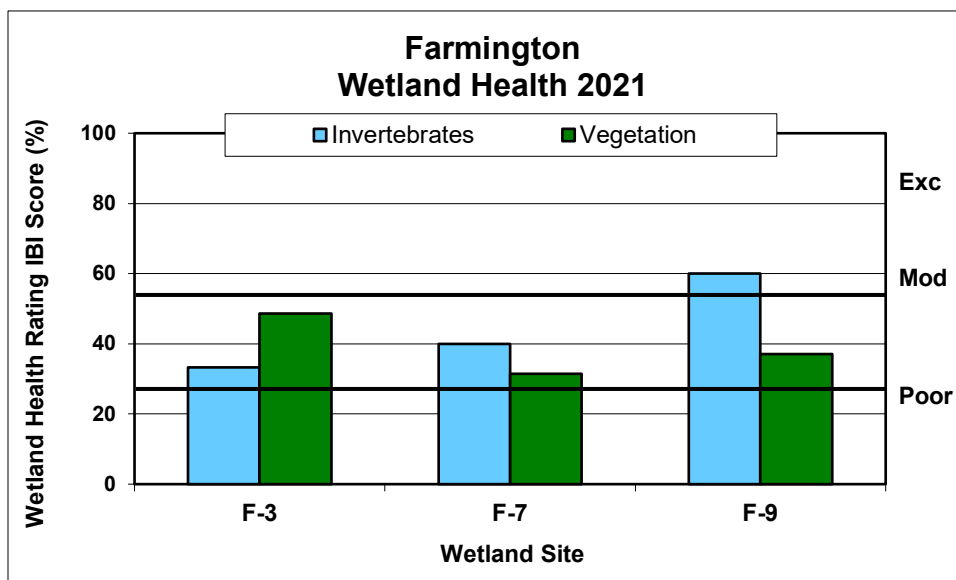


### 4.5.1 Kral Pond (F-3)

F-3, also known as Kral Pond, is a 10-acre, type 4 wetland located within the Vermillion River Watershed. The wetland watershed is 41.8 acres and 6.6 percent impervious. There is one inlet in the southwest corner, one inlet in the northeast corner, and one outlet on the north end of the wetland. It is obvious, based on its shape, that this wetland has been altered in the past, likely to accommodate farming practices. Kral Pond is included in the City's wetland management plan and is designated as a Manage 2 wetland. Manage 2 wetlands have usually been altered by human activities. These wetlands have low to medium floral diversity and wildlife habitat components, and are slightly susceptible to impacts

from stormwater. The management goal is to monitor and document how different land uses impact man-made wetlands over time. There is development to the north, south, and west, and agriculture to the east. Native vegetation serves as a buffer around the wetland.

## Wetland Health

**Site Observations:** The wetland slope is gentle. The wetland substrate is fairly solid. This is a large wetland (lake) with an extensive ring of of cattail. Anglers use this site to launch kayaks, canoes, and small boats, though not heavily accessed. Water levels were very low due to drought conditions in 2021. Emergent plants were not included in the vegetation plot due to the retreating shoreline. Duckweed (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) covered the open water present. Pondweed (*Potamogeton* sp.), coontail (*Ceratophyllum* sp.), water-crowfoot (*Ranunculus* sp.), and water milfoil (*Myriophyllum* sp.) dominated the water column. Bladderwort (*Utricularia* sp.) was blooming during the invertebrates survey in June; however, it was not observed during the vegetation survey in July. The area of the wetland where bladderwort had previously been observed was dry in July. Invasive species, including curly-leaf pondweed (*Potamogeton* crispus) and Eurasian water-milfoil (*Myriophyllum spicatum*) were present. Dragonflies, damselflies, snails, and a single beetle were collected.

**Table 4.5.1 Kral Pond (F-3) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (F-3) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (10) | Moderate (17) |
| **Trend 1998-2021** | Stable | Variable |

**Figure 4.5.1 Invertebrate and vegetation trends for Kral Pond (F-3)**
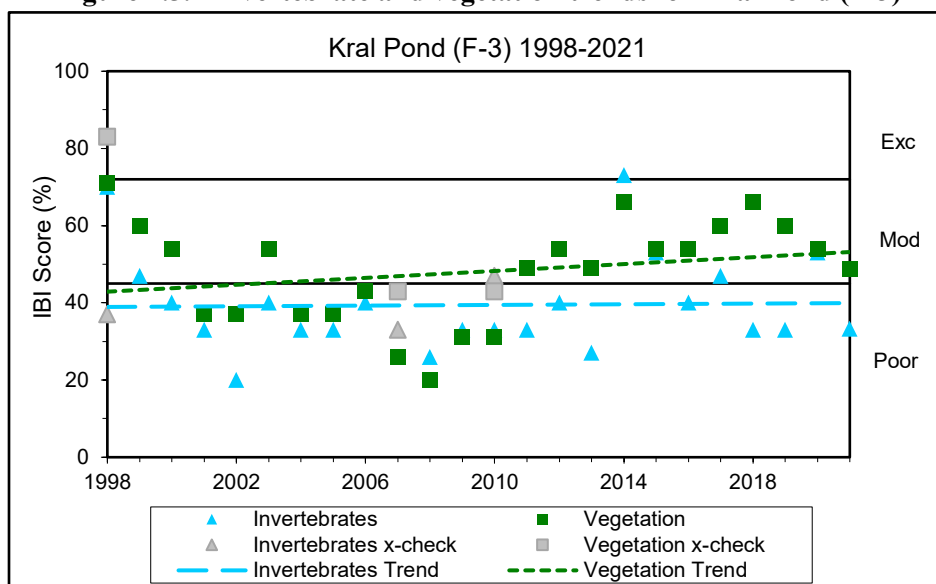
**Site summary:** Kral Pond has been monitored for 24 consecutive years. The invertebrate and vegetation scores were inconsistent in 2021, differing by 16 percent. The invertebrates score indicates poor wetland health while the vegetation score indicates moderate wetland health. The team commented that the water level was the lowest they've observed, and in July was partially dry. The data throughout the years has been variable. The vegetation scores were gradually decreasing from 1998 to 2008 and then rebounding. The invertebrate scores are consistently poor with exception to a few years of data. Vegetation scores are more often higher than invertebrate scores. The long-term health trends are



KATIE KOCH-LAVEEN, MARCIA RICHTER, AND CHAN HARRIES sorting sample

variable but stable. The area was historically agricultural. Development surrounding the wetland may have impacted the wetland. In some cases, conversion from agriculture to residential development can improve water quality since stormwater treatment is added.

## 4.5.2 Autumn Glen (F-7)

Autumn Glen (F-7) is a 2.9-acre wetland within the Vermillion River Watershed. The wetland watershed is ten acres including four percent impervious surface. There is one inlet in the northwest corner of the wetland along Dunbury Avenue and one outlet in the northeast corner. The wetland is included in the City's stormwater management plan; however, it does not have a designated classification. The wetland management goal is to monitor and document the health of a wetland surrounded by forest, agriculture, and residential with possible future develeopment. There is development to the north, south, and west. Forest and agricultural



landscape exists to the east. Man-made ponds lie to the north and south. The water ultimately flows to North Creek.
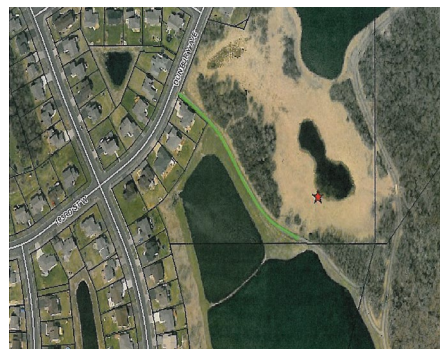
Autumn Glen is located within a trail system, but is not easily spotted from the trail. Tall grasses (including reed canary grass) and tree lines obstruct views. The wetland is approximately 50 meters from the trail.

**Wetland Health**

**Site Observations:** The wetland slope is gentle and the substrate is very mucky. The water levels were almost too low to set bottle traps in 2021. A bicycle path runs along the south side of the wetland. A meadow of reed canary grass (*Phalaris arundinacea*) surrounds the wetland. Water-meal (*Wolfia* sp.) is the only plant found in the vegetation releve. Spike-rush (*Eleocharis* sp.), bulrush (*Scirpus* sp.), and smartweed (*Polygonum* sp.) were observed in the dry mudflats. There were very few plants in deeper portions of the wetland. Leeches, damselflies, mayflies, snails, trueflies, crustaceans, and bugs and beetles were collected.



AUTUMN GLEN IN AUGUST 2021

**Table 4.5.2 Autumn Glen (F-7) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (F-7) | Invertebrates | Vegetation |
|---|---|---|
| Wetland Health Rating (IBI score) | Poor (12) | Poor (11) |
| Trend 2011-2021 | Variable | Variable |

**Figure 4.5.2 Invertebrate and vegetation trends for Autumn Glen (F-7)**
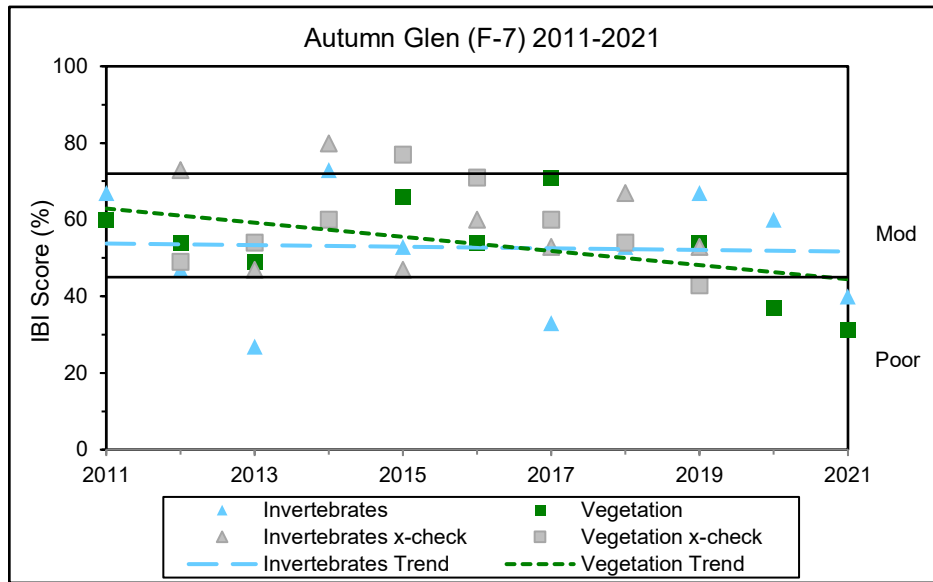


**Site Summary:** This is the eleventh consecutive year that Autumn Glen has been monitored. The invertebrate and vegetation scores are consistent with each other. The invertebrate and vegetation scores indicate poor wetland health. Vegetation diversity declined in 2019 and 2020, and in 2021 drought conditions drastically reduced the vegetation representation to one taxa (water-meal). Macroinvertebrate diversity also declined. Water levels were almost too low to set bottle traps. Dry conditions seem to have impacted wetland health scores. Long term health trends for invertebrates appear stable, though data is variable. The vegetation health trend are starting to show signs of decline. The large invasion of reed canary grass encrouching on this wetland may be impacting the vegetation diversity.

## 4.5.3 Cambodia Avenue (F-9)

Cambodia Aveune (F-9) is a 5-acre, type 5 wetland within the Vermillion River Watershed. The wetland drainage area is 24 acres with 9 percent impervious surface. There is one inlet on the southwest corner of the wetland and one outlet in the northeast end of the wetland. It is included in the City's Stormwater Management Plan, and is designated as a Manage 2 wetland. The management goals are to monitor and document how different land uses impact man-made wetlands over time.



Cambodia Ave Wetland

A wide buffer zone with native vegetation surrounds the wetland. Much of the surrounding area is agricultural land; however, development of residential homes exist to the north and west of the wetland.

## Wetland Health

**Site Observations:** The wetland slope is gentle, and the substrate is fairly solid. It is a small wetland with open water covered by white water lilies (*Nymphaea* sp.) and surrounded by cattails (*Typha* sp.). Dense populations of coontail (*Ceratophyllum* sp.) and pondweed (*Potamogeton* sp.) dominated the water column. Duckweeds (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) were also present. Bulrush (*Scirpus* sp.), reed canary grass (*Phalaris arundinacea*), and cattails dominate the emergent vegetation. Sedges (*Carex* sp.) and blue grass (*Poa* sp.) were also present. Leeches, dragonflies, damselflies, mayflies, caddisflies, snails, trueflies, crustaceans, and bugs and beetles were collected.



JOSIAH HAKALA RECORDING SAMPLING DATA

**Table 4.5.3 Cambodia Avenue (F-9) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (F-9) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (18) | Poor (13) |
| **Cross-check Rating (IBI score)** | Excellent (26) | Poor (15) |
| **Trend 2018-2021** | Not enough data | Not enough data |

**Figure 4.5.3 Invertebrate and vegetation trends for Cambodia Avenue (F-9)**
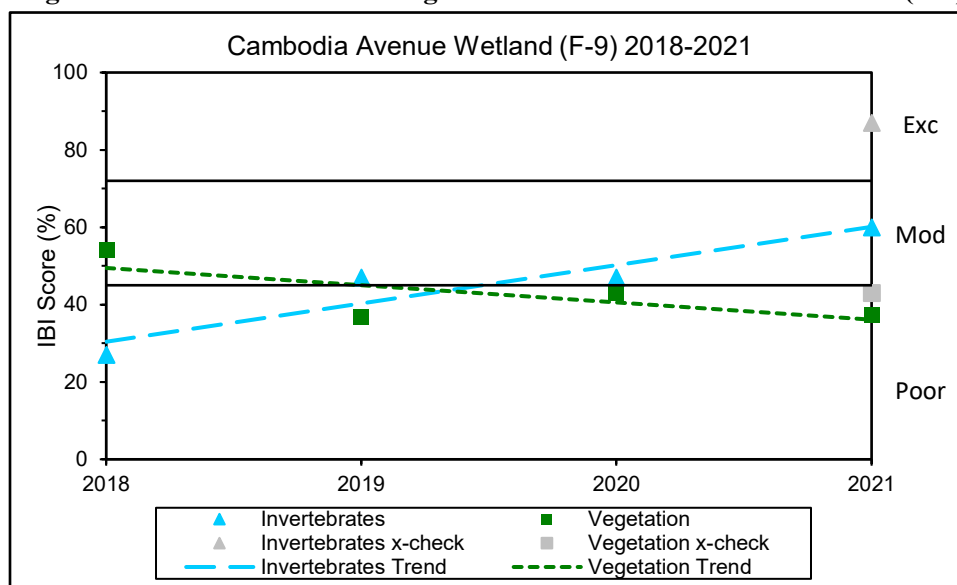
**Site Summary:** This is the fourth consecutive year that Cambodia Avenue wetland has been surveyed for WHEP. Invertebrate and vegetation scores were inconsistent with each other, differing by 23 percent. The invertebrates score indicates moderate wetland health while the vegetation score indicates poor wetland health. The wetland is crowded with vegetation providing invertebrate habitat; however, the diversity of vegetation is low. This wetland was cross-checked by another team. The vegetation data was very similar between teams. The invertebrate scores were inconsistent, differing by 27 percent. The cross-check team's invertebrate score indicates excellent wetland health. The cross-check team collected more dragonfly and snail taxa, and a healthier Corixid proportion. It should be noted that the cross-check team collected invertebrate samples in late July while the City team collected invertebrate samples in early June. This may have affected the invertebrate diversity between teams. More years of data are needed to help determine a more reliable health trend.

## 4.6 Hastings Wetlands

Four wetlands were monitored within the City of Hastings in 2021. The City has 23 years of data! Nine wetlands have been sampled in the City of Hastings through the WHEP program since 1999.

**Team Leader**: Jessie Eckroad

**Team Members**: Tricia Bremer, David Chavie, Ivy Frater, Rolf Lalone, Rick Logan, Mike Nelson, Dwight Smith, Alexander Theisen, Amelia Untiedt, and Tess Zahradka


Hastings WHEP Sites Monitored in 2021
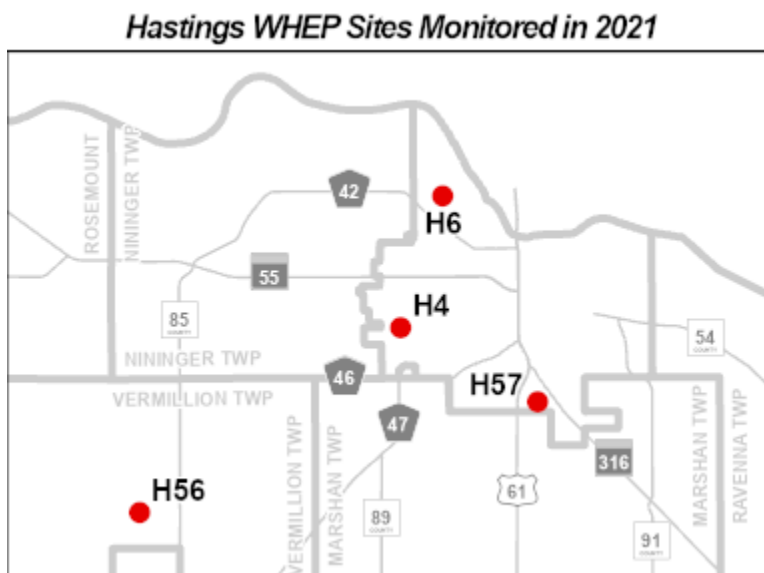

JESSIE ECKROAD

Jessie Eckroad is an environmental educator at Carpenter St. Croix Valley Nature Center and has been the WHEP Hastings Team leader for seven years. "I love WHEP because it provides me the opportunity to spend time outdoors and connect with other people who are passionate about the environment," she says. Even though this season was a challenge due to the COVID-19 pandemic, the Hastings team adjusted and had a fun summer. Working outside, wearing masks, and keeping space between team members when possible kept everyone safe and healthy. Jessie was excited to welcome many new members to the Hastings Team this year. She was also delighted to have family and friends of team members join for several monitoring sessions as well!

John Caven is the Assistant City Engineer for the City of Hastings. He has been the WHEP City contact and administrator since 2010. His role includes selecting the wetlands to be monitored as well as being a communication link for the City. He said, "The City appreciates the dedication of the volunteers as they are the very reason this program is a success. The data collected provides a biological snapshot of the health of the area ponds. Through time, the City can see how surrounding land management practices affect a local ponding basin. Thank you!"



Joⁿⁿ Caven

## Hastings General Wetland Health

Figure 4.6 presents an overall view of wetland health for all the 2021 monitoring sites in Hastings based on the IBI scores for invertebrates and vegetation presented as a percent. Figure 4.6 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate and vegetation scores that differ by ten percent or less are considered consistent. Based on the IBI scores, a wetland health rating is assigned as excellent, moderate or poor. The wetlands showed poor to moderate wetland health in 2021. Invertebrate and vegetation scores for H-6, H-56, and H-57 were inconsistent, differing by 11, 17, and 18 percent, respectively.

**Figure 4.6 Hastings site scores (percent) for the 2021 sampling season**
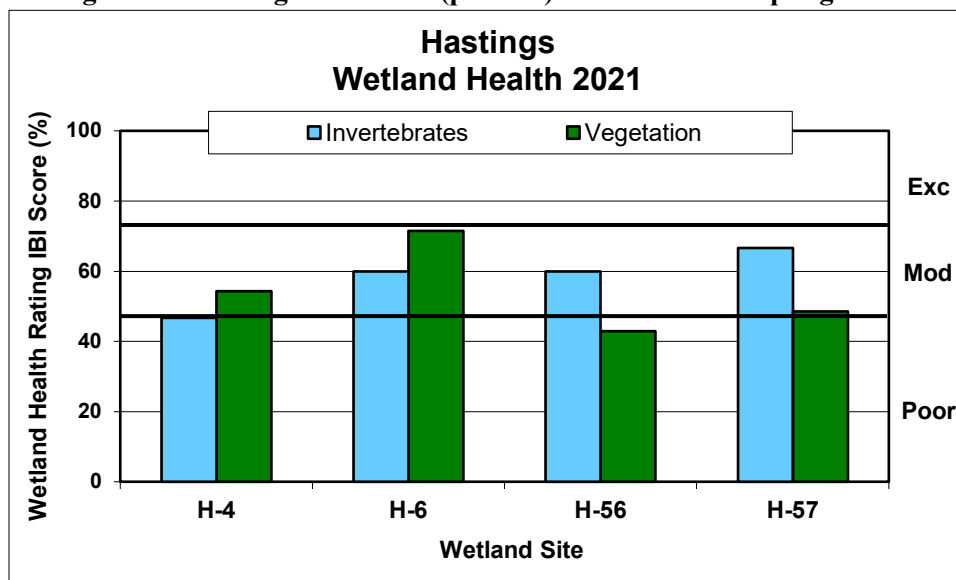


## 4.6.1 Stonegate Treated Wetland (H-4)

H-4, also known as Stonegate Treated, is the second cell of a two-celled stormwater management system created to treat runoff from surrounding residential development. It is a 1.2-acre, open water wetland located within the Vermillion River Watershed. The watershed is nine to ten acres, and is 30 to 40 percent impervious. The wetland has one inlet in the southeast corner and one outlet on the north end. It is part of the stormwater management plan, and is designated as a Stormwater Detention Pond. It serves as a

stormwater detention pond within a developed neighborhood. The goal for the wetland is to improve water quality of the stormwater runoff before it adversely affects the Vermillion River.



The watershed is primarily residential with private property on three sides and a public trail along the south side of the wetland. Private landowners within the Wyndham Hills Neighborhood Association manage their own frontages of the pond with rip-rap, mowing, and chemical use. Several property owners demonstrate good management practices by maintaining shoreland buffers to protect water quality and provide wildlife habitat. In 2004, the Wyndham Hills Neighborhood Association partnered with the City of Hastings and the DNR to provide native plantings around the pond. A private trail access divides Stonegate pond from another pond just south of the site. Some concerns compromising the health of the pond include invasive species, mowing too close to the water's edge, and the use of chemicals on adjacent shoreline turf.

## Wetland Health

**Site Observations:** The wetland slope is moderate. The substrate is sandy and fairly solid. The upland prairie is flourishing in comparison to the past two summers. The 5x20 meter plot was set along the southern edge of the wetland in water up to 0.9 meters deep. Coontail (*Ceratophyllum* sp.) and pondweed (*Potamogeton* sp.) were the only submergent or floating forbs found in the water. Mostly emergent woody, grasses, and forbs were represented in the vegetation releve, including: willow trees (*Salix* sp.), dogwood trees (*Cornus* sp.), bulrush (*Scirpus* sp.), cut grass (*Leersia* sp.), reed canary grass (*Phalaris*



AMELIA UNTIEDT, ROLF LALONE, DWIGHT SMITH, AND RICK LOGAN

*arundinacea)*, cattail (*Typha* sp.), swamp milkweed (*Asclepias incarnata*), Joe-pye weed (*Eupatorium* sp.), bugle weed (*Lycopus* sp.), smartweed (*Polygonum* sp.), and several other upland species. Leeches, dragonflies, damselflies, mayflies, snails, true flies, and bugs and beetles were collected.

**Table 4.6.1 Stonegate Treated (H-4) Health based on Index of Biotic Integrity**

| 2021 Data (H-4) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (14) | Moderate (19) |
| **Trend 2001-2021** | Stable | Stable |

Dakota Co. WHEP
2021 Report      Fortin Consulting, Inc., now Bolton & Menk, Inc.      March 2022
P a g e | 6 4

**Figure 4.6.1 Invertebrate and vegetation trends for Stonegate Treated (H-4)**
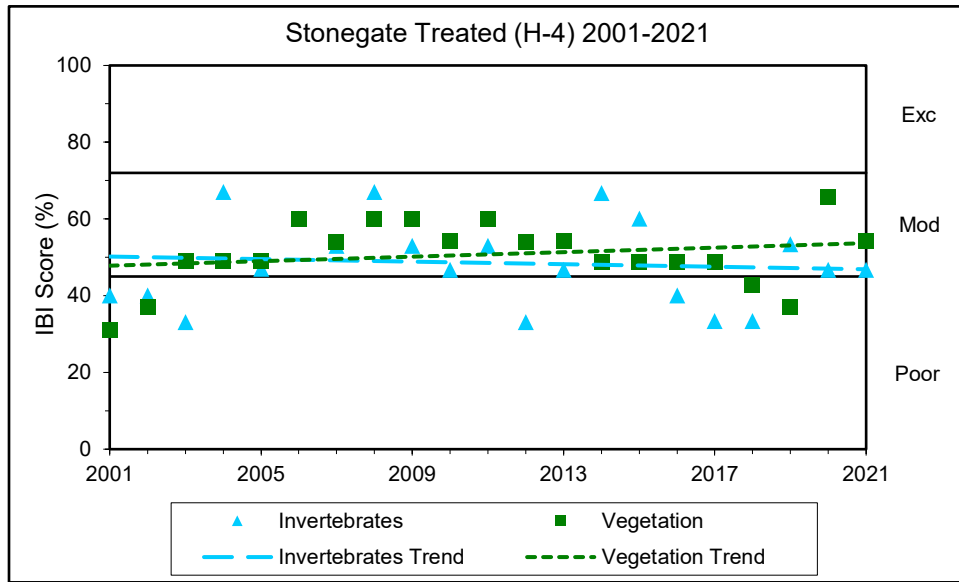


**Site summary:** This is the twenty-first consecutive year that Stonegate Treated has been surveyed! The invertebrates and vegetation scores were consistent in 2021, though the invertebrates score indicates poor wetland health while the vegetation score indicates moderate wetland health. The scores are variable over the years; however, the invertebrates and vegetation scores often fluctuate together. In general, the invertebrate scores have been lower than the vegetation scores. The long term trends appear stable.

## 4.6.2 Lake Rebecca Wetland (H-6)

Lake Rebecca, H-6, also known as Rebecca EM 1&2, is a public water wetland in the City of Hastings. It is a 19-acre, open water wetland located in the Vermillion River Watershed. The wetland drainage area is 56 acres, and is 1 percent impervious. The wetland has two stormwater inlets along the southwest shoreline and one controlled outlet on the southeast end. The wetland is part of the City's stormwater management plan, and is designated as a High Quality Wetland. It is being managed as a wildlife habitat area and for recreational use. A natural shoreline buffer zone exists along much of the lake's perimeter. The Mississippi River Flats Natural Resource Management and Restoration Plan was adopted in December 2002. One of the inflow areas to the lake is fitted with a series of sediment control structures. These are maintained by the City Public Works Department. The City Parks Department operates an aeration system during the winter season to benefit the game fish.



The wetland is an emergent marsh and shoreline/floodplain forest. Spring fed water from the bluffs helps maintain water levels. Jaycee Park provides access for recreation on the lake, including a boat launch. Diversion of stormwater into the lake and an impervious parking lot/boat launch adjacent to the eastern edge of the lake are of concern. Purple loosestrife and zebra mussels compromise the health of the lake.

## Wetland Health

**Site Observations:** The wetland slope is gentle. The wetland substrate is sandy and solid. Fallen logs are in the water. Access to the monitoring site is via the bikepath on the levee that divides the Mississippi River and Lake Rebecca. The slope from the bike path to the water is very steep and is covered with tall grasses and forbs. Dense stands of cottonwood trees (*Populus* sp.), dogwood trees (*Cornus* sp.), and maple trees (*Acer* sp.) hang over the plot. Sedges (*Carex* sp.) are prevelent. Coontail (*Ceratophyllum* sp.) and pondweed (*Potamogeton* sp.) dominate the water column. Duckweed (*Lemna* sp.) and water-meal (*Wolffia* sp.) cover the open water. Spike-rush (*Eleocharis* sp.), cut grass (*Leersia* sp.), reed canary grass (*Phalaris arundinacea*), smartweed (*Polygonum* sp.), swamp milkweed (*Asclepias* sp.), beggar-tick (*Bidens* sp.), water-plantain (*Alisma* sp.), and waterweed (*Elodea* sp.) were also present. Leeches, dragonflies, damselflies, mayflies, caddisflies, snails, trueflies, crustaceans, and bugs and beetles were collected.

**Table 4.6.2 Lake Rebecca (H-6) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (H-6) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (18) | Moderate (25) |
| **Cross-check Rating (IBI score)** | Moderate (16) | Poor (15) |
| **Trend 2003-2021** | Stable | Stable |

**Figure 4.6.2 Invertebrate and vegetation trends for Lake Rebecca (H-6)**
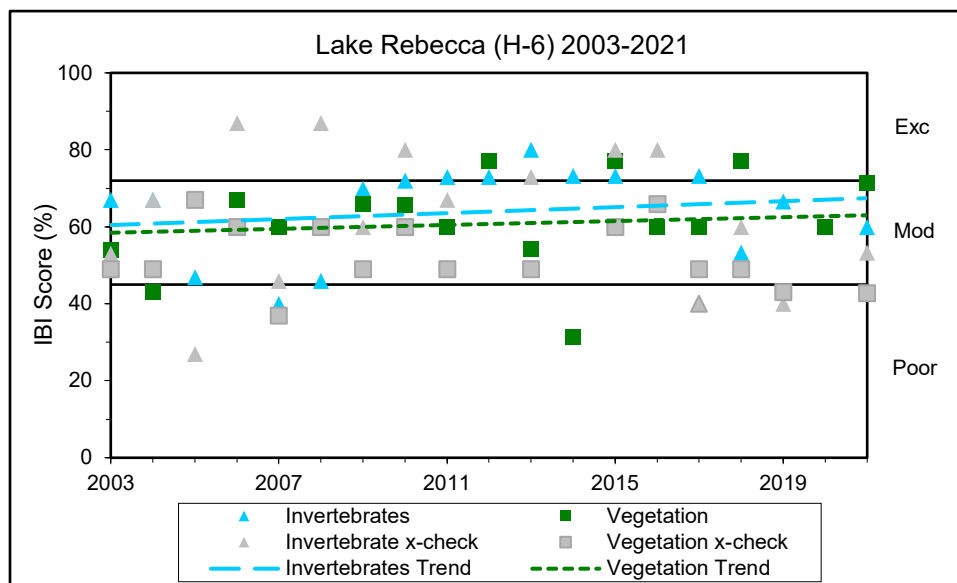


**Site summary:** This is the nineteenth consecutive year of monitoring for Lake Rebecca. Invertebrate and vegetation scores are considered inconsistent, differing by 11 percent. With the exception of a few variable years, the invertebrates and vegetation scores have fallen near a long-term stable health trend. A new location for sampling was set in 2020, which was repeated in 2021. This vegetation plot at this site was cross-checked by another team in 2021. The invertebrates scores between the two teams were consistent; however, the vegetation scores were inconsistent, differing by 28 percent. The teams placed their

vegetation plots in different areas of the wetland.  The City team found a larger diversity of woody, emergent, and submergent plant species.

## 4.6.3  180th Street Marsh (H-56)

H-56, also known as 180th Street Marsh, is a 20-acre open water wetland located in the Vermillion River Watershed.  The wetland drainage area is 340 acres, and is less than one percent impervious.  The wetland has one inlet on the west side.  It also has one outlet that flows south to the Vermillion River from a culvert under 180th Street.  This wetland is not part of the City's stormwater management plan; it is in Dakota County and not under the management of the City.
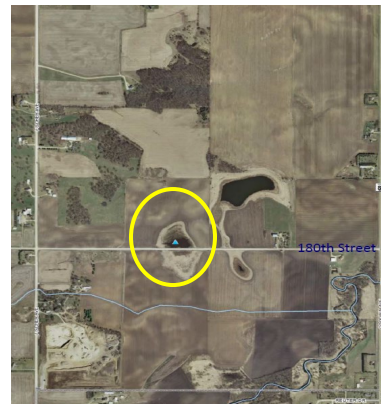
The wetland is a part of several natural ponds in this agricultural area. The ponds partially cover several parcels of land; each parcel owned by a different party. Management practices are dependent on individual property owners. The landowners have not communicated any plans on management of the wetland. Farming practices to the south restrict any above ground outflow to the Vermillion River. Wildlife management is protected through the Farmland and Natural Area Program. The wetland management goal is for agriculture to continue in area, and wildlife habitat management to be practiced in the wetland areas.

### Wetland Health

**Site Observations:** The wetland slope is moderate.  The wetland substrate is sand and gravel beneath a layer of mucky organic matter.  Water levels dropped between the macroinvertebrate and vegetation surveys, receeding by two meters.  This affected the ability to capture emergent and submergent plants together in the vegetation releve.  Dense populations of coontail (*Ceratophyllum* sp.) and pondweed (*Potamogeton* sp.) dominated the water column.  Duckweed (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) floated on the water.  Cattail (*Typha* sp.), water plantain (*Alisma*

RETREATING SHORELINE AT 180TH ST MARSH

sp.), and smartweed (*Polygonum* sp.) were also present.  Vegetation outside of the plot included willow trees (*Salix* sp.), spike-rush (*Eleocharis* sp.), sedge (*Carex* sp.), burreed (*Scirpus* sp.), reed canary grass (*Phalaris arundinacea*), arrowhead (*Sagittaria* sp.), and bugle weed (*Lycopus* sp.).  Leeches, dragonflies, damselflies, caddisflies, snails, fingernail clams, crustaceans, and bugs and beetles were collected.

**Table 4.6.3 180th Street Marsh (H-56) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (H-56) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (18) | Poor (15) |
| **Trend 2005-2021** | Improving | Improving |

**Figure 4.6.3 Invertebrate and vegetation trends for 180ᵗʰ Street Marsh (H-56)**
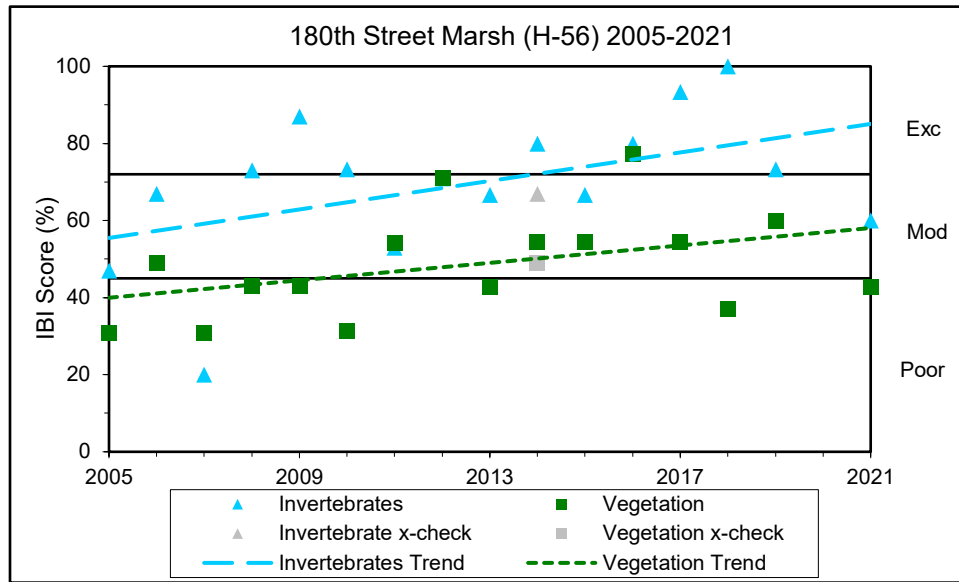


**Site summary:** This is the sixteenth year that H-56 has been monitored for WHEP since 2005. The invertebrate and vegetation scores are inconsistent, differing by 17 percent. The invertebrates score indicates moderate wetland health while the vegetation score indicates poor wetland health; however, low water levels affected the vegetation plot placement which excluded many emergent species that would have enhanced the vegetation score in 2021. In comparison, high water affected the collection location for both invertebrates and vegetation in 2019. Long-term health trends for both invertebrates and vegetation appear to be improving.



TESS ZAHRADKA, TRICIA BREMER, RICK LOGAN, AND DWIGHT SMITH

## 4.6.4 Cari Park Pond (H-57)

Cari Park Pond (H-57) is a 0.78-acre stormwater detention pond located in the Vermillion River Watershed. The wetland drainage area is 29 acres, and 14 percent impervious. The wetland has four inlets of which three are located on the east side of the pond and one on the west side. It also has one outlet on the west side. This wetland is part of the City's stormwater management plan. It is a man-made sedimentation pond that was constructed in 1989. It is designated as a Medium Quality Wetland. It serves as a stormwater detention pond within a developed neighborhood. The goal for the wetland is to improve water quality of the stormwater runoff before it adversely affects the Vermillion River. The City has erosion control regulations in place to minimize the impacts of development within the watershed.
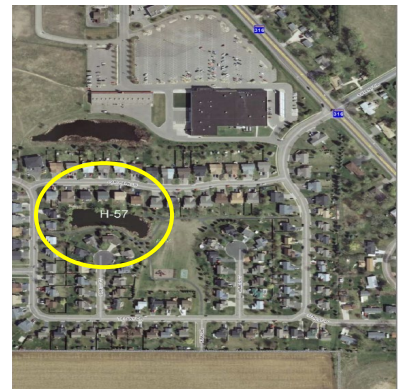
Private landowners within the Cari Park neighborhood manage their own frontages of the pond with rip-rap, mowing, and chemical use.  On the south and east sides of the pond, a City bituminous path connects the neighborhoods through Cari Park.  Cari Park offers recreational opportunities on the south side of the pond.  A bike trail runs along the south and east sides of the pond.

## Wetland Health

**Site Observations:** The wetland slope is moderate, and the substrate is very mucky.  The wetland is surrounded by homes and a nearby park.  Trees overhang portions of the wetland shoreline, including dogwood (*Cornus* sp.) and maple trees (*Acer* sp.).  Cattails (*Typha* sp.) dominated the shoreline.  A small population of pondweed (*Potamogeton* sp.) was the only submergent vegetation found in the vegetation plot.  Duckweed (*Lemna* sp.) and slender riccia (*Ricia fluitans*) float on the water surface. Bulrush (*Scirpus* sp.), reed canary grass (*Phalaris arundinacea*), and bugle weed (*Lycopus* sp.) were also present. Leeches, damselflies, mayflies, caddisflies, snails, fingernail clams, trueflies,



TRICIA BREMER, ALEX THEISEN, AND TESS ZARAHDKA

crustaceans, and bugs and beetles were collected.  Chinese mystery snails were found.

**Table 4.6.4 Cari Park Pond (H-57) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (H-57) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (20) | Moderate (17) |
| **Trend 2013-2021** | Stable | Stable |

**Figure 4.6.4 Invertebrate and vegetation trends for Cari Park Pond (H-57)**
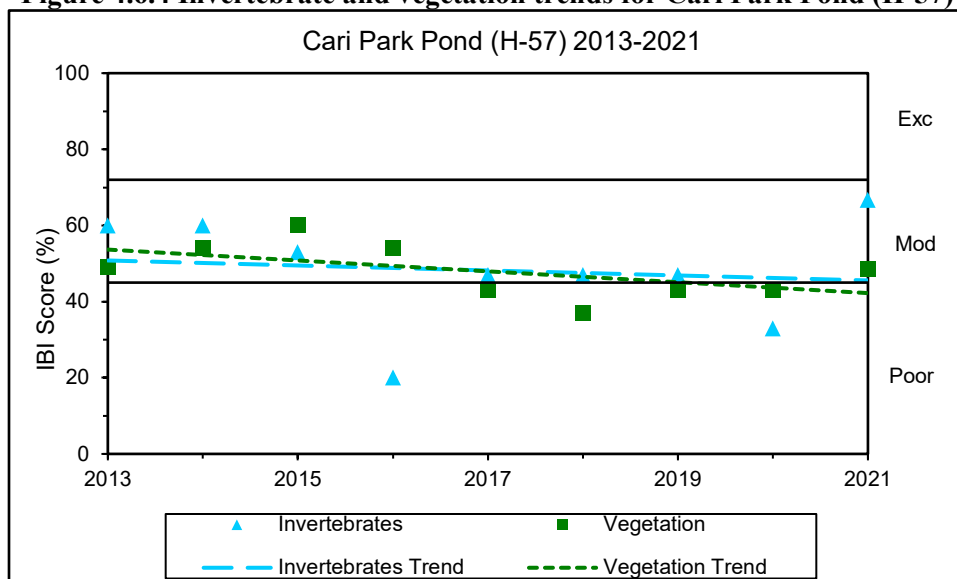
**Site summary:** This is the ninth consecutive year that Cari Park Pond has been monitored. The vegetation and invertebrate scores were inconsistent with each other in 2021, differing by 18 percent; however, both scores indicate moderate wetland health. Long-term trend data appears stable; however, the invertebrates score improved in 2021. More snails and trueflies were collected in 2021.

## 4.7 Lakeville Wetlands

Two wetlands were monitored within the City of Lakeville in 2021. The City has 24 years of data! Ten wetlands have been sampled in the City of Lakeville through the WHEP program since 1998.

**Team Leader**: Steve Weston

**Team Members**: Melanie Anderson-Novy, Nate Barnes, William Barnes, Macey Glad, Kim Menard, Ella Renner, Nora Renner, and Alexander Swartz.



Lakeville WHEP Sites Monitored in 2021
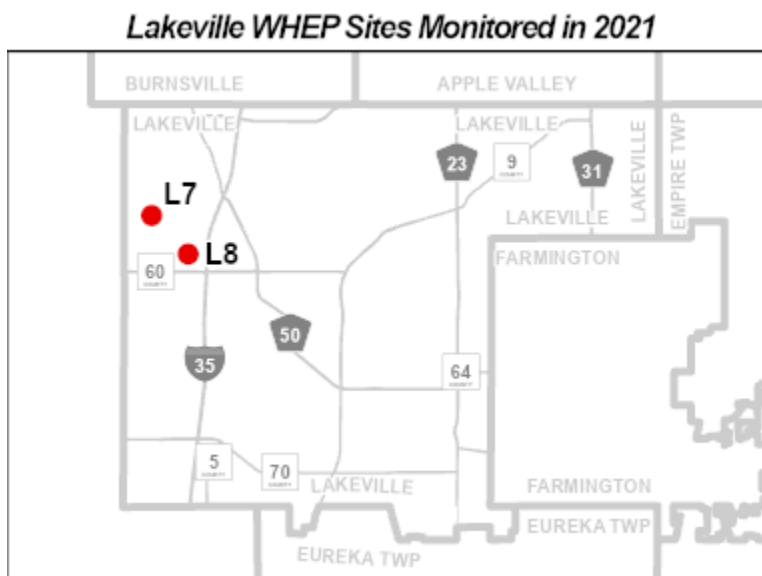


STEVE WESTON

Steve Weston has participated in WHEP for over 20 years. He explained, "I have been a team leader of the Lakeville team since 2001 and it continues to be a high point of the year. I enjoy sharing the experience with volunteers, especially the high school students, several of whom have gone on to study biology in college and find environmental jobs. "This year we found the wetlands at their lowest water levels, suffering from the severe drought. The low survey results show that the Lakeville wetlands that we surveyed were significantly stressed."

Ann Messerschmidt is the WHEP contact at the City of Lakeville. Her role is to determine which wetlands should be monitored by WHEP volunteers as well as review the collected data. She uses the data to compare to past years data and see what changes are occurring with the wetlands. She says, "Over time, we hope to be able to see trends in the data." Ann believes, "The WHEP program is a great opportunity for residents interested in the natural environment to learn about wetland plants and invertebrates. This is a valuable asset to the volunteers. Because of the work by the volunteers, the community as a whole can now find in-depth information about the connections of the environment to its inhabitants and how that reflects the overall health of the system. This helps residents of



ANN MESSERSCHMIDT

our community learn how their actions can directly affect water quality." She admits, "I like how WHEP connects residents to wetlands, and the long-term data at these sites are something worth tracking."

## Lakeville General Wetland Health

Figure 4.7 presents an overall view of wetland health for all the 2021 monitoring sites in Lakeville based on the IBI scores for invertebrates and vegetation presented as a percent. Figure 4.7 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate and vegetation



NATE BARNES, STEVE WESTON, AND BILL BARNES

scores that differ by ten percent or less are considered consistent. Based on the IBI scores, a wetland health rating is assigned as excellent, moderate or poor. The wetlands showed poor to moderate wetland health in 2021. The invertebrates and vegetation scores for sites L-7 and L-8 were inconsistent, differing by 24 and 27 percent, respectively.

**Figure 4.7 Lakeville site scores (percent) for the 2021 sampling season**
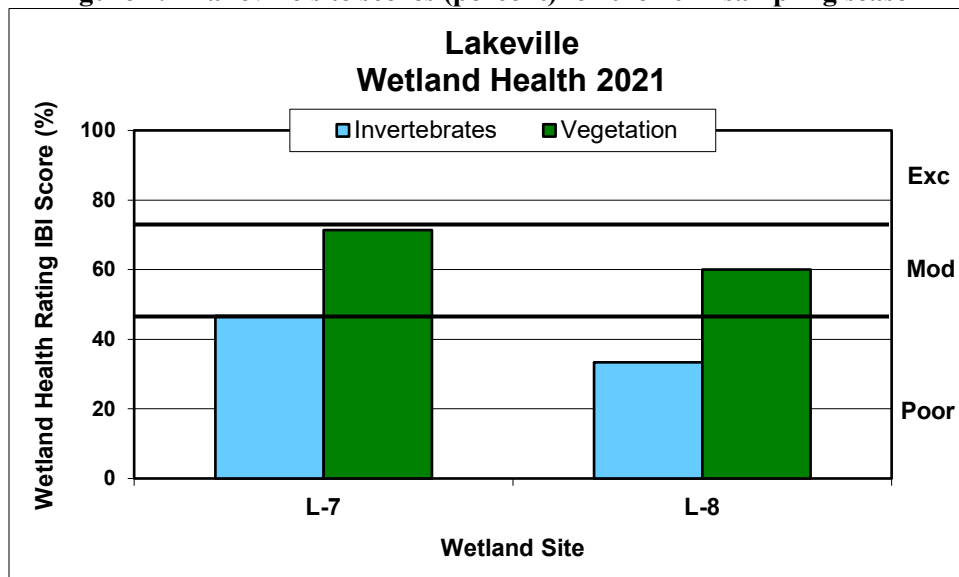


### 4.7.1 DNR Wetland #387 (L-7)

DNR #387 (L-7) is a ten-acre, type 4 wetland located in the Orchard Lake subwatershed within the Black Dog Watershed. The Orchard Lake subwatershed is 506.6 acres with 105.5 acres of direct drainage. It is 29 percent impervious, and both publicly and privately owned. It has one inlet in the southeast corner of the wetland off of Kettering Trail and two outlets along the north side near Orchard Lake. The wetland is part of the City's stormwater management plan. The wetland designation is to preserve. The management goal is to actively protect and preserve the functions and values of the wetland.
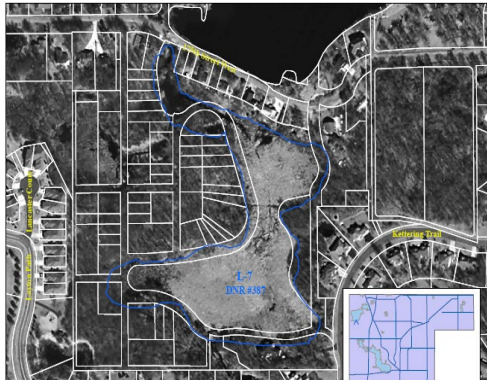
A woodland buffer surrounds most of the west side of the wetland, with woodland buffers between the few properties along the north and southeast wetland boundary. In an effort to improve water quality of Orchard Lake, an aeration system was installed in L-7 in 2010. There are four diffuser heads installed near the north outlet into Orchard Lake. The goal is to precipitate phosphorous out of the water column and drop it out into the sediments in L-7 so that less phosphorous will enter Orchard Lake. The aeration system is scheduled to run from April to October annually. In 2020, it was noted that there were periodic aerator issues where none or only a few aerator heads were in operation. In addition, road reconstruction is active right near the wetland.

## Wetland Health

**Site Observations:** The wetland slope is mostly steep, and the substrate is comprised of "boot-sucking muck". The wetland was dry during the vegetation survey in July 2021. The team



KIM MENARD

commented that they have not seen this wetland without water in the last 20 years of surveys. Only a small amount of duckweed (*Lemna* sp.) represented the submergent and floating plant community. Many emergent woody, grass, and forb species were observed, though most



ELLA RENNER WITH MACRO TRAP

in very small population sizes. Reed canary grass (*Phalaris arundinacea*) dominated the vegetation releve. Spike-rush (*Eleocharis* sp.), arrowhead (*Sagittaria* sp.), cattail (*Typha* sp.), water-hemlock (*Cicuta* sp.), smartweed (*Polygonum* sp.), and purple loosestrife (*Lythrum salicaria*) were present. Leeches, snails, fingernail clams, trueflies, crustaceans, and bugs and beetles were collected.

**Table 4.7.1 DNR 387 (L-7) Health based on Index of Biotic Integrity**

| 2021 Data (L-7) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (14) | Moderate (25) |
| **Trend 2002-2021** | Stable | Stable |

**Figure 4.7.1 Invertebrate and vegetation trend for DNR 387 (L-7)**



DNR 387 (L-7) 2002-2021

IBI Score (%)

Exc
Mod
Poor

Legend:
- ▲ Invertebrates
- ■ Vegetation
- ▲ Invertebrate x-check
- ■ Vegetation x-check
- — Invertebrates Trend
- --- Vegetation Trend
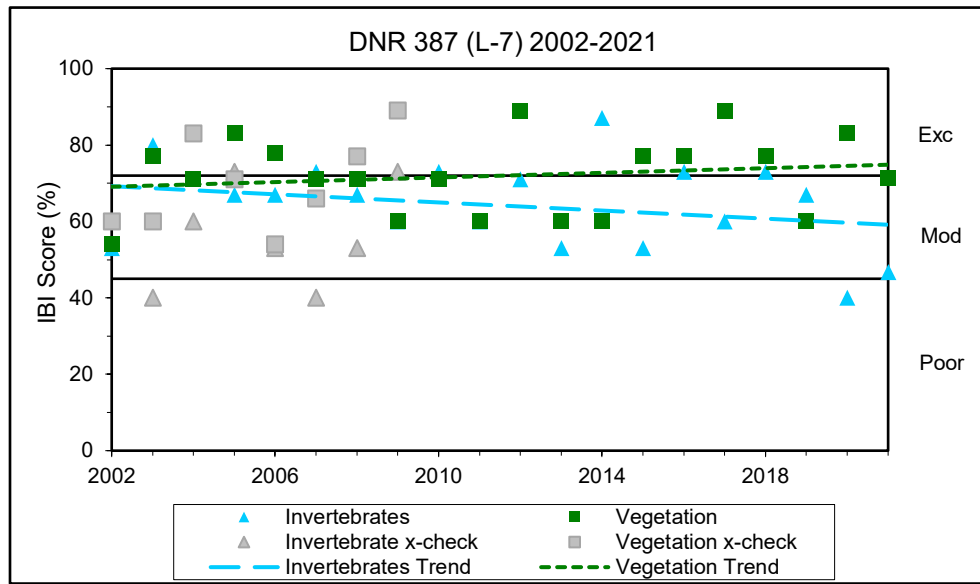
**Site summary:** This is the twentieth consecutive year that DNR 387 has been monitored for WHEP. The invertebrate and vegetation scores were inconsistent in 2021, differing by 24 percent. The invertebrates score indicates poor wetland health while the vegetation score indicates moderate wetland health. The invertebrate and vegetation both appear to have long-term stable health trends. Low water levels due to drought conditions proved poor habitat for invertebrates and submergent and floating plants. A large diversity of emergent woody, grass, and forb species enhanced the vegetation score.



LAKEVILLE TEAM SORTING INVERTEBRATES

## 4.7.2 DNR #393 (L-8)

DNR #393 (L-8) is a 9.6-acre, type 5 wetland located in the Lake Marion subwatershed of the Vermillion River Watershed. The wetland drainage area is 74.7 acres, and 17 percent impervious. It is a publicly owned wetland. It has one non-stormwater inlet on the west side, and one outlet on the south side. There is a structure on the west side of the wetland that is connected to another wetland; however, it does not receive stormwater. The wetland is included in the City's stormwater management plan and is designated to preserve. The wetland management plan is to actively protect and



preserve the function and values of the wetland to the maximum extent feasible. The wetland is within a residential neighborhood where development began in 2003 and ended in 2008. A conservation easement of varying widths exists along all sides of this wetland, with vegetative buffer.
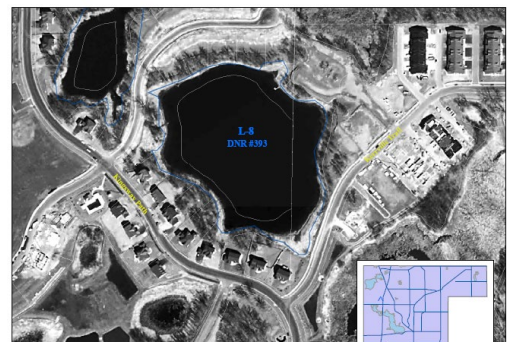
## Wetland Health

**Site Observations:**  The wetland slope is steep near the shoreline, but gentle in the water.  The substrate is a firm, sandy bottom.  The team commented that water levels were very lowest they've observed in this wetland in 2021.  The water level decreased between the invertebrates sampling in June and the vegetation survey in July.   Coontail (*Ceratophyllum* sp.) and pondweed (*Potamogeton* sp.) dominated the water column.   Water-shield (*Brasenia schreberi*) covered the open water.   Arrowhead (*Sagiattaria* sp.), smartweed (*Polygonum* sp.), spike-rush (*Eleocharis* sp.), rush (*Juncus* sp.), bulrush (*Scirpus* sp.), cutgrass (*Leersia* sp.), reed canary grass (*Phalaris arundinacea*), and several other emergent grasses and forbs were observed.  Damselflies, mayflies, snails, fingernail clams, trueflies, and crustaceans were collected.

**Table 4.7.2 DNR Wetland 393 (L-8) Health based on Index of Biotic Integrity**

| 2021 Data (L-8) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (10) | Moderate (21) |
| **Cross-check Rating (IBI score)** | Poor (8) | Moderate (19) |
| **Trend 2002-2021** | Variable | Stable |

**Figure 4.7.2 Invertebrate and vegetation trends for DNR 393 (L-8)**
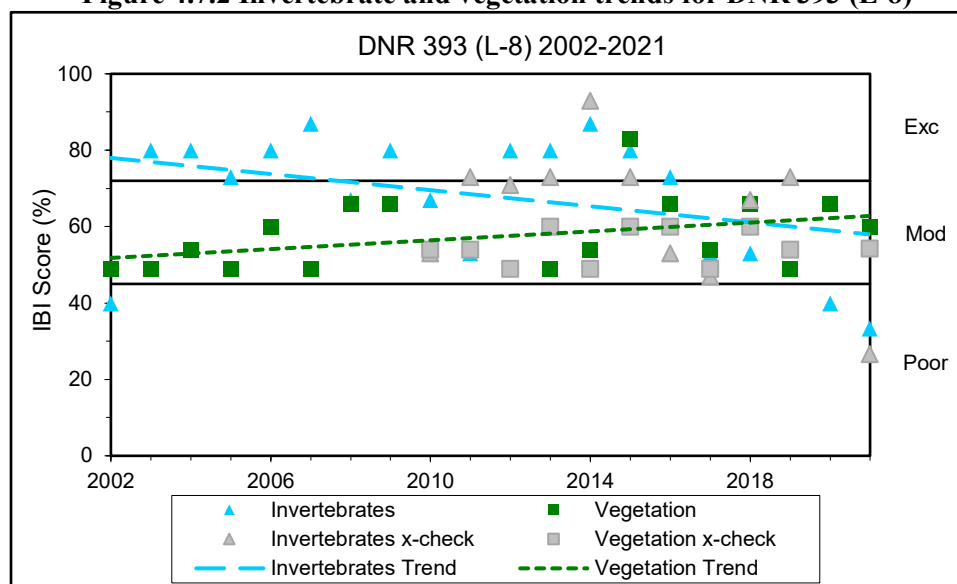


**Site summary:** DNR 393 has been monitored 20 consecutive years.  The invertebrate and vegetation scores were inconsistent, differing by 27 percent.  Excluding a high score in 2015, the vegetation scores regularly indicate moderate wetland health, and the trend is stable.  Until recently, invertebrate health scores have indicated excellent wetland health.  In general, the diversity of invertebrates has been declining through the years.  Large mouth bass are present, and may be impacting the invertebrate population.

## 4.8 Mendota Heights Wetlands

Two wetlands were monitored within the City of Mendota Heights, in 2021. The City has 24 years of WHEP data! Nineteen wetlands have been monitored in Mendota Heights since the start of the WHEP program.

**Team Leader**: Darcy Tatham

**Team Members**: John Bottomley, Jim Chastek, Gayl Gustafson, Niko Hess, Jamie Nikolai, Caitlin Noseworthy, Joan O'Donnell, Eliza Pessereau, Angela Richardson, Emma Richardson, Michelle Skog, Krista Spreiter, Mary Stade, Camille Wang, and Noelle Wang.



Mendota Heights WHEP Sites Monitored in 2021



DARCY TATHAM

Mendota Heights' team leader, Darcy Tatham, has been part of WHEP for more than 20 years. She commented, "2021 was quite a year, with heat, drought, and the continuing pandemic. What more can one ask for? How about adding five more ponds to monitor in addition to our usual three?! So, let's start with Covid-19. I have to thank Paula, the Dakota County coordinator, for taking the necessary steps to keep the program running, despite the pandemic.

"Then there was the heat and the drought. I am very grateful for the lack of mosquitoes, and the fact that we didn't get rained out - although we did get hailed on once! The drought gave our ponds the opportunity to act in a more normal manner, not having to react to large influxes of storm water. It was fascinating to see which ponds were dry, and which weren't. For instance, at the Mendota Heights reference pond, Copperfield, some of the plant species we saw during our earlier trips could not be found during the vegetation survey because of being buried in the mud. One of the West St. Paul ponds had a 15-foot mud zone before we could reach the water. We feel blessed not to have lost any volunteers permanently to the mud!

"I took over the West St. Paul team and their five ponds mid-season. I owe a huge debt of thanks to my Mendota Heights team members for stepping up to this challenge at the last minute. Their help in guiding and training the new West St. Paul volunteers, and willingness to take on the extra work of collection and analysis were what



MICHELLE SKOG, DARCY TATHAM, JOAN O'DONNELL, JIM CHASTEK, JAMIE NIKOLAI, JOHN BOTTOMLEY, CAITLIN NOSEWORTHY, GAYL GUSTAFSON, AND NOELLE WANG

made this task possible. I hope this experience under such unusual circumstances did not put off my West St. Paul team members, and that they had enough fun that they will return next season.

"It was fun to revisit some of the West St. Paul ponds which I and some of my long-term team members had monitored in previous years - and the fact that they were close to my home didn't hurt either! Yes, it was a lot of work, but I couldn't have done it without my team members. I've been involved with the program for more than 20 years and I'm still learning and having fun. I hope to see you next year."

Krista Spreiter is the Natural Resources Technician for Mendota Heights. She commented, "I had the opportunity to work with the Mendota Heights WHEP team this season both in the field and in the lab. I was so impressed with their dedication, experience, and knowledge. They have put in a lot of time and effort. Some volunteers have participated in the program for many years, providing the City and the program with invaluable data. The City uses the data that the team collects to monitor our wetlands for changes that may occur over time and how they respond to pressure from development and other environmental stressors, and then the City looks for ways to protect and improve them. The City is very grateful for our WHEP team!"

KRISTA SPREITER

## Mendota Heights General Wetland Health

Figure 4.8 presents an overall view of wetland health for all of the 2021 monitoring sites in Mendota Heights based on the IBI scores for invertebrates and vegetation presented as a percent. Figure 4.8 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate and vegetation scores that differ by ten percent or less are considered consistent. Based on the IBI scores, a wetland health rating is assigned as excellent, moderate or poor. Two wetlands were monitored in 2021. Invertebrate and vegetation scores indicate moderate wetland health for both wetlands; however, scores are inconsistent with each other, differing by 24 and 11 percent, respectively.

**Figure 4.8 Mendota Heights' site scores (percent) for the 2021 sampling season**
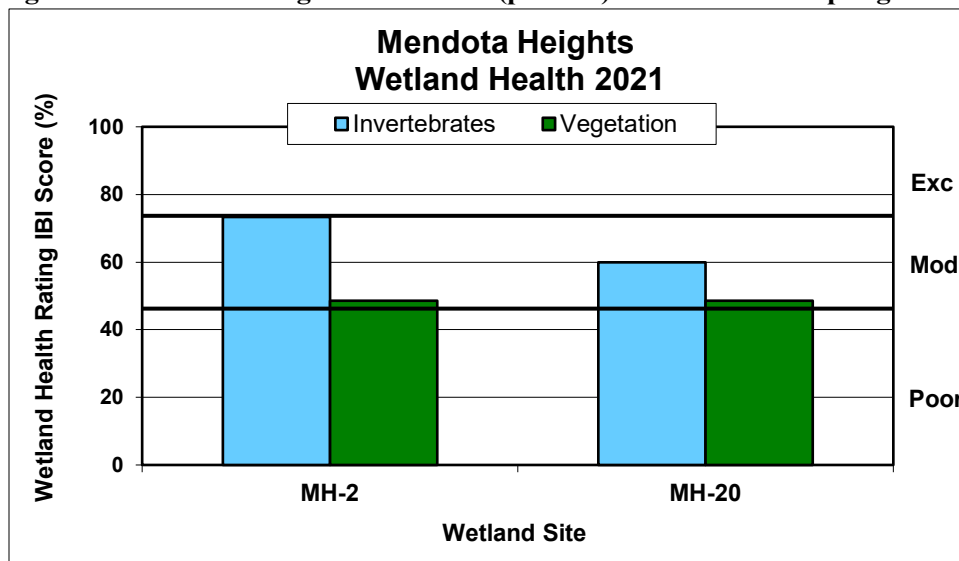
## 4.8.1 Copperfield (MH-2)

Copperfield (MH-2) is a 5.8-acre, type 5 wetland within the Lower Mississippi River Watershed. Its watershed is 965.4 acres and is 30.1 percent impervious. There is one inlet in the northeast corner of the wetland, one inlet in the southeast corner, and one inlet in the southwest corner. There is one outlet in the northwest corner, near Huber Drive. The wetland is included in the City's stormwater management plan and is designated as NWI-PUBG. The pond serves as a natural resource with a surrounding paved trail and gravel nature trail. The wetland management goal is to protect and improve water quality, and provide wildlife habitat and flood storage. A majority of the drainage area includes several additional treatment ponds. Copperfield is connected to an adjacent wetland when water levels are high. Many of these ponds receive surface runoff from residential and road development.

This area is a City-owned open space, and is intended for educating the public on native plantings and the importance of water management. The pond is located in a wooded area with mature trees. Some invasive buckthorn, amur maple, and garlic mustard are present in the area; however, the park and surrounding buffer is undergoing a native restoration in order to remove invasive species and re-establish a native vegetative buffer. The surrounding area includes residential neighborhoods in Mendota Heights.

### Wetland Health

**Site Observations:** Copperfield is part of a chain of ponds within an established neighborhood, but it is City-owned with no houses around it. The pathway to the pond is flat and wooded, with a buffer strip of grasses, ferns, irises, and goldenrod around the water's edge. The wetland slope is gentle, and the substrate is very mucky. Water levels were very low in 2021. Snails and leeches were observed dried on top of the exposed wetland bottom. Floating vegetation, including duckweeds (*Lemna* sp. and *Spirodela* sp.), water-meal (*Wolfia* sp.), and white water lily (*Nymphaea* sp.) crowd the open water. No submergent vegetation was present. Many species of emergent grasses and forbs were represented in the vegetation releve. Cattail (*Typha* sp.), arrowhead (*Sagittaria* sp.), spike-rush (*Eleocharis* sp.), smartweed (*Polygonum* sp.), reed canary grass (*Phalaris arundinacea*), and purple loosestrife (*Lythrum salicria*) were most prevalent. Leeches, dragonflies, caddisflies, snails, fingernail clams, trueflies, crustaceans, and bugs and beetles were collected.

**Table 4.8.1 Copperfield (MH-2) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (MH-2) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (22) | Moderate (17) |
| **Cross-check Rating (IBI score)** | Moderate (22) | Poor (15) |
| **Trend 1998-2021** | Variable | Stable |

**Figure 4.8.1 Invertebrate and vegetation trends for Copperfield (MH-2)**



Copperfield/Friendly Hills (MH-2) 1998-2021

Legend:
- ▲ Invertebrates
- ■ Vegetation
- ▲ Invertebrate x-check
- ■ Vegetation x-check
- — Invertebrates Trend
- --- Vegetation Trend

Y-axis: IBI Score (%) — Exc, Mod, Poor
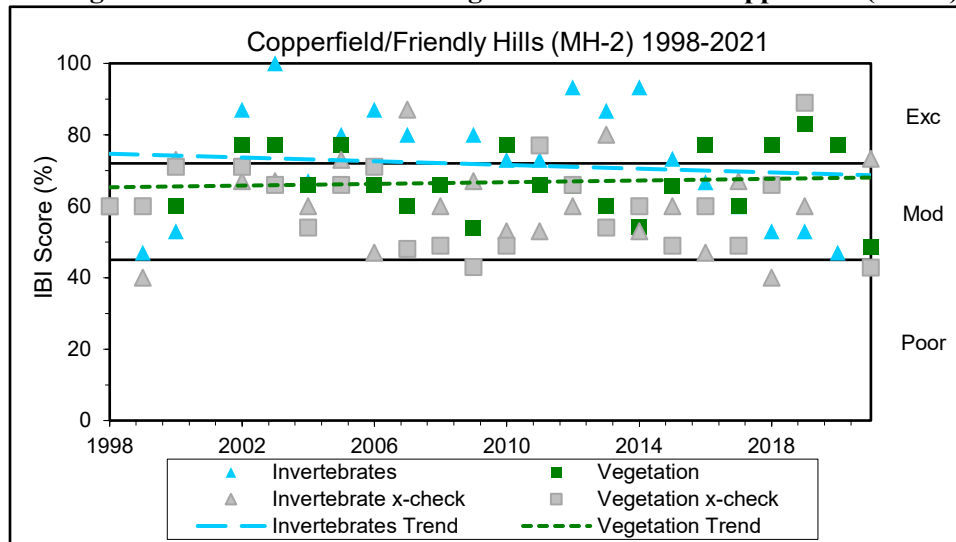
**Site Summary:** This is the 23rd year that MH-2 has been monitored since 1998. There is a lot of variability in the data throughout the years of monitoring. Both health data sets show steady long-term trends. Fluctuation in water levels from year to year may impact data results. The invertebrate and vegetation scores are inconsistent again, differing by 24 percent in 2021. MH-2 scores have showed this inconsistency several years. This wetland was cross-checked by another team. The invertebrate collections were very similar between teams. The City team found a large diversity of emergent vegetation represented in their vegetation plot, but the cross-check team observed none. However, the cross-check team did observe coontail (*Ceratophyllum* sp.), a submergent plant, while the City team found no submergent plants. Different vegetation plot placement likely affected these differences which caused a difference in scores.

## 4.8.2 City Hall-Orchard Heights (MH-20)

City Hall-Orchard Heights (MH-20) is a 10.6-acre, type 5 wetland located within the Lower Mississippi River Watershed. The water level has risen in recent years, and the wetland type has likely changed from a Type 3/Type 4 to a Type 5. The watershed is 80.9 acres and 30 percent impervious. There is one inlet on the northwest side of the wetland, and three inlets on the east side of the wetland. One stormwater inlet has a pretreatment sump manhole. There is also one outlet on the south side of the wetland. It is part of the City's stormwater management plan and is designated on the National Wetland



Inventory as wetland types PUBG/PEM1F/PEM1C/PEMA, and is designated as a Public Water on the Minnesota DNR's PWI. The wetland management goal is to protect and improve water quality and wildlife habitat, and provide flood storage and control.

NOELLE WANG, JAMIE NIKOLAI, GAYL GUSTAFSON, AND MICHELLE SKOG



JAMIE NIKOLAI AND NOELLE WANG

This wetland contains purple loosestrife, cattails (non-native), and some upland invasive species including buckthorn. Vegetation management of the upland areas, invasive species control, and recent development on the north side/shore cause disturbance concerns. The new development to the north includes two stormwater ponds with infiltration features. Curb-cut raingardens were completed in the neighborhood to the east, in the summer of 2019. A large portion of the area (south and east) is public open space and contains a raingarden, pollinator garden, and native prairie planting within the solar garden area. It is intended to help educate the public on the importance of stormwater Best Management Practices.

## Wetland Health

**Site Observations:** The wetland slope is gentle, and the substrate mucky. The water level is very low in 2021. Hummocks were all along the shallow water. The releve included a lot of cattail (*Typha* sp.). Duckweeds (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) were on the surface of the water. Coontail (*Ceratophyllum* sp.) was the only submergent vegetation found. Many emergent grasses and forbs were present. Smartweed (*Polygonum* sp.), spike-rush (*Eleocharis* sp.), and sedges (*Carex* sp.) were the most prevelent. Leeches, dragonflies, caddisflies, snails, crustaceans, and a single beetle were collected.

**Table 4.8.2 City Hall-Orchard Heights (MH-20) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (MH-20) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (18) | Moderate (17) |
| **Trend 2007-2021** | Not enough data | Not enough data |

**Figure 4.8.2 Invertebrate and vegetation trends for City Hall-Orchard Heights (MH-20)**



City Hall Orchard Heights (MH-20) 2007-2021
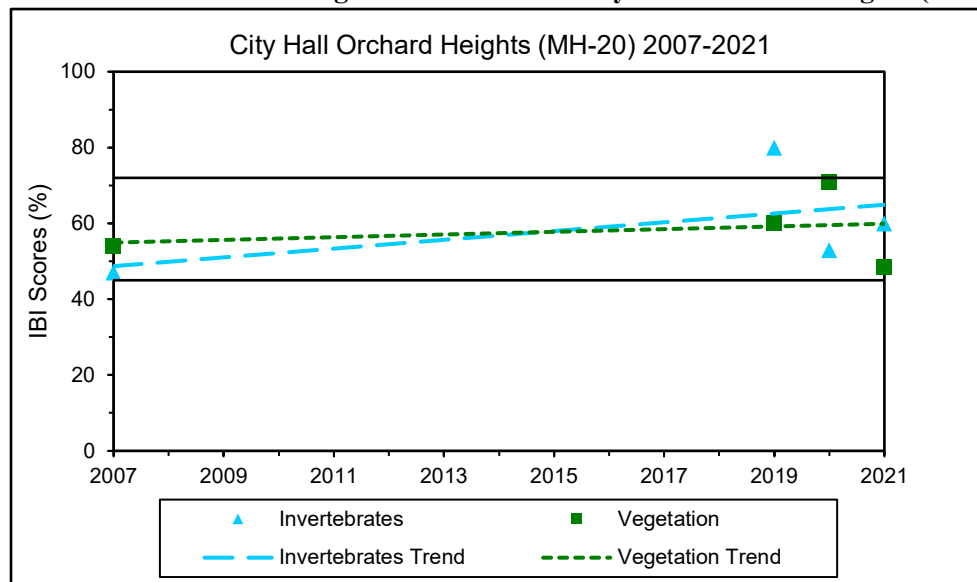
**Site summary:** This is the third consecutive time, and the fourth time overall, that MH-20 has been monitored for WHEP since 2007. The invertebrate and vegetation scores are inconsistent with each other, differing by 11 percent; though both scores indicate moderate wetland health. Low water levels may have affected scores in 2021. More years of data collection will help determine a more reliable health trend.

## 4.9 North Cannon River Watershed Management Organization

Two wetlands were monitored for North Cannon River Watershed Management Organization in 2021. This is the fifth year that North Cannon River WMO has monitored wetlands with WHEP. Three wetlands have been monitored for NCRWMO since their inclusion in WHEP.

**Team Leader**: Katie Hoffman and Nicole Ruppert



North Cannon River WMO WHEP Sites Monitored in 2021

**Team Members**: Cully Hanek, Jay Kummet, Sterling Kummet, Sydney Specht, and Colleen Vitek
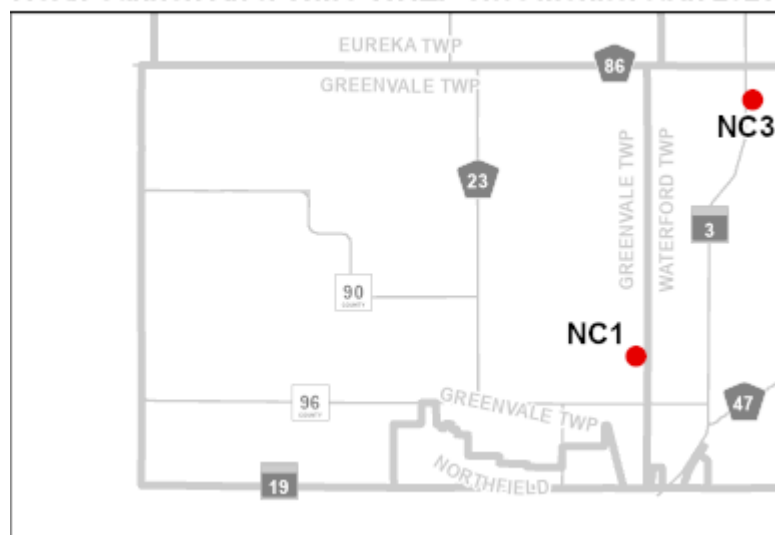
KATIE HOFFMAN

Katie Hoffman and Nicole Ruppert are the team leaders of the North Cannon River WHEP team. Katie recently graduated from St. Olaf College with a degree in Biology and Environmental Studies, and she works in a freshwater ecology lab at the University of Minnesota. This was her first year as a team leader.


NICOLE RUPPERT

Katie said, "This year we had a great crew of volunteers. Although there were a few sunken bottle traps, some wet feet, and one dry wetland, our team ventured through muck and cattails to make the most of the summer."


ASHLEY GALLAGHER

Ashley Gallagher is a Senior Resource Conservationist for Dakota County Soil and Water Conservation District. She explained, "We serve as the Administrator for the North Cannon River Watershed Management Organization (NCRWMO). The NCRWMO is a watershed in the southern part of Dakota County. A Board of managers with representation from eight townships and three cities oversees watershed management and planning in the North Cannon River Watershed area. One goal within the NCRWMO watershed management plan is 'to inform landowners, children, and local units of government, about the watershed and human impacts on water quality and quantity, and to invite public participation in watershed management processes.' In 2017, the Board decided to participate in WHEP for the first time. They are pleased with the way the program uses volunteers to conduct the monitoring, which helps increase public awareness of the watershed and the issues it faces.

## North Cannon River WMO General Wetland Health

Figure 4.9 presents an overall view of wetland health for all the 2021 monitoring sites in North Cannon River WMO based on the scores for invertebrates and vegetation presented as a percent. Figure 4.9 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate and vegetation scores that differ by ten percent or less are considered consistent. Based on the IBI scores, a wetland health rating is assigned as excellent, moderate or poor. Invertebrate and vegetation scores ranged from poor to moderate wetland health. Invertebrate and vegetation scores for NCR-3 were inconsistent with each other, differing by 13 percent.

**Figure 4.9 North Cannon River WMO site scores (percent) for 2021**
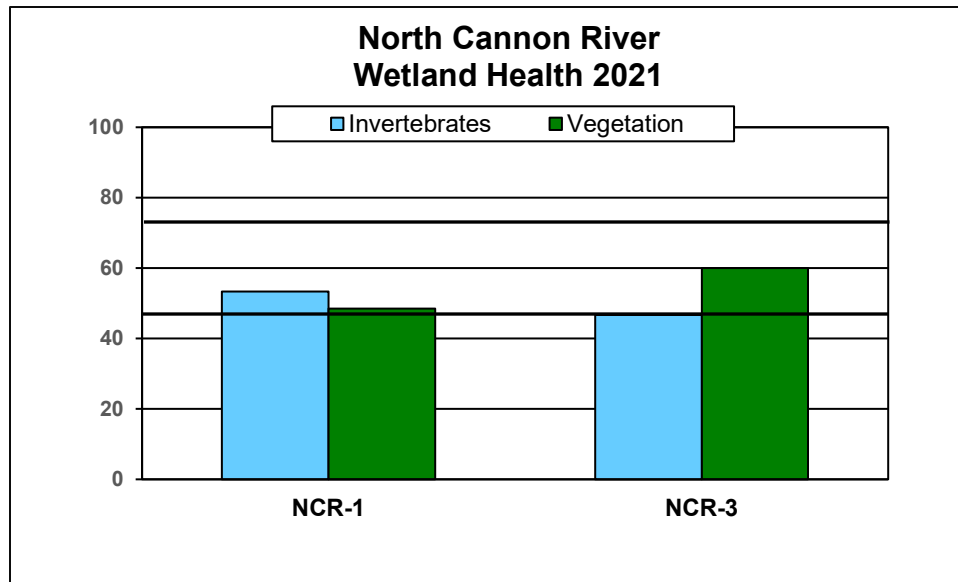


## 4.9.1 Loretto Wetland (NCR-1)

Loretto Wetland (NCR-1), formerly known as Wasner, is a 0.5-acre, type 4 wetland within the Cannon River Watershed. The wetland watershed is 160 acres with four percent impervious surface. A wetland restoration was completed in 1996. The wetland management goal is to maintain the wetland and determine the effectiveness of the restoration.

This wetland is located within the Greenvale Township in southwest Dakota County. The surrounding area is predominately agricultural. There is potential for future development in the area.
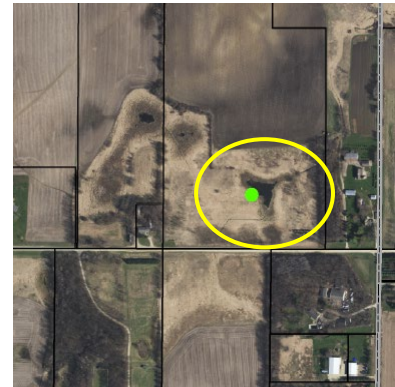


**Wetland Health**

**Site Observations:** The wetland slope is gentle, and the substrate is very mucky. An organic farm is north of the wetland and a conventional farm is to the west. Water levels were very low in 2021. Cattails (*Typha* sp.), reed canary grass (*Phalaris arundinacea*), and bur-reed *(Sparganium)* dominate the shoreline. Duckweeds (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) cover the water surface. Pondweed (*Potamogeton* sp.) is the only submergent vegetation represented in vegetation plot. Bulrush (*Scirpus* sp.), spike-rush (*Eloeocharis* sp.), and water plantain (*Alisma* sp.) were also present. Leeches, dragonflies, damselflies, snails, fingernail clams, trueflies, crustaceans, and bugs and beetles were collected.



STERLING KUMMET AND KATIE HOFFMAN

**Table 4.9.1 Loretto Wetland (NCR-1) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (NCR-1) | Invertebrates | Vegetation |
|---|---|---|
| Wetland Health Rating (IBI score) | Moderate (16) | Moderate (17) |
| Cross-check Rating (IBI score) | Moderate (16) | Poor (13) |
| Trend 2017-2021 | Variable | Stable |

**Figure 4.9.1 Invertebrate and vegetation trends for Loretto Wetland (NCR-1)**
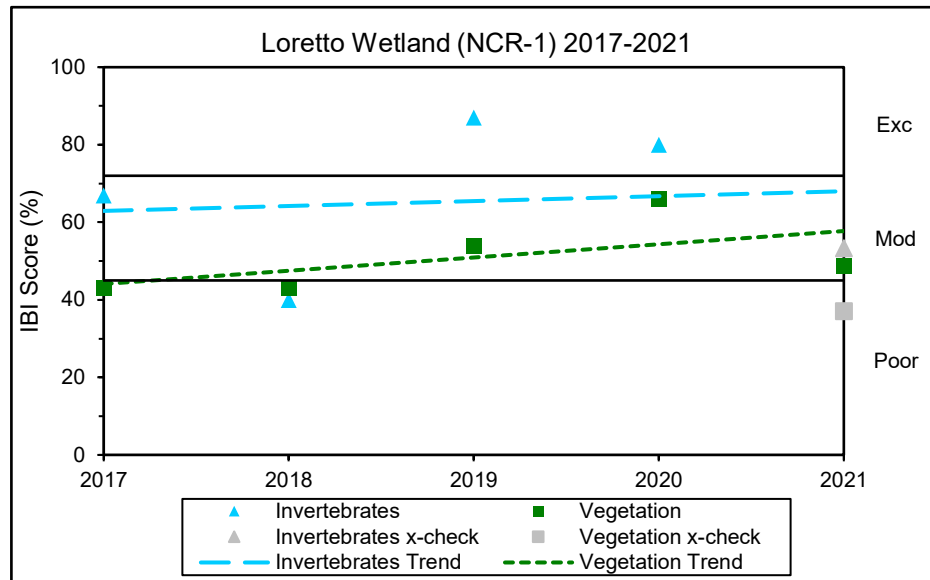


**Site summary:** This is the fifth consecutive year that Loretto Wetland has been monitored by WHEP volunteers. The invertebrate and vegetation health scores were consistent, both indicating moderate wetland health. Invertebrate scores declined in 2021 compared to the previous two years; however, low water levels and reduced submergent vegetation likely impacted invertebrate collection. The vegetation scores were showing improvement each year until 2021. Again, low water levels likely impacted plot placement and submergent plant presence. This wetland was cross-checked by another team. Data for both invertebrates and vegetation were very similar. Minor differences in the vegetation surveys (Aquatic Guild and Persistent litter Metrics) affected the vegetation scores. More years of data will help determine a more reliable health trend.



STERLING KUMMET, KATIE HOFFMAN, AND NICOLE RUPPERT

## 4.9.2 Jordan Wetland (NCR-3)

Jordan Wetland (NCR-3) is a 25-acre, type 3 shallow marsh within the Cannon River Watershed. The wetland watershed is 33 acres with nine percent impervious surface. The wetland management goal is to restore for the State of Minnesota Wetland Bank.

The surrounding area includes agriculture and roads. The site was cropped until 2018 when restoration work began. The drainage ditches were filled and a berm was built to hold back water. Vegetation work and seeding throughout the easement have created various wetland and upland habitats.
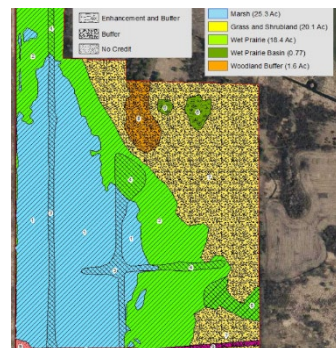
**Wetland Health**

**Site Observations:** The wetland slope is gentle, and the substrate is fairly solid. There are no trees, as it is located in the remnants of a agricultural field. The site was very dry in 2021. Only small populations of water-crowfoot (*Ranunculus* sp.) and duckweed (*Lemna* sp.) were found in the small amount of standing water. Water-plantain (*Alisma* sp.), arrowhead (*Sagittaria* sp.), bulrush (*Scirpus* sp.), cut grass (*Leersia* sp.), and cattail dominated the vegetation releve. Reed canary grass (*Phalaris arundinacea*), spike-rush (*Eleocharis* sp.), smartweed (*Polygonum* sp.), and beggar-ticks (*Bidens*) were also present. Leeches, dragonflies, snails, trueflies, and bugs and beetles were collected.

**Table 4.9.2 Jordan Wetland (NCR-3) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (NCR-3) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (14) | Moderate (21) |
| **Trend 2020-2021** | Not enough data | Not enough data |

**Figure 4.9.2 Invertebrate and vegetation trends for Jordan Wetland (NCR-3)**
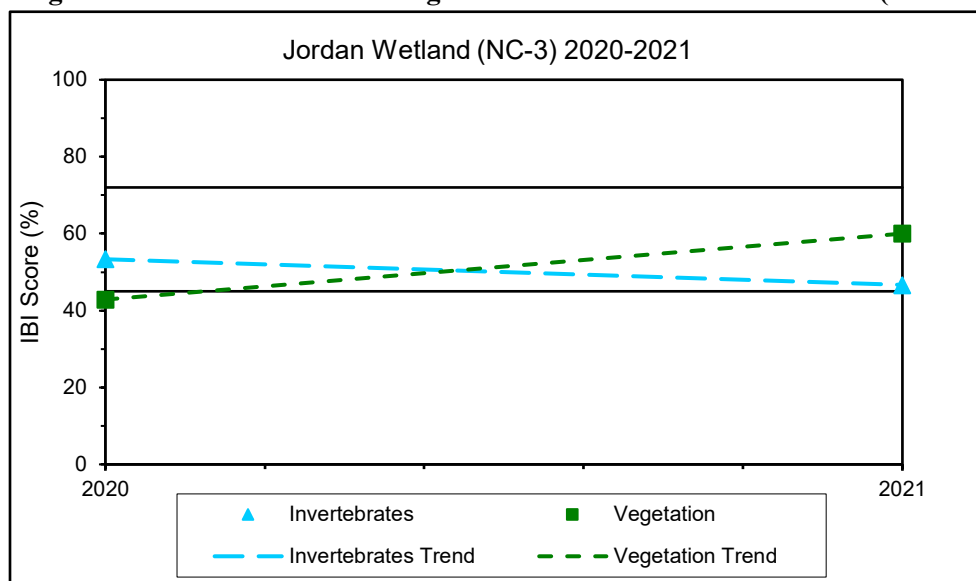
**Site summary:** This is the second year that Jordan wetland has been monitored by WHEP volunteers. The invertebrate and vegetation scores were inconsistent, differing by 13 percent. The invertebrate data indicates poor wetland health, while the vegetation data indicates moderate wetland health. The vegetation was lacking in submergent and floating vegetation. Low water levels likely impacted the wetland invertebrates and vegetation community. Perhaps as the restoration stabilizes, the vegetation diversity will increase and provide more habitat for invertebrates. The vegetation plot was cross-checked by Fortin Consulting. Very similar data was found by the WHEP team and FCI. Additional years of monitoring will help to determine more reliable wetland health trends.

## 4.10  Rosemount Wetlands

Four wetlands were monitored in the City of Rosemount in 2021. The City has 24 years of WHEP data! Twenty-four wetlands have been monitored in Rosemount since the start of WHEP.

**Team Leaders**: Amy Jo Forslund and Lisa Wolfe

**Team Members**: Theresa Back, Maria Back, Charles Bauman, Riley DePaulis, Matt Drinen, Benjamin Funk, Stephan Hoche, Caleb Jones, Tory Kaye Witten, Hank Myers, Jacie Myers, Eric Nelson, Jane Porterfield, Janet Rohlf, Dave Steimer, Phyllis Stratman, Gunnar Vraa, and Denise Wilkens.



Rosemount WHEP Sites Monitored in 2021
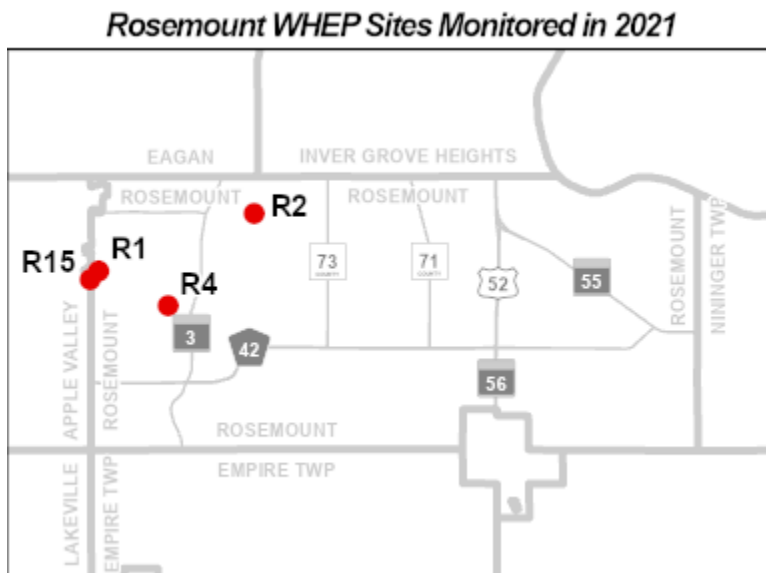
Amy Jo Forslund is the co-team leader for Rosemount. She was originally an Eagan volunteer from 2007 to 2012. In 2016, returned as the Rosemount team leader. She has worked as an environmental educator and with several metro area parks including Three Rivers Park District, Dakota County Parks, and Tamarack Nature Center. She explained, "as an environmental educator I have taught many elementary age children about natural history topics, and one of my favorite topics is wetlands. Being a part of WHEP has been a great opportunity to delve deeper into the wetland world. I want to thank the WHEP Rosemount team for their dedication, knowledge, and their masterful skills. I also want to thank co-leader Lisa Wolfe. I love our team! It is honor to be a part of such a wonderful Citizen Science project."



AMY JO FORSLUND

LISA WOLFE

Lisa Wolfe is the co-team leader for the Rosemount team. She said, "I started volunteering for WHEP in 2018 and really loved the program. It was so well organized and very adaptive to the interests and commitment levels of the volunteers. What I love about WHEP the most is that not only does it benefit the local environment and ecology, but it also brings neighbors together in the community. This season we had lots of new volunteers who brought so much passion and energy to the program. Combined with our experienced veterans, we were a very strong team that worked together to solve problems and literally pull each other out of the mud! I am grateful to all of our volunteers that made this year so rewarding for me."

Jane Byron is the Stormwater Specialist and WHEP coordinator at the City of Rosemount. She has been involved in WHEP for many years. She commented, "We get really great data from this program, and our volunteers have really come through for us during the pandemic. It will be interesting to see how the drought may have affected these wetlands after so many years of so much water. We wouldn't be able to see the potential effects without the diligence of our skilled volunteers."


JANE BYRON

## Rosemount General Wetland Health

The City of Rosemount has a wetland management plan which includes four different categories of protection. Vegetated buffers are required around wetlands in new developments, with the buffer size determined by the wetland protection designation.

| Wetland designation | Required buffer |
|---|---|
| Preserve Wetlands | 75 feet |
| Manage I Wetlands | 50 feet |
| Manage II Wetlands | 30 feet |
| Utilize Wetlands | 15 feet in non-agricultural areas only |

Figure 4.10 presents an overall view of wetland health for all the 2021 monitoring sites in Rosemount based on the scores for invertebrates and vegetation presented as a percent. Figure 4.10 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate and vegetation scores that differ by ten percent or less are considered consistent. Based on the IBI scores, a wetland health rating is assigned as excellent, moderate or poor. The four wetlands scored moderate to poor health. The invertebrate and vegetation scores for wetland R-15 were inconsistent, differing by 13 percent.


MATT DRINEN, DAVE STEIMER, PHYLLIS STRATMAN, LISA WOLFE, AND JANE PORTERFIELD

**Figure 4.10 Rosemount site scores (percent) for 2021**



Rosemount
Wetland Health 2021

Legend: ☐ Invertebrates ■ Vegetation

Y-axis: Wetland Health Rating IBI Score (%) — 0, 20, 40, 60, 80, 100

Right-side labels: Exc, Mod, Poor

X-axis: Wetland Site — R-1, R-2, R-4, R-15
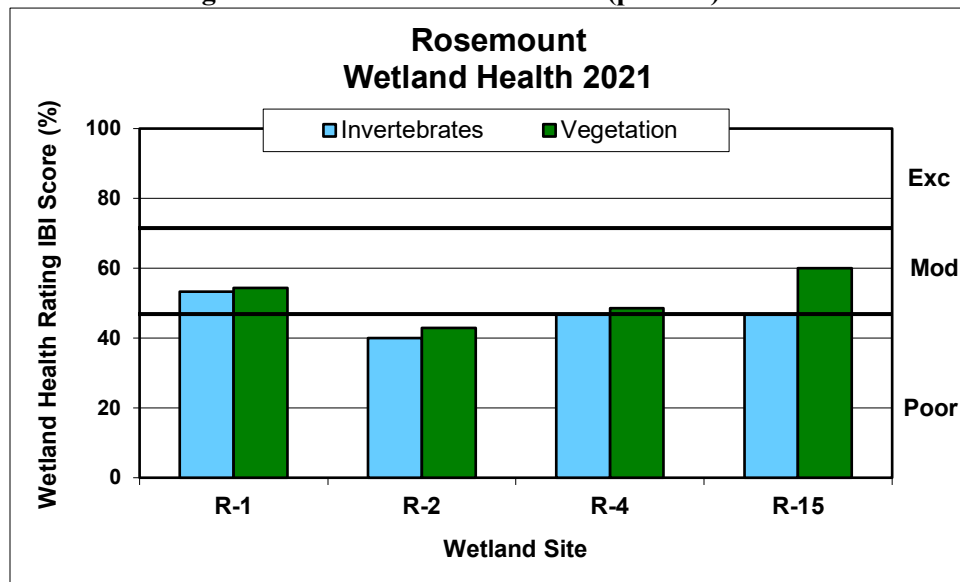
## 4.10.1  Kelly Marsh (R-1)

Kelly Marsh (R-1), also known as WMP #362, is a 1.3 acre, type 5 wetland within the Birger Pond subwatershed of the Vermillion River Watershed. The subwatershed is 897 acres with 80 percent impervious surface. There is one inlet on the north side and one outlet on the south side of the wetland. Kelly Marsh is part of the City's stormwater management plan and is designated to preserve with a management goal to maintain wetland without loss of function and value, and to maximize potential for education purposes by taking advantage of surrounding residential area and park.



The wetland is within a basin surrounded by residences and a city park. The wetland basin is affected by storm water runoff from the nearby development which is encroaching upon the existing 75-foot buffer.

**Wetland Health**

**Site Observations:** The wetland slope is gentle. The wetland substrate is very mucky. The wetland is within Innisfree Park and surrounded by trees including willows (*Salix* sp.) The water levels were low in 2021, and dropped between invertebrate samples in June and vegetation surveys in July. Duckweeds (*Lemna* sp. and *Spirodela* sp.), water-meal (*Wolfia* sp.), and white water lilies (*Nymphaea* sp.) crowd the surface of



AMY JO FORSLUND AND
CHUCK BAUMAN

Dakota Co. WHEP
2021 Report      Fortin Consulting, Inc., now Bolton & Menk, Inc.      March 2022
     P a g e  |  **8 7**

the water.  Dense populations of coontail (*Ceratophyllum* sp.), waterwead (*Elodea* sp.), and pondweed (*Potamogeton* sp.) fill the submergent zone.  Spike rush (*Eleocharis* sp.), smartweed (*Polygonum* sp.), water plantain (*Alisma* sp.), and reed canary grass (*Phalaris arundinacea*) were also present. Very few emergent plants were observed.  Leeches, dragonflies, damselflies, caddisflies, snails, fingernail clams, truflies, crustacens, and beetles and bugs were collected.

**Table 4.10.1 Kelly Marsh (R-1) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (R-1) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (16) | Moderate (19) |
| **Cross-check Rating (IBI score)** | Poor (12) | Moderate (19) |
| **Trend 1998-2021** | Stable | Stable |

**Figure 4.10 .1 Invertebrate and vegetation trends for Kelly Marsh (R-1)**
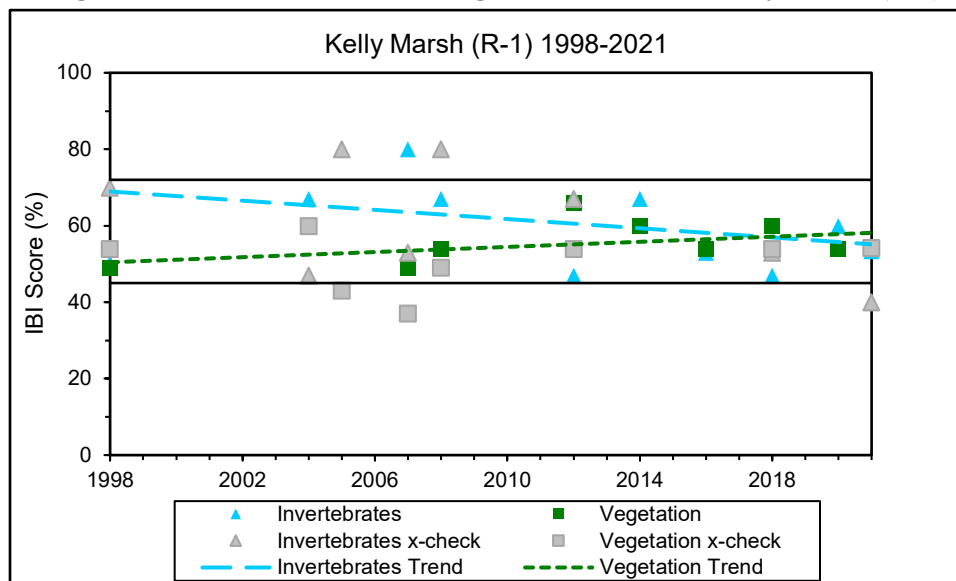


**Site summary:**   This is the eleventh time Kelly Marsh has been monitored since 1998. The invertebrate and vegetation health scores are very consistent with each other in 2021, and indicate moderate wetland health. The low water levels don't appear to have impacted the data trends of the last several years of monitoring.  This wetland was cross-checked by another team.  The vegetation data findings for both teams was very similar.  The invertebrates scores between teams are inconsistent, differing by 13 percent.  The City team found a larger diversity of invertebrates including dragonflies, damselflies, and caddisflies.

## 4.10.2  White Lake (R-2)

White Lake (R-2), also known as WMP #152, is a 22-acre, type 5 openwater wetland within the White Lake subwatershed of the Vermillion River Watershed. The subwatershed is 998 acres with 30 percent impervious surface.  There is one outlet on the south side of the wetland, but no inlets.  White Lake is part of the City's stormwater management plan and is designated to preserve with a management goal to maintain wetland and its existing functions, values, and wildlife habitat.



The surrounding area includes an active agricultural field and large-lot residential properties.  The wetland receives some stormwater flow from the south and nonpoint runoff from adjacent areas.  There are existing, undedicated, buffers around the wetland.  This waterbody has had some periods of long term high water since 2018 that could have had short term impacts on near shore habitat.

### Wetland Health

**Site Observations:**  The wetland slope is steep.  The wetland substrate is mucky.  The water levels are lower than in previous years, but still gets deep pretty quickly.  A very low diversity of vegetation was observed in 2021.  A dense population of coontail (*Ceratophyllum* sp.) was prevelant.  Cattails (*Typha* sp.) ringed the wetland.  Duckweeds (*Lemna* sp. and *Spirodela* sp.) and white water lilies (*Nymphea* sp.) floated on the water surface.  Smartweed (*Polygonum* sp.) and arrowhead (*Sagittaria* sp.) were also present. Leeches, mayflies, snails, fingernail clams, crustaceans, and beetles and bugs were collected.



JANE PORTERFIELD, DAVE STEIMER, AND CALEB JONES

**Table 4.10.2 White Lake (R-2) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (R-2) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (12) | Poor (15) |
| **Trend 1998-2021** | Variable | Stable |

**Figure 4.10.2 Invertebrate and vegetation trends for White Lake (R-2)**



White Lake (R-2) 1998-2021
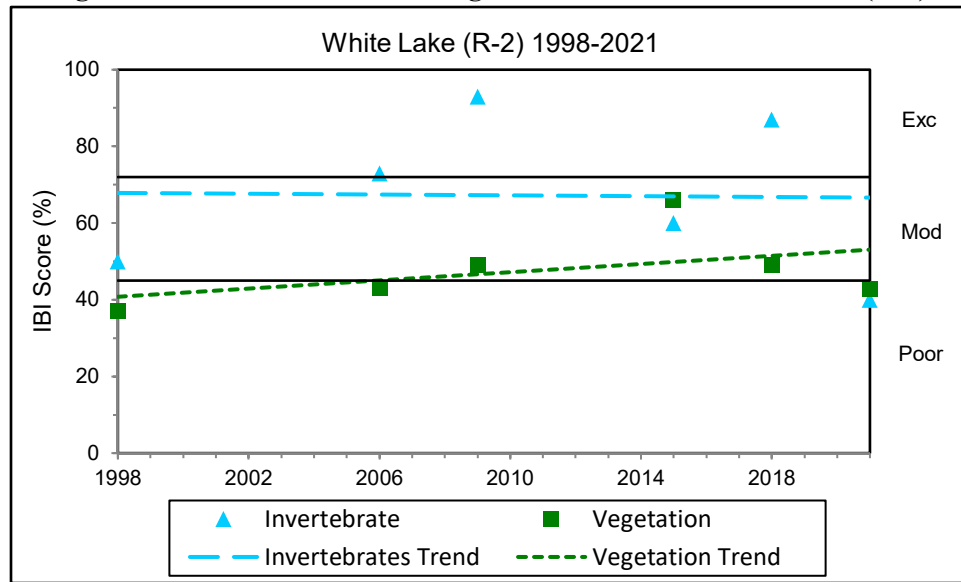
**Site summary:** This is the sixth year that R-2 has been monitored since 1998. The invertebrate and vegetation scores were consistent, both indicating poor wetland health. The invertebrate score declined in 2021. The vegetation diversity was very low, dominated by a dense growth of coontail, and including only small populations of a few other plants which is very similar to past years. The vegetation data appears stable while the invertebrates data is variable. Safe access may be a factor for invertebrate and vegetation sampling at this site. More years of data will help determine more reliable health trends.

## 4.10.3 Schwarz Pond (R-4)

Schwarz Pond (R-4), also known as WMP #431, is an 11-acre, type 5 wetland in the Erickson Pond subwatershed of the Vermillion River Watershed. The subwatershed is 1,832 acres with 25 percent impervious surface. There is one inlet on the northwest shoreline, one inlet on the southern shoreline, and one inlet on the eastern shoreline of the wetland. There is one outlet on the eastern side of the wetland at the liftstation. It is included in the City's stormwater management plan and is designated to preserve with a management goal to maintain wetland and its existing functions, values, and wildlife habitat.
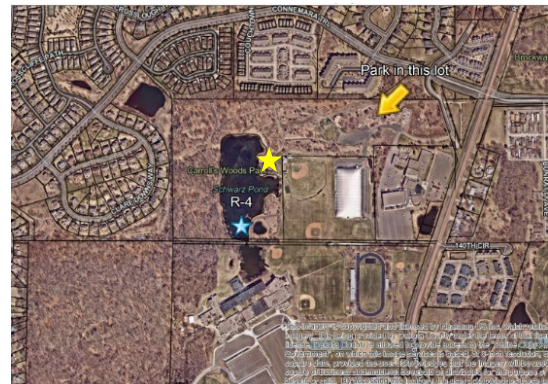


This is a medium sized pond surrounded by parkland and institutional land uses. The pond receives suburban and parkland runoff, and disturbances associated with those land uses. Upstream ponds and large buffers mitigate for the existing runoff. Some buckthorn removal and vegetation management has occurred in nearby parkland in recent years.

## Wetland Health

**Site Observations:** The wetland slope is gentle. The wetland substrate is very mucky. The water level is very low in 2021. A low diversity of vegetation is observed. A dense population of pondweed (*Potamogeton* sp.) dominates the vegetation releve. Duckweeds (*Lemna* sp. and *Spirodela* sp.) cover the water surface. Cattail (*Typha* sp.), arrowhead (*Sagittaria* sp.), smartweed (*Polygonum* sp.), spike-rush (*Eleocharis* sp.), and reed canary grass (*Phalaris arundinacea*) were present. Leeches, damselflies, mayflies, caddisflies, snails, fingernail clams, crustaceans, and bugs and beetles were collected.

**Table 4.10.3 Schwarz Pond (R-4) Wetland Health based on Index of Biotic Integrity**

| **2021 Data (R-4)** | **Invertebrates** | **Vegetation** |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (14) | Moderate (17) |
| **Trend 1999-2021** | Stable | Stable |

**Figure 4.10.3 Invertebrate and vegetation trends for Schwarz Pond (R-4)**
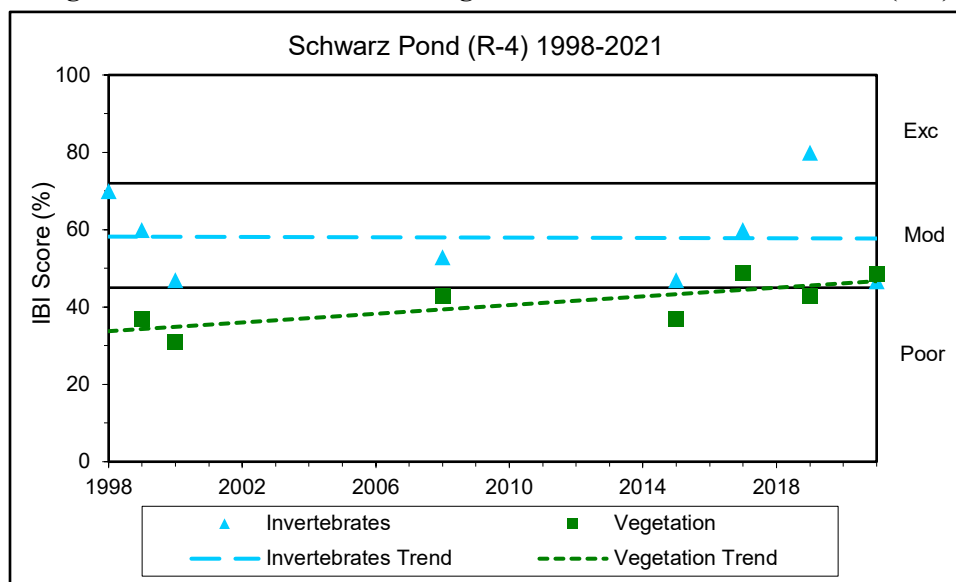


**Site summary:** This is the eighth time Schwarz Pond has been monitored since 1998. The invertebrate and vegetation health scores were very consistent., even though the invertebrate score indicates poor wetland health while the vegetation score indicates moderate wetland health. The invertebrate and vegetation data trend have both remained fairly stable with minor fluctuation. The vegetation population is similar to previous data. Low water levels may have impacted invertebrate collection.

## 4.10.4 Birger Mitigation Area (R-15)

Birger Mitigation Area (R-15) is a 0.6-acre, type 5 open water wetland within the Birger Pond subwatershed of the Vermillion River Watershed. The subwatershed is approximately 897 acres with 20 percent impervious surface. There is one inlet on the northeast shoreline, and no outlets. Birger Pond is part of the City's stormwater management plan and is designated to preserve with a management goal to maintain wetland and its existing functions, values, and wildlife habitat. The wetland has a small, undedicated buffer surrounded by parkland and residential properties. The near shore habitat may have been impacted by high water in recent years. Fish kill of minnows and bullheads occurred over winter.
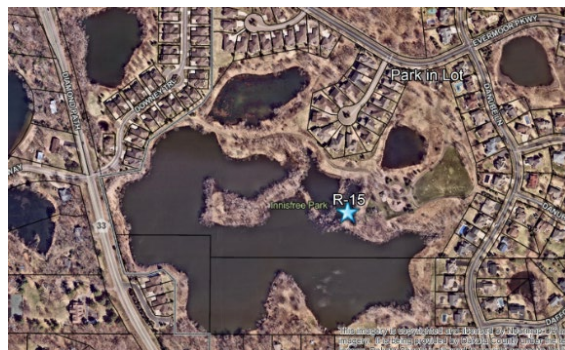


### Wetland Health

**Site Observations:** The wetland slope is steep, and water gets deep quickly. The wetland substrate is solid. Dense populations of waterweed (*Elodea* sp.) and coontail (*Ceratophyllum* sp.) crowded the submergent zone. Duckweeds (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) floated on the surface of the water. Cattail (*Typha* sp.), smartweed (*Polygonum* sp.), and reed canary grass (*Phalaris arundinacea*) were the only emergent grasses and forbs present. The shoreline has a buffer of overhanging trees including willow (*Salix* sp.), cottonwood (*Populus* sp), and maple (*Acer* sp.). Leeches, dragonflies, caddisflies, snails, true flies, crustaceans, and beetles and bugs were collected.



JANE PORTERFIELD AND DAVE STEIMER

**Table 4.10.4 Birger Pond (R-15) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (R-15) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (14) | Moderate (21) |
| **Trend 2005-2021** | Not enough data | Not enough data |

**Figure 4.10.4 Invertebrate and vegetation trends for Birger Pond (R-15)**



Birger Pond (R-15) 2005-2021
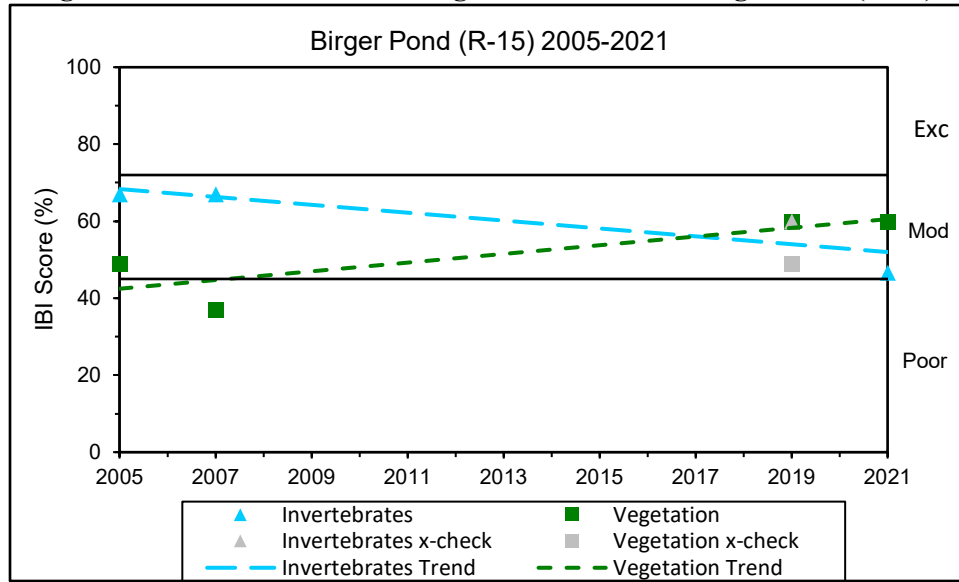
**Site summary:** This is the fourth year that R-15 has been monitored since 2005. The invertebrate and vegetation scores were inconsistent, differing by 13 percent. Invertebrate score indicates poor wetland health while the vegetation score indicates moderate wetland health. The steep shoreline of this wetland is dominated by a variety of trees, but low in emergent grasses and forbs. The water column provides a dense but low diversity of submergent and floating plants. This is similar to data in 2019. The invertebrate score may have been impacted by severe water level fluctuations in 2021. More years of data will help determine a more reliable health trend.

## 4.11 South St. Paul Wetlands

Two wetlands were monitored in South St. Paul in 2021 by the South St. Paul team. The City has 16 years of WHEP data! Four wetlands have been monitored in South St. Paul since the start of the WHEP program.

**Team Leader**: Rachel Funke

**Team Members**: Josie Allaire, Jeff Brenner, Julie Brenner, Ken Chlebanowski, Dllonna Clendenen, Anna Deneen, Emily Evans, Luann Hoganson, Ashley Lakes, Sue Polka, Kari Stonecipher, Cindy Swaim, and Don Wendel



South St. Paul WHEP Sites Monitored in 2021

This was Rachel's third year as a WHEP team leader. Rachel currently works for Capitol Region Watershed District in Saint Paul, where she assists with various water quality improvement projects. Rachel enjoyed the variety of experiences and assets that her volunteers brought to the team in 2021.

The City of South St. Paul has relatively few wetlands compared to most Cities which is why it is important to monitor the functionality and health of this limited natural resource in the community to ensure it is protected. The City appreciates the WHEP program, and its volunteers help in monitoring the wetlands' health, and will continue to support the program.

## South St. Paul General Wetland Health

Figure 4.11 presents an overall view of wetland health for all of the 2021 monitoring sites in South St. Paul based on the IBI scores for invertebrates and vegetation presented as a percent. Figure 4.11 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate and vegetation scores that differ by ten percent or less are considered consistent. Based on the IBI scores, a wetland health rating is assigned as excellent, moderate or poor. In 2021, the invertebrates and vegetation health scores ranged from poor to moderate. The invertebrates and vegetation scores for SSP-1 and SSP-3 were inconsistent, differing by 29 and 16 percent, respectively.

VEGETATION PLOT SET-UP BY SSP

**Figure 4.11 South St. Paul site scores (percent) for the 2021 sampling season**
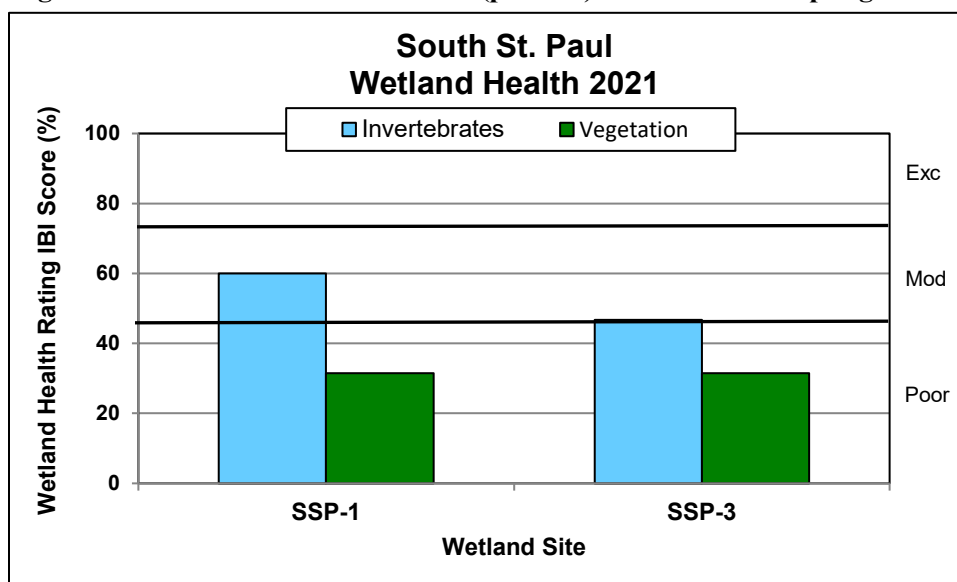
## 4.11.1 Anderson Pond (SSP-1)

Anderson Pond (SSP-1) is a 2.4-acre, type 4 wetland within the Lower Mississippi River Watershed. The drainage area is 168 acres, and is approximately 15 percent impervious. It is publicly owned. It has three inlets: one inlet on the north side of the wetland, one inlet on the west side, and one inlet on the south side. There is also an outlet on the south side of the wetland. It is part of the City's Stormwater Management Plan.
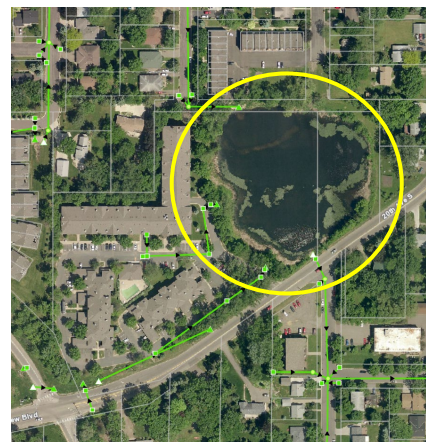
Virtually all of the area that contributes to this wetland is fully developed. In 2008, the City performed an extensive dredging of Anderson Pond. The cattails are returning on the east and west sides of the pond. A separate maintenance cell was created near the northwest inlet to facilitate future dredging and other maintenance activities. Additional dredging was done in 2011 and 2012. In 2009, Southview Pond was constructed as a pre-treatment measure for the runoff from Highway 52 and West St. Paul, prior to conveyance into Anderson Pond. Highway 52 is a major contributor to Anderson Pond as is the City of West St. Paul (over 90% of the pond's watershed is in West St. Paul). The pond is in an older established residential area surrounded by roads, apartment blocks, and houses.

**Wetland Health**

**Site Observations:** The wetland slope is gentle. The wetland substrate is mucky. The water level is low in 2021. A thick band of cattails (*Typha* sp.) surrounds about 75 percent of the wetland shoreline. The area without the cattails has large overhanging trees. Coontail (*Ceratophyllum* sp.) dominated the vegetation plot. Pondweed (*Potamogeton* sp.), duckweed (*Lemna* sp. and *Spirodela* sp.), arrowhead (*Sagittaria* sp.), smartweed (*Polygonum* sp), jewelweed (*Impatiens* sp.), purple loosestrife (*Lythrum salicaria*), beggar-ticks (*Bidens* sp.), and sedges (*Carex* sp.) were also present. Leeches, dragonflies, damselflies, mayflies, caddisflies, snails, trueflies, and crustaceans were collected. Chinese mystery snails (*Cipangopaludina chinensis*) were abundantly present.

**Table 4.11.1 Anderson Pond (SSP-1) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (SSP-1) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (18) | Poor (11) |
| **Trend 2001-2021** | Variable | Stable |

**Figure 4.11.1 Invertebrate and vegetation trends for Anderson Pond (SSP-1)**



Anderson Pond (SSP-1) 2001-2021
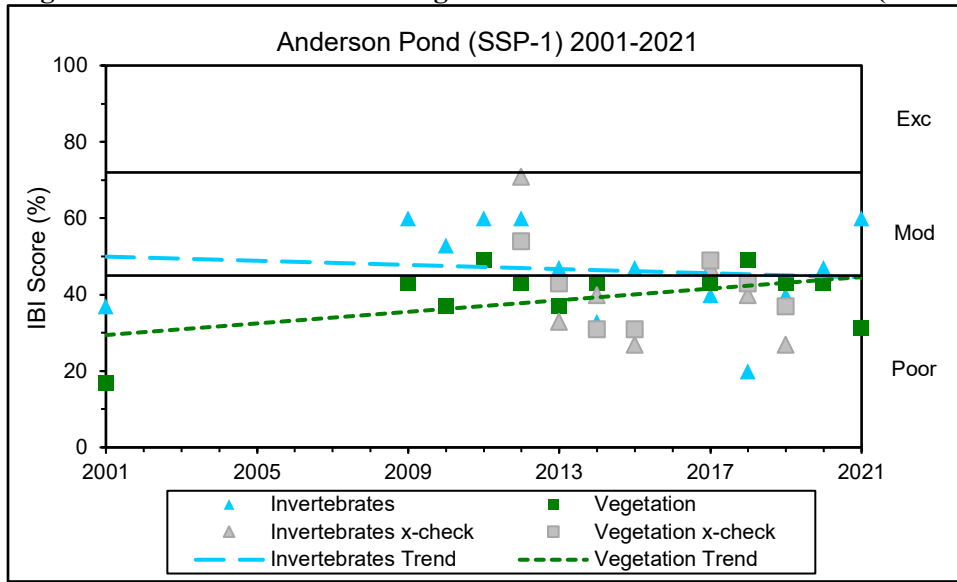
**Site Summary:** This is the thirteenth time that SSP-1 has been monitored since 2001.  The invertebrate and vegetation scores are very inconsistent, differing by 29 percent.  The invertebrate score indicates moderate wetland health while the vegetation score indicates poor wetland health.  The vegetation data was similar to that of the past few years of surveys.   The vegetation trend appears stable since 2009. Lower water levels, in 2021, may have affected plot placement.  The invertebrate diversity was greater in 2021.  Highway 52 contributes stormwater input to the wetland.   An abundant but low diversity of vegetation provides adequate habitat to support a large diversity of invertebrates.  Perhaps low rainfall eliminated additional stormwater pollution allowing invertebrate populations to thrive in 2021.

## 4.11.2 LeVander Pond (SSP-3)

LeVander Pond, also known as SSP-3, is a 3.4-acre, type 4 wetland within the Lower Mississippi River Watershed.  Its watershed is 37.9 acres which is approximately 20 percent impervious.  It is part of a City of South St. Paul easement.  There is one inlet on the west side, one on the north side, and one on the east side.  There is one outlet on the north side of the wetland.  It is part of the City's stormwater management plan.



Virtually all of the area that contributes to this wetland is fully developed. In 2008, LeVander Estates, a new development was completed on the east side of LeVander Pond.  A trail was constructed down to the pond. During an upgrade at the Wentworth/Thompson interchanges, Mn/DOT installed a pretreatment basin south of the pond to improve drainage. Highway 52 is a major contributor to LeVander Pond as is the City of West St. Paul.

## Wetland Health

**Site Observations:** The wetland slope is gentle. The substrate is very mucky. The wetland surface is covered in duckweed (*Lemna* sp. and *Spriodela* sp.) and water-meal (*Wolfia* sp.). Coontail (*Ceratophyllum* sp.) was the only submergent vegetation observed. Cattails (*Typha* sp.), reed canary grass (*Phalaris arundinacea*), willow trees (*Salix* sp.), cottonwood trees (*Populus* sp.), and buckthorn (*Rhamnus cathartica*) surround the wetland. No other emergent grasses or forbs present. Leeches, snails, trueflies, crustaceans, and bugs and beetles were collected.



LEVANDER POND AFTER RAIN

**Table 4.11.2 LeVander Pond (SSP-3) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (SSP-3) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (14) | Poor (11) |
| **Cross-check Rating (IBI score)** | Poor (12) | Moderate (19) |
| **Trend 2009-2021** | Declining | Stable |

**Figure 4.11.2 Invertebrate and vegetation trends for LeVander Pond (SSP-3)**
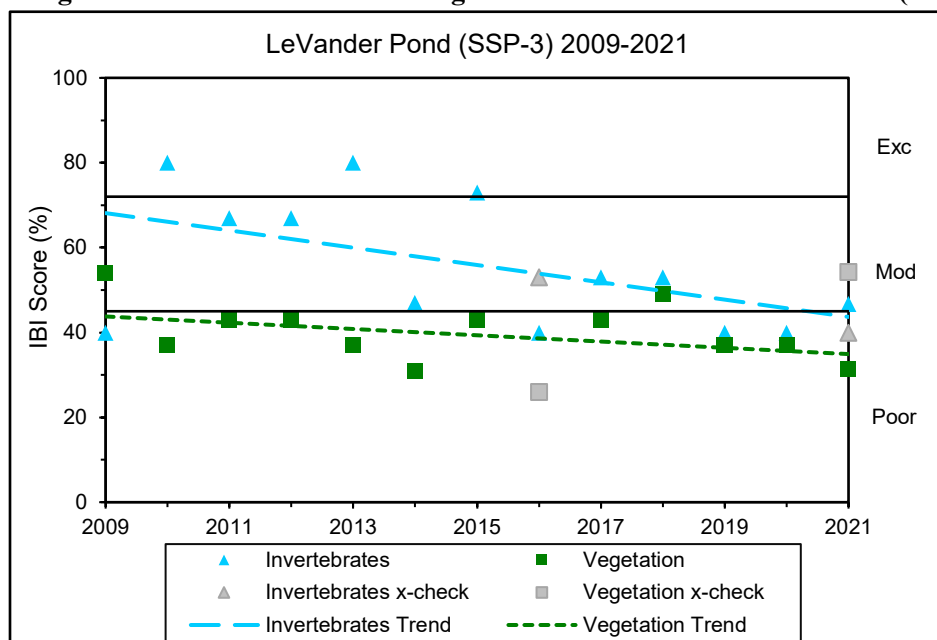


**Site summary:** This is the thirteenth consecutive year of monitoring LeVander Pond. The vegetation and invertebrates scores were inconsistent with each other in 2020, differing by 16 percent; however, both

scores indicate poor wetland health. The invertebrate scores have fluctuated between poor and excellent over the years. The vegetation trend appears stable. This wetland was cross-checked by another team in 2021. The invertebrate scores were consistent with each other, and the data is similar. The vegetation scores are inconsistent, though, differing by 23 percent; however, the vegetation data is very similar. Differences in the non-vascular and persistent litter metrics measured different values for the data. Plot positioning likely caused the differences in observations.
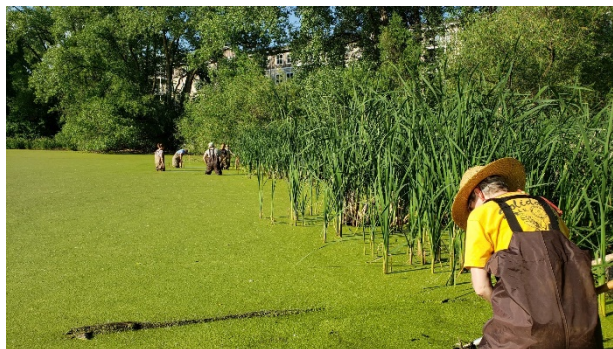


SETTING BOTTLE TRAPS AT LEVANDER POND

## 4.12 West St. Paul Wetlands

Four wetlands were monitored in West St. Paul in 2021 by the West St. Paul team. The City of West St. Paul has 22 years of WHEP data! Eleven wetlands have been monitored in West St. Paul since the City became involved with WHEP in 1999.

**Team Leader**: Darcy Tatham

**Team Members**: Ann Aegerter, James Aegerter, Jim Chastek, Gayl Gustafson, Jens Kvaal, Julia Michienzi, Joan O'Donnell, Eliza Pessereau, Melissa Rodriguez, Dave Schletty, Katie Schletty, Michelle Skog, Mary Stade, Anneliese Tatham, and Noelle Wang



West St. Paul WHEP Sites Monitored in 2021



DARCY TATHAM

Mendota Heights' team leader, Darcy Tatham, has been part of WHEP for more than 20 years. She commented, "2021 was quite a year, with heat, drought, and the continuing pandemic. What more can one ask for? How about adding five more ponds to monitor in addition to our usual three?!

So, let's start with Covid-19. I have to thank Paula, the Dakota County coordinator, for taking the necessary steps to keep the program running, despite the pandemic.

"Then there was the heat and the drought. I am very grateful for the lack of mosquitoes, and the fact that we didn't get rained out - although we did get hailed on once! The drought gave our ponds the opportunity to act in a more normal manner, not having to react to large influxes of storm water. It was fascinating to

see which ponds were dry, and which weren't. For instance, at the Mendota Heights reference pond, Copperfield, some of the plant species we saw during our earlier trips could not be found during the vegetation survey because of being buried in the mud. One of the West St. Paul ponds had a 15-foot mud zone before we could reach the water. We feel blessed not to have lost any volunteers permanently to the mud!

"I took over the West St. Paul team and their five ponds mid-season. I owe a huge debt of thanks to my Mendota Heights team members for stepping up to this challenge at the last minute. Their help in guiding and training the new West St. Paul volunteers, and willingness to take on the extra work of collection and analysis were what made this task possible. I hope this experience under such unusual circumstances did not put off my West St. Paul team members, and that they had enough fun that they will return next season.



"It was fun to revisit some of the West St. Paul ponds which I and some of my long-term team members had monitored in previous years - and the fact that they were close to my home didn't hurt either! Yes, it was a lot of work, but I couldn't have done it without my team members. I've been involved with the program for more than 20 years and I'm still learning and having fun.  I hope to see you next year."

MARY STADE AND KATIE SCHLETTY



DAVE SCHLETTY

Dave Schletty is the Assistant Parks & Recreation Director at the City of West St Paul.  He assists with the City's coordination of the program.  Dave helps select which wetlands to monitor each year and then reviews the data. With so few wetlands within the 95 percent-developed 5-square-mile City, Dave understands the importance of keeping them healthy.  He also supervises the City's Environmental Committee and shares the WHEP data with the group, so together they help educate residents about improving water quality and how to implement best practices.

## West St. Paul General Wetland Health

Figure 4.12 presents an overall view of wetland health for all of the 2021 monitoring sites in West St. Paul based on the IBI scores for invertebrates and vegetation presented as a percent. Figure 4.12 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled.  Invertebrate and vegetation scores that differ by ten percent or less are considered consistent.  Based on the IBI scores, a wetland health rating is assigned as excellent, moderate or poor.  The West St. Paul wetland ratings ranged from poor to moderate wetland health in 2021.  The



MELISA RODRIGUEZ, KATIE SCHLETTY,
AND MICHELLE SKOG

invertebrate and vegetation scores for WSP-1 were inconsistent, differing by 30 percent. Invertebrate and vegetation scores for WSP-3, WSP-9, and WSP-10 are considered consistent, but differed by 9, 10, and 10 percent, respectively.

**Figure 4.12 West St. Paul site scores (percent) for the 2021 sampling season**
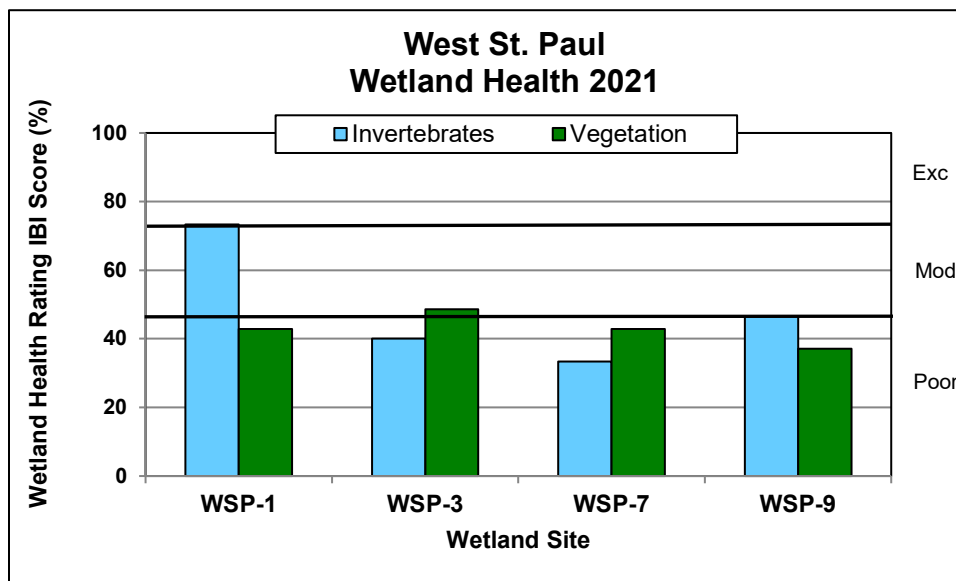


## 4.12.1 Mud Lake (WSP-1)

Mud Lake (WSP-1), also known as RW7, is a 3.1-acre, type 3 wetland within the Riverview Tunnel Drainage District. The drainage area is approximately 34 acres, with no impervious surface. It is publicly owned, and is part of the City's stormwater management plan. There is an inlet on the east side of the wetland, and an outlet on the west side.

**Wetland Health**

**Site Observations:** The wetland slope is moderate. The wetland substrate is very mucky. Teams explain that it is very difficult to walk through this wetland. The shoreline has a very wide (15-20 ft) cattail (*Typha* sp.) fringe. Duckweed (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) cover much of the surface of the pond. Coontail (*Ceratophyllum* sp.) and pondweed (*Potamogeton* sp.) represented the submergent vegetation. Sedge (*Carex* sp.), smartweed (*Polygonum* sp.), beggar-ticks (*Bidens* sp.), and purple loosestrife (*Lythrum salicaria*) were also present. Leeches, dragonflies, caddisflies, snails, true flies, crustaceans, and beetle and bugs were collected.
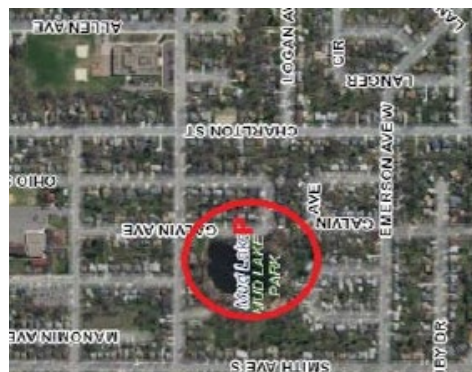
**Table 4.12.1 Mud Lake (WSP-1) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (WSP-1) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Moderate (22) | Poor (15) |
| **Cross-check Rating (IBI score)** | Poor (12) | Poor (7) |
| **Trend 1999-2021** | Improving | Stable |

**Figure 4.12.1 Invertebrate and vegetation trends for Mud Lake (WSP-1)**
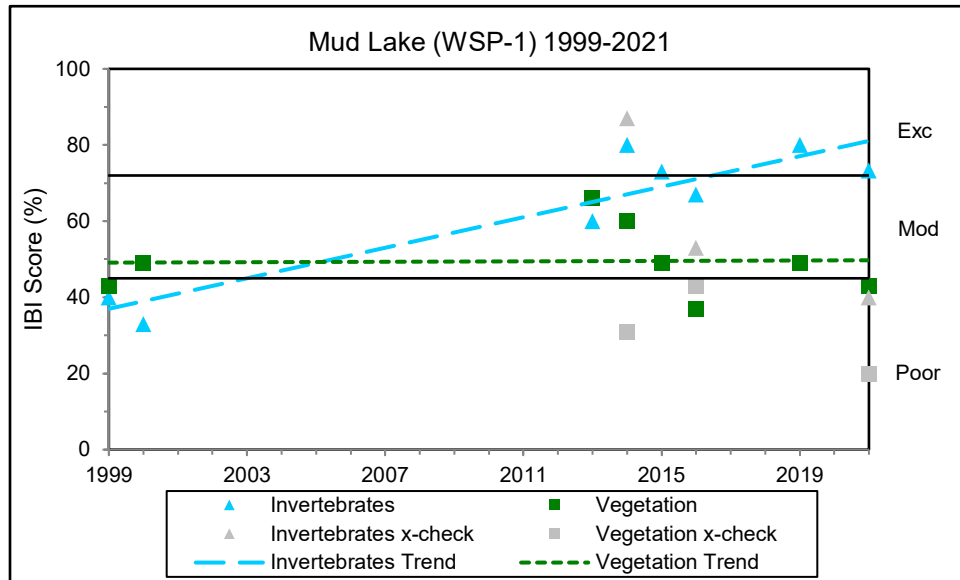


**Site Summary:** This is the eighth time that Mud Lake has been surveyed since 1999. The invertebrates and vegetation scores were inconsistent, differing by 30 percent. The invertebrate score indicating moderate wetland health while the vegetation score indicates poor wetland health. The vegetation community is very poor with low diversity and a barely existent emergent community. The submergent vegetation that is present may provide satisfactory habitat for the invertebrate population. The invertebrate scores have remained moderate to excellent since 2014. These scores are higher than original scores received in 1999 and 2000, which is causing the trend to appear to be improving. The vegetation data is very similar for the past several surveys. The invertebrate data is stable in recent years. This wetland was cross-checked by another team. Scores between teams were inconsistent. The cross-check team only found duckweeds, cattail, and some woody species, resulting in an even lower vegetation score. The lack of vegetation in this plot area could be the cause for low invertebrate diversity, as well. The score differences are likely due to different plot placement than the City team. The invertebrate sample collected by WSP was completed in late July which also could have resulted in a different diversity make-up.

## 4.12.2 Duck Pond (WSP-3)

Duck Pond (WSP-3) is a 2.5-acre, type 5 wetland within the Highway 110-494 subwatershed within the Lower Mississippi River Watershed. The subwatershed is 65 acres. It is publicly owned, and is part of the City's stormwater management plan. It is designated as A4P Duck Pond. There is an inlet on the north side of the wetland, and an outlet on the east side. Although Duck Pond is located within a densely populated area, it is largely surrounded by trees and not widely visible from the road. The shoreline contains woody debris from fallen branches or trees.
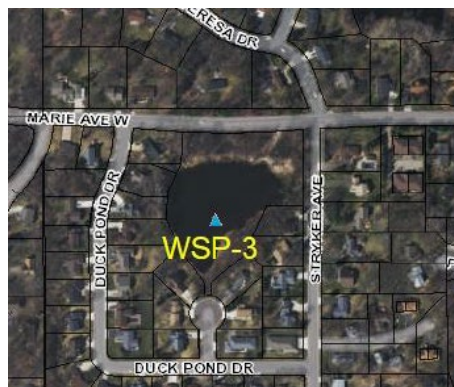
**Wetland Health**

**Site Observations:** The wetland slope is steep. The wetland substrate is very mucky. Approximately 12-15 feet of exposed mud is traversed before reaching open water. The wetland is surrounded by trees. There was no submergent vegetation present. Water-meal (*Wolfia* sp.) covered the surface of the water. A small amount of duckweed (*Lemna* sp.) was also present. Several emergent forbs and grasses were included in the vegetation plot, including sedges (*Carex* sp.), spike-rush (*Eleocharis* sp.), reed canary grass (*Phalaris arundinacea*), water plantain (*Alisma* sp.), and smartweed (*Polygonum* sp.). Leeches, snails, crustaceans, and a single bug were collected.

**Table 4.12.2 Duck Pond (WSP-3) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (WSP-3) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (12) | Moderate (17) |
| **Trend 1999-2021** | Stable | Stable |

**Figure 4.12.2 Invertebrate and vegetation trends for Duck Pond (WSP-3)**
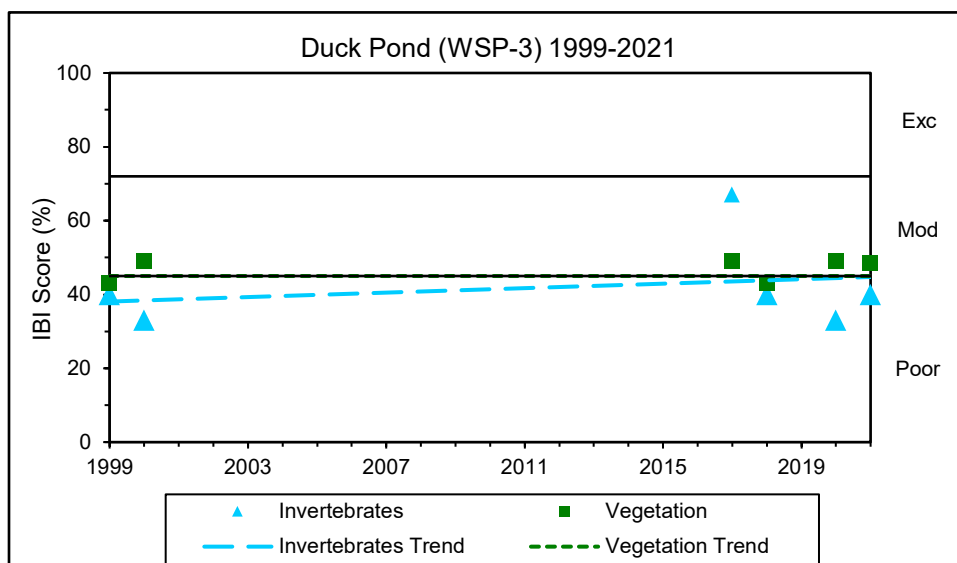
**Site Summary:** This is the sixth time that Duck Pond has been surveyed by WHEP volunteers, since 1999. Prior to 2017, it had not been surveyed since 2000. The invertebrate and vegetation scores were consistent. The invertebrates score indicates poor wetland health, while the vegetation score indicates moderate wetland health. The wetland has low diversity of vegetation which likely impacts the invertebrates community, especially since it lacks submergent vegetation. The health trends appear stable, and the data remains similar through the years of monitoring.

## 4.12.3 Humboldt Pond (WSP-7)

Humboldt Pond (WSP-7), once known as Vivian Pond, is a 1.2-acre, type 4 wetland within the Simons Ravine District drainage area. Its watershed is 23 acres. It is publicly owned, and it is part of the City's stormwater management plan. It is designated as SR1P Humboldt Pond. There is one inlet on the east side, but no outlets. The wetland is located south of Marthaler Park, west of Robert Street.



**Wetland Health**

**Site Observations:** The wetland slope is moderate to steep. The wetland substrate is solid. There was very little vegetation present. Trees surround the pond. The pond was very small and shallow. Small populations of pondweed (*Potamogeton* sp.), duckweed (*Lemna* sp.), water-meal (*Wolffia* sp.), sedges (*Carex* sp.), and smartweed (*Polygonum* sp.) were observed in the vegetation releve. Leeches, snails, trueflies, and true bugs were collected.

**Table 4.12.3 Humboldt Pond (WSP-7) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (WSP-7) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (10) | Poor (15) |
| **Trend 2001-2021** | Not enough data | Not enough data |



JIM CHASTEK AND MICHELLE SKOG



KATIE SCHLETTY, NOELLE WANG, ANN AEGERTER, MARY STADE, AND JULIA MICHIENZI

**Figure 4.12.3 Invertebrate and vegetation trends for Humboldt Pond (WSP-7)**
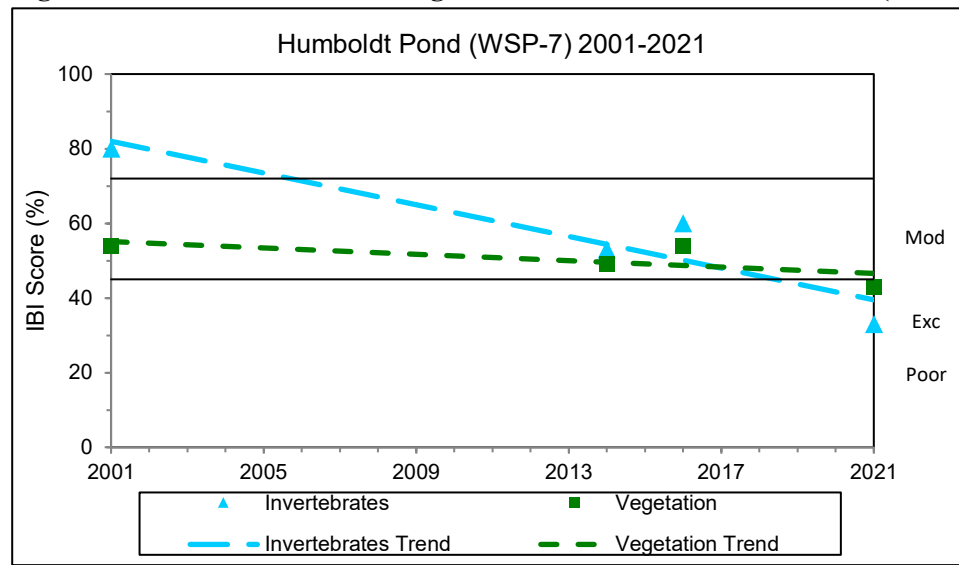


**Site summary:** This is the fourth time that Humboldt Pond has been monitored since 2001. The invertebrates and vegetation scores were consistent, both indicating poor wetland health. Vegetation abundance and diversity is very low in this wetland. This site was cross-checked by Fortin Consulting for quality assurance purposes. The teams found very similar species. More years of data may help determine a reliable health trend.

## 4.12.4 Marie Pond (WSP-9)

Marie Pond (WSP-9) is a 2.9-acre, type 3 wetland within the Highway 110-494 subwatershed within the Lower Mississippi River Watershed. Its watershed is approximately 49 acres. It is publicly owned. There is one inlet on the east side of the wetland. There is an outlet on the north side of the wetland. It is part of the City's stormwater management plan.



The wetland is located on the south side of Marie Avenue between Bidwell Avenue and Charlton street.
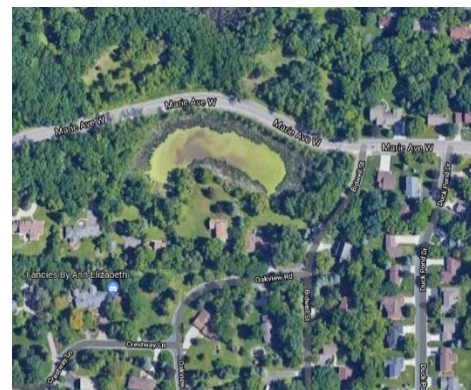
**Wetland Health**

**Site Observations:** The wetland slope is gentle, and the substrate is mucky. There is a wide buffer around the wetland separating it from the residential lawns and roads. A thick cattail (*Typha* sp.) fringe surrounds the wetland. A low diversity of vegetation was observed in 2021. Duckweed (*Lemna* sp.) and water-meal (*Wolffia* sp.) cover most of the open water. A dense population of coontail (*Ceratophyllum* sp.) is the only submergent vegetation present. Some upland emergent vegetation was also represented in the vegetation releve. Leeches, damselflies, mayflies, snails, trueflies, crustaceans, and beetles and bugs were collected.

**Table 4.12.4 Marie Pond (WSP-9) Wetland Health based on Index of Biotic Integrity**

| 2021 Data (WSP-9) | Invertebrates | Vegetation |
|---|---|---|
| **Wetland Health Rating (IBI score)** | Poor (14) | Poor (13) |
| **Trend 2013-2021** | Not enough data | Not enough data |

**Figure 4.12.4 Invertebrate and vegetation trends for Marie Pond (WSP-9)**
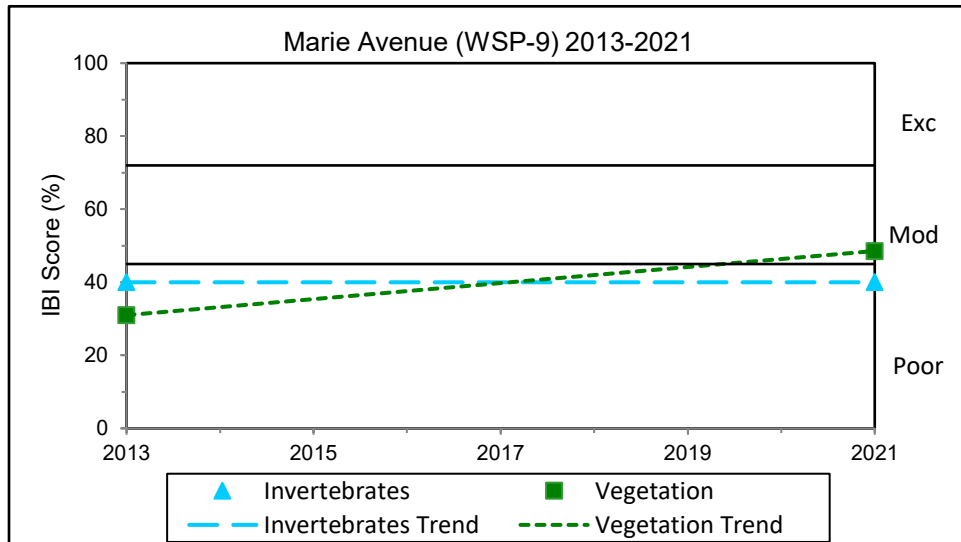


**Site Summary:** This is the second time that Marie Pond has been surveyed since 2013. The invertebrates and vegetation scores were consistent with each other. The invertebrate score indicates poor wetland health while the vegetation score indicates moderate wetland health. The vegetation diversity is low, though the high abundance of vegetation may provide substantial habitat for invertebrates to thrive. More years of data will help determine the health trend.

## Appendix A-1. Invertebrate Metric Scores

| Site Number | Leech Metric | Corixid Metric | Odonata Metric | ETSD Metric | Snail Metric | Total Taxa Metric | Total IBI Score |
|---|---|---|---|---|---|---|---|
| AV-1 | 5 | 1 | 1 | 3 | 1 | 5 | 16 |
| AV-17 | 3 | 1 | 1 | 1 | 1 | 1 | 8 |
| AV-18 | 3 | 5 | 1 | 1 | 1 | 3 | 14 |
| AV-19 | 3 | 1 | 1 | 1 | 5 | 3 | 14 |
| B-1 | 1 | 3 | 1 | 1 | 1 | 1 | 8 |
| B-6 | 3 | 5 | 1 | 3 | 1 | 3 | 16 |
| B-13 | 1 | 5 | 1 | 3 | 3 | 3 | 16 |
| B-14 | 3 | 5 | 1 | 1 | 1 | 3 | 14 |
| DC-1 | 3 | 1 | 1 | 1 | 3 | 3 | 12 |
| DC-2 | 5 | 5 | 1 | 3 | 1 | 3 | 18 |
| DC-3 | NA | NA | NA | NA | NA | NA | NA |
| DC-4 | 1 | 3 | 1 | 3 | 1 | 3 | 12 |
| DC-5 | 1 | 1 | 1 | 3 | 1 | 3 | 10 |
| DC-6 | 5 | 5 | 1 | 1 | 3 | 5 | 20 |
| DC-7 | 1 | 3 | 1 | 3 | 1 | 3 | 12 |
| DC-8 | 3 | 5 | 1 | 1 | 1 | 3 | 14 |
| E-11 | 1 | 3 | 1 | 3 | 1 | 3 | 12 |
| E-24 | 3 | 1 | 1 | 1 | 1 | 3 | 10 |
| E-46 | 5 | 5 | 1 | 1 | 1 | 3 | 16 |
| F-3 | 1 | 5 | 1 | 1 | 1 | 1 | 10 |
| F-7 | 3 | 1 | 1 | 3 | 1 | 3 | 12 |
| F-9 | 1 | 1 | 3 | 5 | 3 | 5 | 18 |
| H-4 | 1 | 5 | 1 | 3 | 1 | 3 | 14 |
| H-6 | 1 | 5 | 1 | 3 | 3 | 5 | 18 |
| H-56 | 1 | 5 | 5 | 3 | 1 | 3 | 18 |
| H-57 | 5 | 3 | 1 | 3 | 3 | 5 | 20 |
| L-7 | 3 | 1 | 1 | 1 | 5 | 3 | 14 |

| Site Number | Leech Metric | Corixid Metric | Odonata Metric | ETSD Metric | Snail Metric | Total Taxa Metric | Total IBI Score |
|---|---|---|---|---|---|---|---|
| L-8 | 1 | 1 | 1 | 3 | 1 | 3 | 10 |
| MH-2 | 5 | 5 | 1 | 5 | 1 | 5 | 22 |
| MH-20 | 5 | 5 | 1 | 3 | 1 | 3 | 18 |
| NC-1 | 3 | 3 | 1 | 3 | 3 | 3 | 16 |
| NC-3 | 3 | 5 | 1 | 1 | 1 | 3 | 14 |
| R-1 | 3 | 1 | 3 | 3 | 1 | 5 | 16 |
| R-2 | 1 | 5 | 1 | 3 | 1 | 1 | 12 |
| R-4 | 1 | 1 | 1 | 5 | 3 | 3 | 14 |
| R-15 | 1 | 5 | 1 | 3 | 1 | 3 | 14 |
| SSP-1 | 1 | 5 | 3 | 3 | 1 | 5 | 18 |
| SSP-3 | 3 | 5 | 1 | 1 | 1 | 3 | 14 |
| WSP-1 | 5 | 5 | 1 | 3 | 3 | 5 | 22 |
| WSP-3 | 3 | 5 | 1 | 1 | 1 | 1 | 12 |
| WSP-7 | 3 | 1 | 1 | 1 | 1 | 3 | 10 |
| WSP-9 | 5 | 3 | 1 | 1 | 1 | 3 | 14 |

Appendix A-2. Vegetation Metric Scores

| Site # | Vascular Genera | Nonvascular Taxa | Grasslike Genera | *Carex* Cover | *Utricularia* Presence | Aquatic Guild | Persistent Litter | Total IBI Score |
|--------|----------------|------------------|------------------|---------------|------------------------|---------------|-------------------|-----------------|
| AV-1 | 3 | 1 | 3 | 1 | 1 | 3 | 5 | 17 |
| AV-17 | 3 | 1 | 3 | 1 | 1 | 1 | 5 | 15 |
| AV-18 | 3 | 1 | 3 | 1 | 1 | 5 | 5 | 19 |
| AV-19 | 3 | 1 | 5 | 1 | 1 | 3 | 5 | 19 |
| B-1 | 3 | 1 | 3 | 1 | 5 | 5 | 5 | 23 |
| B-6 | 3 | 1 | 3 | 1 | 1 | 3 | 5 | 17 |
| B-13 | 3 | 1 | 1 | 1 | 1 | 5 | 5 | 17 |
| B-14 | 3 | 5 | 1 | 1 | 1 | 3 | 5 | 19 |
| DC-1 | 3 | 1 | 3 | 1 | 1 | 3 | 5 | 17 |
| DC-2 | 3 | 3 | 3 | 1 | 1 | 3 | 5 | 19 |
| DC-3 | 3 | 1 | 5 | 3 | 1 | 1 | 3 | 17 |
| DC-4 | 3 | 1 | 1 | 1 | 1 | 1 | 5 | 13 |
| DC-5 | 5 | 1 | 3 | 1 | 1 | 3 | 5 | 19 |
| DC-6 | 5 | 5 | 3 | 5 | 1 | 3 | 5 | 27 |
| DC-7 | 5 | 5 | 3 | 5 | 1 | 5 | 5 | 29 |
| DC-8 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 11 |
| E-11 | 5 | 3 | 3 | 1 | 1 | 5 | 5 | 23 |
| E-24 | 3 | 1 | 5 | 1 | 1 | 5 | 5 | 21 |
| E-46 | 3 | 1 | 1 | 1 | 1 | 5 | 1 | 13 |
| F-3 | 3 | 1 | 1 | 1 | 1 | 5 | 5 | 17 |
| F-7 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 11 |
| F-9 | 1 | 1 | 1 | 1 | 1 | 3 | 5 | 13 |
| H-4 | 5 | 3 | 3 | 1 | 1 | 1 | 5 | 19 |
| H-6 | 5 | 3 | 3 | 5 | 1 | 3 | 5 | 25 |
| H-56 | 1 | 1 | 1 | 1 | 1 | 5 | 5 | 15 |
| H-57 | 3 | 3 | 3 | 1 | 1 | 3 | 3 | 17 |
| L-7 | 5 | 5 | 5 | 3 | 1 | 1 | 5 | 25 |

| Site # | Vascular Genera | Nonvascular Taxa | Grasslike Genera | *Carex* Cover | *Utricularia* Presence | Aquatic Guild | Persistent Litter | Total IBI Score |
|--------|------|------|------|------|------|------|------|------|
| L-8 | 5 | 3 | 5 | 1 | 1 | 3 | 3 | 21 |
| MH-2 | 5 | 1 | 5 | 1 | 1 | 3 | 1 | 17 |
| MH-20 | 3 | 3 | 3 | 3 | 1 | 3 | 1 | 17 |
| NC-1 | 3 | 1 | 3 | 1 | 1 | 3 | 5 | 17 |
| NC-3 | 3 | 3 | 5 | 3 | 1 | 1 | 5 | 21 |
| R-1 | 3 | 1 | 3 | 1 | 1 | 5 | 5 | 19 |
| R-2 | 3 | 1 | 1 | 1 | 1 | 3 | 5 | 15 |
| R-4 | 3 | 1 | 3 | 1 | 1 | 3 | 5 | 17 |
| R-15 | 3 | 5 | 1 | 1 | 1 | 5 | 5 | 21 |
| SSP-1 | 3 | 1 | 1 | 1 | 1 | 3 | 1 | 11 |
| SSP-3 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 11 |
| WSP-1 | 3 | 1 | 1 | 1 | 1 | 3 | 5 | 15 |
| WSP-3 | 3 | 1 | 3 | 3 | 1 | 1 | 5 | 17 |
| WSP-7 | 3 | 1 | 1 | 1 | 1 | 3 | 5 | 15 |
| WSP-9 | 3 | 1 | 1 | 1 | 1 | 3 | 3 | 13 |

Appendix B. Invasive Species Presence 2012-2021

| Site | Purple loose-strife | Reed canary grass | Curly-leaf pond-weed | Eurasian Water-milfoil | Honey-suckle | Buckthorn | Chinese mystery snail | Banded mystery snail |
|------|------|------|------|------|------|------|------|------|
| AV1 | | 1 | | | | | | |
| AV6 | | 1 | | | | | 1 | |
| AV7 | | 1 | | | | | | |
| AV8 | | 1 | | | | | | |
| AV10 | | 1 | | | | 1 | | |
| AV11 | | 1 | | | | | 1 | |
| AV12 | | 1 | | | | 1 | | |
| AV13 | 1 | 1 | | 1 | | | 1 | |
| AV18 | | 1 | 1 | | | | 1 | |
| AV19 | | 1 | | | | 1 | | |
| AV20 | | 1 | | | | 1 | | |
| B1 | 1 | 1 | | | | 1 | | |
| B1A | 1 | 1 | | | | | | |
| B2 | | 1 | | | | 1 | | |
| B3 | | | | | | | 1 | 1 |
| B4 | | 1 | | | | | | |
| B6 | | 1 | | | | | | |
| B7 | | 1 | | | | | | |
| B8 | 1 | 1 | | | | | | |
| B9 | 1 | 1 | | | | | | |
| B10 | | 1 | | | | | | |
| B12 | | 1 | | | | 1 | | |
| B13 | 1 | 1 | | 1 | | | 1 | 1 |
| B17 | 1 | 1 | | | | | | |
| B18 | | 1 | | | | 1 | | |
| DC1 | | 1 | | | | | 1 | |
| DC2 | | 1 | | | | | | |

| Site | Purple loose-strife | Reed canary grass | Curly-leaf pond-weed | Eurasian Water-milfoil | Honey-suckle | Buckthorn | Chinese mystery snail | Banded mystery snail |
|---|---|---|---|---|---|---|---|---|
| DC3 | | 1 | | | | | | |
| DC4 | | 1 | | | | 1 | | |
| DC5 | | 1 | | | | | | |
| DC6 | | 1 | | 1 | | | | |
| DC7 | | 1 | | | | 1 | | |
| DC8 | | 1 | | | | | | |
| DC9 | | 1 | | | | | | |
| DC10 | | 1 | | | | | | |
| E7 | | 1 | | | | | | |
| E9 | 1 | 1 | | | | | | |
| E1 | | 1 | | | | | 1 | |
| E10 | | 1 | 1 | | | | | |
| E11 | 1 | 1 | | 1 | | | | |
| E18 | | 1 | | | | 1 | | |
| E20 | | 1 | | | | | | |
| E22 | | 1 | | | | | | |
| E24 | | 1 | | | | | 1 | |
| E30 | | | | | | | 1 | |
| E31 | | 1 | | | | | | |
| E32 | | 1 | 1 | | | | 1 | |
| E33 | | 1 | | | | | | |
| E34 | 1 | 1 | | | | | | |
| E35 | | 1 | | | | | | |
| E36 | | 1 | | | | | | |
| E37 | | 1 | | | | | | |
| E38 | | 1 | | | | | | |
| E40 | | 1 | | | | | 1 | |

| Site | Purple loose-strife | Reed canary grass | Curly-leaf pond-weed | Eurasian Water-milfoil | Honey-suckle | Buckthorn | Chinese mystery snail | Banded mystery snail |
|---|---|---|---|---|---|---|---|---|
| E41 | | 1 | | | | 1 | | |
| E42 | | 1 | | | | | | |
| E43 | | | | | | 1 | | |
| E44 | | | | | | | | |
| E45 | | 1 | | | | | | |
| E46 | | | | | 1 | | | |
| F3 | 1 | 1 | 1 | 1 | | | | |
| F6 | | 1 | | | | | | |
| F7 | | 1 | | | | | | |
| F9 | | 1 | | | | | | |
| H4 | 1 | 1 | 1 | | 1 | | 1 | |
| H6 | 1 | 1 | 1 | | | 1 | | |
| H56 | 1 | 1 | | | | | | |
| H57 | 1 | 1 | | | | | 1 | |
| L7 | 1 | 1 | | | | | | |
| L8 | | 1 | 1 | 1 | | | | |
| L9 | | 1 | | | | | | |
| L10 | | 1 | | | | | | |
| LD1 | 1 | 1 | | | | | | |
| MH2 | 1 | 1 | | | | 1 | | |
| MH4 | | 1 | | | | | | |
| MH16 | | 1 | | | | | | |
| MH17 | | 1 | | | | | | |
| MH19 | | | | | | 1 | | |
| MH20 | 1 | 1 | | | 1 | 1 | | |
| NCR1 | 1 | 1 | | | | | | |
| NCR2 | | 1 | | | | | | |

| Site | Purple loose-strife | Reed canary grass | Curly-leaf pond-weed | Eurasian Water-milfoil | Honey-suckle | Buckthorn | Chinese mystery snail | Banded mystery snail |
|---|---|---|---|---|---|---|---|---|
| NCR3 | | 1 | | | | | | |
| R1 | | 1 | | | | | | |
| R2 | | 1 | | | | | 1 | |
| R4 | | 1 | 1 | | | | 1 | |
| R6 | | 1 | | | | | | |
| R14 | | 1 | | | | | | |
| R15 | | 1 | | | | | | |
| R20 | | 1 | | | | | | |
| R21 | 1 | 1 | | | | | | |
| R23 | 1 | 1 | | | | | | |
| R25 | | 1 | | | | | | |
| R26 | | 1 | | | | | | |
| SSP1 | 1 | 1 | 1 | | | 1 | 1 | |
| SSP3 | | 1 | | | | 1 | | |
| SSP4 | 1 | | | | | | | |
| WSP1 | 1 | 1 | | | | 1 | 1 | |
| WSP2 | | 1 | | | | | | |
| WSP3 | | 1 | | | | 1 | | |
| WSP4 | 1 | 1 | | | | 1 | | |
| WSP5 | | 1 | | | | | 1 | |
| WSP6 | 1 | 1 | | | 1 | 1 | 1 | |
| WSP7 | | 1 | | | | | | |
| WSP8 | | 1 | | | | | | |
| WSP9 | | 1 | | | | 1 | | |
| WSP10 | | 1 | | | | | 1 | |
| WSP18 | 1 | | | | | | | |
| Totals: | 29 | 99 | 9 | 6 | 4 | 24 | 21 | 2 |

Appendix C. Site Score Averages of Created, Stormwater, and Natural Wetland 2008-2021

| Wetland | Invertebrates | | | Vegetation | | |
|---|---|---|---|---|---|---|
| | Created Wetlands | Stormwater Wetlands | Natural Wetlands | Created Wetlands | Stormwater Wetlands | Natural Wetlands |
| AV-1 | | 16 | | | 17 | |
| AV-5 | | | 15 | | | 18 |
| AV-6 | | 15 | | | 18 | |
| AV-7 | | 11 | | | 14 | |
| AV-8 | | 15 | | | 20 | |
| AV-10 | | | 11 | | | 12 |
| AV-11 | | | 20 | | | 17 |
| AV-12 | | 14 | | | 18 | |
| AV-13 | | 21 | | | 12 | |
| AV-14 | | 12 | | | 9 | |
| AV-15 | | 11 | | | 13 | |
| AV-16 | | | | | 17 | |
| AV-17 | | | 8 | | | 15 |
| AV-18 | | 14 | | | 19 | |
| AV-19 | | | 14 | | | 19 |
| AV-20 | | | 20 | | | 19 |
| B-1 | | | 8 | | | 23 |
| B-1 Alt. | | | 20 | | | 23 |
| B-2 | | | 16 | | | 17 |
| B-3 | | 20 | | | 19 | |
| B-4 | | | 18 | | | 15 |
| B-6 | | 16 | | | 17 | |
| B-7 | | 17 | | | 18 | |
| B-8 | | | 22 | | | 14 |
| B-9 | | 13 | | | 12 | |
| B-10 | | 20 | | | 14 | |

| Wetland | Invertebrates | | | Vegetation | | |
|---|---|---|---|---|---|---|
| | Created Wetlands | Stormwater Wetlands | Natural Wetlands | Created Wetlands | Stormwater Wetlands | Natural Wetlands |
| B-11 | | 18 | | | 21 | |
| B-12 | | | 17 | | | 15 |
| B-13 | | 16 | | | 17 | |
| B-14 | | | 14 | | | 19 |
| B-17 | | | 21 | | | 21 |
| B-18 | | | 18 | | | 23 |
| DC-1 | | | 12 | | | 17 |
| DC-2 | | | 18 | | | 19 |
| DC-3 | | | 12 | | | 17 |
| DC-4 | | | 12 | | | 13 |
| DC-5 | | | 10 | | | 19 |
| DC-6 | | | 20 | | | 27 |
| DC-7 | | | 12 | | | 29 |
| DC-8 | | | 14 | | | 11 |
| DC-9 | | | 14 | | | 22 |
| DC-10 | | | 12 | | | 13 |
| E-1 | | 16 | | | 23 | |
| E-7 | | 22 | | | 20 | |
| E-9 | | | 16 | | | 23 |
| E-10 | | 16 | | | 19 | |
| E-11 | | 12 | | | 23 | |
| E-18 | | 15 | | | 20 | |
| E-20 | | 19 | | | 23 | |
| E-21 | | 20 | | | 17 | |
| E-22 | | 19 | | | 19 | |
| E-24 | | 10 | | | 21 | |
| E-25 | | 16 | | | 19 | |

| Wetland | Invertebrates | | | Vegetation | | |
|---|---|---|---|---|---|---|
| | Created Wetlands | Stormwater Wetlands | Natural Wetlands | Created Wetlands | Stormwater Wetlands | Natural Wetlands |
| E-26 | | 14 | | | 15 | |
| E-27 | | 18 | | | 21 | |
| E-28 | | 16 | | | 21 | |
| E-29 | | | 14 | | | 27 |
| E-31 | | 21 | | | 15 | |
| E-32 | | 18 | | | 21 | |
| E-33 | | 16 | | | 21 | |
| E-34 | | 24 | | | 23 | |
| E-35 | | | 12 | | | 27 |
| E-36 | | 16 | | | 17 | |
| E-37 | | 18 | | | 17 | |
| E-38 | | 24 | | | 19 | |
| E-39 | | 16 | | | 11 | |
| E-40 | | 18 | | | 15 | |
| E-41 | | 22 | | | 23 | |
| E-42 | | 12 | | | 19 | |
| E-43 | | 22 | | | 19 | |
| E-44 | | 14 | | | 23 | |
| E-45 | | | 10 | | | 25 |
| E-46 | | 16 | | | 13 | |
| F-1 | | 14 | | | 16 | |
| F-3 | | 10 | | | 17 | |
| F-4 | 11 | | | 15 | | |
| F-5 | | 17 | | | 16 | |
| F-6 | | 16 | | | 10 | |
| F-7 | | 12 | | | 11 | |
| F-8 | 17 | | | 16 | | |

| Wetland | Invertebrates | | | Vegetation | | |
|---|---|---|---|---|---|---|
| | Created Wetlands | Stormwater Wetlands | Natural Wetlands | Created Wetlands | Stormwater Wetlands | Natural Wetlands |
| F-9 | | 18 | | | 13 | |
| H-4 | 14 | | | 19 | | |
| H-6 | | 18 | | | 25 | |
| H-30 | 14 | | | 14 | | |
| H-56 | | 18 | | | 15 | |
| H-57 | 20 | | | 17 | | |
| L-4 | 16 | | | 20 | | |
| L-7 | | 14 | | | 25 | |
| L-8 | | | 10 | | | 21 |
| L-9 | 17 | | | 17 | | |
| L-10 | | | 13 | | | 11 |
| LD-1 | | | 14 | | | 17 |
| MH-2 | | 22 | | | 17 | |
| MH-4 | | 19 | | | 17 | |
| MH-8 | | 10 | | | 9 | |
| MH-9 | | 22 | | | 24 | |
| MH-13 | | 16 | | | 21 | |
| MH-14 | | 22 | | | 25 | |
| MH-15 | | 16 | | | 21 | |
| MH-16 | | 24 | | | 29 | |
| MH-17 | 12 | | | 15 | | |
| MH-18 | | 22 | | | 27 | |
| MH-19 | | 14 | | | 15 | |
| MH-20 | | 18 | | | 17 | |
| NCR-1 | | | 16 | | | 17 |
| NCR-2 | | | 19 | | | 16 |
| NCR-3 | | | 14 | | | 21 |

| Wetland | Invertebrates | | | Vegetation | | |
|---|---|---|---|---|---|---|
| | Created Wetlands | Stormwater Wetlands | Natural Wetlands | Created Wetlands | Stormwater Wetlands | Natural Wetlands |
| R-1 | | 16 | | | 19 | |
| R-2 | | 12 | | | 15 | |
| R-4 | | 14 | | | 17 | |
| R-6 | | | 18 | | | 18 |
| R-14 | | | 22 | | | 24 |
| R-15 | | 14 | | | 21 | |
| R-18 | | | 26 | | | 19 |
| R-20 | | 17 | | | 17 | |
| R-21 | 22 | | | 19 | | |
| R-22 | | 22 | | | 22 | |
| R-23 | 16 | | | 27 | | |
| R-25 | | 13 | | | 27 | |
| R-26 | | | 15 | | | 17 |
| SSP-1 | | 18 | | | 11 | |
| SSP-3 | | 14 | | | 11 | |
| SSP-4 | | 18 | | | 11 | |
| WSP-1 | | | 22 | | | 15 |
| WSP-2 | | 17 | | | 16 | |
| WSP-3 | | 12 | | | 17 | |
| WSP-4 | | 16 | | | 21 | |
| WSP-5 | | | 14 | | | 21 |
| WSP-6 | | | 22 | | | 17 |
| WSP-7 | | 19 | | | 18 | |
| WSP-8 | | | 20 | | | 16 |
| WSP-9 | | | 14 | | | 13 |
| WSP-10 | | 10 | | | 15 | |
| AVERAGES | 16 | 16 | 16 | 18 | 18 | 19 |

Appendix D. Wetland and Watershed Data for 2008-2021

| Site ID | Site Name | Wetland size (Acres) | Watershed Size (Acres) | % Imperv | Invert. Score | Veg. Score |
|---|---|---|---|---|---|---|
| AV-1 | Hidden Valley | 2 | 21 | 35 | 16 | 17 |
| AV-5 | Cedar Knolls Pond | 0.5 | 8 | 20 | 14 | 19 |
| AV-6 | Belmont Park | 1.3 | 202 | 20 | 14 | 17 |
| AV-7 | Podojil Pond | 1.3 | 8 | 25 | 14 | 15 |
| AV-8 | Chaparal Pond | 1.5 | 110 | 30 | 16 | 17 |
| AV-10 | Alimagnet Park | 0.5 | 25 | 20 | 8 | 17 |
| AV-11 | Farquar Lift Station | 2.2 | 373 | 25 | 10 | 17 |
| AV-12 | EVR-P12 Public Water | 5.7 | 571 | 25 | 14 | 21 |
| AV-13 | EVR-P14 | 3.6 | 26 | 35 | 18 | 9 |
| AV-14 | EVR-P43, Apple Valley East Park | 0.8 | 2738 | 35 | 12 | 9 |
| AV-15 | Carrollwood | 1.2 | 398 | 30 | 10 | 13 |
| AV-16 | Nordic Park | 1 | 17 | 25 | | 17 |
| AV-17 | AL-P9.1 Alimagnet Lift Station Chain of Ponds | 0.25 | 7 | 20 | 8 | 15 |
| AV-18 | Sunset Park Pond | 1 | 252 | 30 | 14 | 19 |
| AV-19 | AL-P9.3 Alimagnet Lift Station Chain of Ponds | 0.25 | 28.5 | 25 | 14 | 19 |
| AV-20 | Valleywood Golf Course | 1.5 | 12 | 0 | 16 | 17 |
| B-1 | Crystal Lake West | 1 | 444.5 | 5 | 8 | 23 |
| B-1 Alt | Crystal Lake West Alternate | 6 | 550 | 0 | 24 | 19 |
| B-2 | Cam Ram | 0.41 | | 10 | 18 | 23 |
| B-3 | Kraemer | 30 | 93 | 30 | 24 | 13 |
| B-4 | Alimagnet | 0.9 | 701 | 20 | 16 | 15 |
| B-6 | Alimagnet East/Dog Park | 2.5 | 34 | 15 | 16 | 17 |
| B-7 | Terrace Oaks North | 2.2 | 15.7 | 5 | 20 | 19 |
| B-8 | Red Oak | 3 | 115 | 25 | 22 | 11 |
| B-9 | Crosstown West | 7.2 | 388 | 50 | 14 | 15 |
| B-10 | AP-3 Cedar Pond | 3.1 | 212 | 22 | 10 | 15 |
| B-11 | Valley View | 1 | 80 | 10 | 16 | 13 |

| Site ID | Site Name | Wetland size (Acres) | Watershed Size (Acres) | % Imperv | Invert. Score | Veg. Score |
|---|---|---|---|---|---|---|
| B-12 | Terrace Oaks | 1.7 | 68 | 5 | 20 | 15 |
| B-13 | Sunset Lake | 48 | 402 | 40 | 16 | 17 |
| B-14 | Terrace Oaks | 1.73 | 15 | 0 | 14 | 19 |
| B-17 | Terrace Oaks Buckthorn Pond | 2.7 | 24 | 10 | 22 | 17 |
| B-18 | Terrace Oaks Central | 0.34 | 2.89 | 0 | 18 | 23 |
| DC-1 | Empire Lake | 21 | 1152 | 5 | 12 | 17 |
| DC-2 | Buck Pond | 1.6 | 12 | 0 | 18 | 19 |
| DC-3 | Tamarack Swamp | 7.7 | 40 | 0 | 14 | 17 |
| DC-4 | Jenson Lake | 50 | 330 | 7 | 12 | 13 |
| DC-5 | Wood Pond | 0.8 | 22 | 0 | 10 | 19 |
| DC-6 | BB's Wetland | NA | NA | NA | 20 | 27 |
| DC-7 | Lilypad Pond/LP-15/E-29 | NA | NA | NA | 12 | 29 |
| DC-8 | Star East | NA | NA | NA | 14 | 11 |
| DC-9 | Star West | NA | NA | NA | 14 | 25 |
| DC-10 | Duck Pond | NA | NA | NA | 12 | 13 |
| E-1 | Thomas Lake Park Pond | 0.4 | 4 | 37 | 18 | 21 |
| E-7 | Discovery Pond | 4.1 | 16.5 | 0 | 20 | 21 |
| E-9 | Wilderness Run/LP-50 | 1.5 | 25 | 20 | 14 | 17 |
| E-10 | AP-3 Cedar Pond | 3.1 | 212 | 25 | 14 | 17 |
| E-11 | Central Park Pond | 3 | 56.5 | 30 | 12 | 23 |
| E-18 | Moonshine Park Pond | 2.5 | 34 | 25 | 14 | 17 |
| E-20 | Shanahan Lake | 10.9 | 56.4 | 1 | 10 | 17 |
| E-21 | FP-11.5 | 0.26 | 1.6 | 0 | 20 | 19 |
| E-22 | FP-11.6 | 0.58 | 2.7 | 0 | 28 | 27 |
| E-24 | JP-42 | 2.8 | 18 | 25 | 10 | 21 |
| E-25 | FP 4.5 | 1 | 35 | 55 | 16 | 19 |
| E-26 | DP-6.2, Northwoods Business Park | 3.2 | 25 | 44 | 14 | 15 |

Dakota Co. WHEP
2021 Report                 Fortin Consulting, Inc., now Bolton & Menk, Inc.

March 2022
P a g e  |  **1 2 0**

| Site ID | Site Name | Wetland size (Acres) | Watershed Size (Acres) | % Imperv | Invert. Score | Veg. Score |
|---------|-----------|---------------------|------------------------|----------|---------------|------------|
| E-27 | LP-26.54, Thomas Woods Site | 0.2 | 5.3 | 29 | 18 | 21 |
| E-28 | HDP-1, Kennerick Addition Site | 0.8 | 39 | 18 | 16 | 21 |
| E-29 | LP-15, Lily Pond in Lebanon Hills Pk | 6.5 | 21.8 | 5.5 | 12 | 27 |
| E-31 | Walnut Hill Pond/LP-69.1 | 0.65 | 20 | 10 | 22 | 17 |
| E-32 | City Hall Pond | 6.6 | 81.3 | 14 | 14 | 15 |
| E-33 | Coventry Pond | 5.5 | 60 | 35 | 16 | 21 |
| E-34 | McCarthy Lake | 11.3 | 220 | 15 | 24 | 23 |
| E-35 | Prairie Pond | 0.8 | 5.1 | 0 | NA | 27 |
| E-36 | Mooney Pond | 7 | 41 | 25 | 16 | 17 |
| E-37 | Kettle Pond | 0.8 | 23 | 30 | 18 | 17 |
| E-38 | Gerhardt Lake | 13.5 | 32 | 5 | 24 | 19 |
| E-39 | Black Hawk Middle School | 0.3 | 24 | 31 | 16 | 11 |
| E-40 | Heine Pond | 7.4 | 17 | 15 | 18 | 15 |
| E-41 | O'Leary Lake | 16 | 84 | 40 | 22 | 23 |
| E-42 | LP-44 | 2.4 | 49 | 30 | 12 | 19 |
| E-43 | LP-41 | 4 | 37 | 30 | 22 | 19 |
| E-44 | Oak Hills Church Pond | 1.5 | 87 | 60 | 14 | 23 |
| E-45 | Oak Chase Pond | 0.75 | 7.5 | 5 | 10 | 25 |
| E-46 | LP-65 | 1.7 | 9.2 | 30 | 16 | 13 |
| F-1 | Pine Knoll | 35 | 107.5 | 10.4 | NA | 13 |
| F-3 | Kral Pond | 10 | 41.8 | 6.6 | 10 | 17 |
| F-4 | Lake Julia | 10 | 233 | 21.2 | 8 | 11 |
| F-5 | Autumn Glen | 2.9 | 10 | NA | 20 | 21 |
| F-6 | Vermillion River | 6.3 | 16 | 30 | 12 | 9 |
| F-7 | Autumn Glen | 2.9 | 10 | 4 | 12 | 11 |
| F-8 | Mystic Meadows | 6.19 | 8.23 | NA | 12 | 15 |
| F-9 | Cambodia | 5 | 24 | 9 | 18 | 13 |

| Site ID | Site Name | Wetland size (Acres) | Watershed Size (Acres) | % Imperv | Invert. Score | Veg. Score |
|---|---|---|---|---|---|---|
| H-4 | Stonegate Treated | 1 | 9.5 | 35 | 14 | 19 |
| H-6 | Lake Rebecca | 19 | 56 | 1 | 18 | 25 |
| H-30 | Sand Coulee | 1 | 107 | 25 | 8 | 13 |
| H-56 | 180th Street Marsh | 20 | 340 | 1 | 18 | 15 |
| H-57 | Cari Park Pond | 0.78 | 29 | 14 | 20 | 17 |
| L-4 | Water Treatment Wetland Bank | 22.85 | 99.8 | 20 | 14 | 15 |
| L-7 | DNR 387 | 10 | 506.6 | 29 | 14 | 25 |
| L-8 | DNR 393 | 9.6 | 74.7 | 17 | 10 | 21 |
| L-9 | NC 54 | 13.8 | 183 | 12 | 20 | 11 |
| L-10 | DNR#349W | 40 | 213 | NA | 12 | 11 |
| LD-1 | Pickerel Lake | NA | NA | NA | 14 | 17 |
| MH-2 | Copperfield/Friendly Hills | 5.8 | 965.4 | 30.1 | 22 | 17 |
| MH-4 | Industrial Park | | | | 16 | 17 |
| MH-8 | Victoria Pond | 0.4 | 209.2 | 40 | 10 | 9 |
| MH-9 | Hagstrom-King | 3 | 20 | 25 | 22 | 27 |
| MH-13 | MH Par 3 | 0.5 | 36 | 3 | 20 | 21 |
| MH-14 | Wagon Wheel | 0.9 | 18.1 | 10 | 22 | 25 |
| MH-15 | Upper Bridgeview | 4.1 | 66.4 | NA | 16 | 21 |
| MH-16 | Field Stone | 6.9 | 577.9 | 20 | 24 | 29 |
| MH-17 | Marie Pond | 0.6 | 64.2 | 20 | 12 | 15 |
| MH-19 | Lexington Marie Pond | 1.1 | 46.5 | 30 | 14 | 15 |
| MH-20 | City Hall Orchard Heights | 10.6 | 80.9 | 30 | 18 | 17 |
| NCR-1 | Loretto Wetland/formerly Wasner | 0.5 | 160 | 4 | 16 | 17 |
| NCR-2 | Peterson | 2 | 55 | 0 | 22 | 15 |
| NCR-3 | Jordan Wetland | 25 | 33 | 9 | 14 | 21 |
| R-1 | Kelly Marsh/WMP 362 | 1.3 | 897 | 80 | 16 | 19 |
| R-2 | White Lake/WMP 152 | 22 | 998 | 30 | 12 | 15 |

| Site ID | Site Name | Wetland size (Acres) | Watershed Size (Acres) | % Imperv | Invert. Score | Veg. Score |
|---------|-----------|---------------------|------------------------|----------|---------------|------------|
| R-4 | Schwarz Pond | 10.9 | 1832 | 25 | 14 | 17 |
| R-6 | Keegan Lake/WMP 310 | 35 | 1530 | 30 | 22 | 19 |
| R-14 | WMP #379 | 4.8 | 81 | 30 | 22 | 21 |
| R-15 | Birger Pond | 0.6 | 897 | 20 | 14 | 21 |
| R-18 | WMP #279 | 4.5 | 33.7 | 30 | 26 | 19 |
| R-20 | Unnamed/WMP 332 | 1 | 897 | 80 | NA | 21 |
| R-21 | CR-38 Mitigation Site 1 | 1.7 | 1530 | 30 | 28 | 23 |
| R-22 | Mare Pond, South | 8 | 81 | 10 | 24 | 19 |
| R-23 | CR-38 Mitigation Site 2 | 0.3 | 81 | 30 | 30 | 27 |
| R-25 | WMP #306 | 1.7 | 81 | 30 | 14 | 31 |
| R-26 | Erickson Pond/WMP 620 | 1.9 | 1832 | 25 | 22 | 27 |
| SSP-1 | Anderson Pond | 2.4 | 168 | 15 | 18 | 11 |
| SSP-3 | LeVander | 3.4 | 37.9 | 20 | 14 | 11 |
| SSP-4 | Villaume Pond | 1.66 | 25 | 30 | 18 | 11 |
| WSP-1 | Mud Lake | 3.1 | 34.2 | 0 | 22 | 15 |
| WSP-2 | Thompson Lake  48W | 9 | 73920? | 50 | 16 | 17 |
| WSP-3 | Duck Pond | 2.5 | 65 | NA | 12 | 17 |
| WSP-4 | Wehke Pond | 1.3 | 42.4 | 0 | 20 | 23 |
| WSP-5 | Lilly Lake | 6.4 | 22 | NA | 20 | 19 |
| WSP-6 | Marthaler Park | 4.5 | 23 | 0 | 14 | 13 |
| WSP-7 | Humboldt Pond/Vivian Pond | 1.2 | 23 | NA | 10 | 15 |
| WSP-8 | DNC Prairie Pond | 2.9 | 113 | 0 | 16 | 17 |
| WSP-9 | Marie Avenue | 2.9 | 49 | NA | 14 | 13 |
| WSP-10 | Emerson Pond South | 1.2 | 23 | NA | 10 | 15 |
| WSP-12 | Wentworth Pond | 6 | 71.2 | NA | 8 | 15 |

Appendix E.  Winter Salt Watch Chloride Level Results

| Site # | Site Name | Quantab Unit | Convert to ppm |
|--------|-----------|--------------|----------------|

| AV-1 | Hidden Valley | 1.8 | 37 |
|------|---------------|-----|-----|
| AV-17 | Alimagnet Lift Station Chain (AL-P9.1) | 1.8 | 37 |
| AV-18 | Sunset Pond Park | 2.8 | 91 |
| AV-19 | Alimagnet Lift Station Chain (AL-P9.3) | 1.8 | 37 |
| B-1 | Crystal West | 1.9 | 40 |
| B-6 | Alimagnet Dog Park | 1.8 | 37 |
| B-13 | Sunset Pond Park | 3.2 | 116 |
| B-14 | Terrace Oaks | 0.4 | <30 |
| DC-1 | Empire Lake | na | na |
| DC-2 | Buck Pond | <1 | <30 |
| DC-3 | Tamarack Swamp | na | na |
| DC-4 | Jenson Lake | na | na |
| DC-5 | Wood Pond | na | na |
| DC-6 | BB's Wetland | 0.4 | <30 |
| DC-7 | Lilypad Pond | <1 | <30 |
| DC-8 | Star Pond East | na | na |
| E-11 | Pond CD-4 | 4 | 172 |
| E-24 | Pond JP-42 | 1.6 | 30 |
| E-46 | Pond LP-65 | 4.8 | 237 |
| F-3 | Kral Pond | 2.4 | 67 |
| F-7 | Autumn Glen | <1 | <30 |
| F-9 | Cambodia Avenue | 2.4 | 67 |
| H-4 | Stonegate Treated | 2.8 | 91 |
| H-6 | Lake Rebecca | 2.0 | 46 |
| H-56 | 180th Street Marsh | 0.8 | <30 |
| H-57 | Cari Pond | 2.8 | 91 |
| L-7 | DNR 387 | 1.2 | <30 |
| L-8 | DNR 393 | 1.8 | 37 |
| MH-2 | Copperfield | 3.2 | 116 |
| MH-20 | Orchard Heights | 5.6 | 313 |
| NC-1 | Loretto Wetland | 1.4 | <30 |
| NC-3 | Jordan Wetland | 0.6 | <30 |
| R-1 | Kelly Marsh | 0.5 | <30 |
| R-2 | White Lake | 1.2 | <30 |
| R-4 | Schwarz Pond | 5.4 | 293 |
| R-15 | Birger Mitigation Area | 1.8 | 37 |
| SSP-1 | Anderson Pond | 3.6 | 143 |
| SSP-3 | Levander Pond | 5.0 | 254 |
| WSP-1 | Mud Lake | 2.8 | 91 |
| WSP-3 | Duck Pond | 4.4 | 203 |
| WSP-9 | Marie Pond | 1.8 | 37 |
| WSP-10 | Humboldt Pond | 2.0 | 46 |

## Appendix F. Data sheet review

| Team Name | Site | Invertebrate IBI Scores | | | Vegetation IBI Scores | | |
|---|---|---|---|---|---|---|---|
| | | Team | Review | Errors | Team | Review | Errors |
| Apple Valley | AV-1 | 16 | 16 | 0 | 17 | 17 | 0 |
| | AV-17 | 8 | 8 | 0 | 15 | 15 | 0 |
| | AV-18 | 14 | 14 | 0 | 19 | 19 | 0 |
| | AV-19 | 14 | 14 | 0 | 19 | 19 | 0 |
| | NC-1 cc* | 16 | 16 | 0 | 13 | 13 | 0 |
| Burnsville | B-1 | 8 | 8 | 0 | 23 | 23 | 0 |
| | B-6 | 20 | 20 | 0 | 19 | 17 | 1 |
| | B-13 | 16 | 16 | 0 | 21 | 21 | 0 |
| | B-14 | 14 | 14 | 0 | 19 | 19 | 0 |
| | MH-2 cc* | 22 | 22 | 0 | 15 | 15 | 0 |
| Dakota Co 1 | DC-1 | NA | 12 | NA | 15 | 17 | 2 |
| | DC-4 | NA | 12 | NA | 13 | 13 | 0 |
| | DC-5 | 10 | 10 | 0 | NA | 19 | NA |
| | DC-8 | NA | 14 | NA | 11 | 11 | 0 |
| | NA cc* | NA | NA | NA | NA | NA | NA |
| Dakota Co 2 | DC-2 | 16 | 18 | 1 | 23 | 23 | 0 |
| | DC-3 | NA | NA | NA | 19 | 17 | 1 |
| | DC-6 | 20 | 20 | 0 | 27 | 27 | 0 |
| | DC-7 | 10 | 12 | 1 | 29 | 29 | 0 |
| | DC-8 cc* | 14 | 12 | 1 | 19 | 17 | 1 |
| Eagan | E-11 | 12 | 12 | 2 | 23 | 23 | 0 |
| | E-24 | 16 | 10 | 2 | 21 | 21 | 0 |
| | E-46 | 16 | 16 | 0 | 11 | 13 | 1 |
| | R-1 cc* | 12 | 12 | 0 | 19 | 19 | 0 |
| Farmington | F-3 | 10 | 10 | 0 | 17 | 17 | 0 |
| | F-7 | 12 | 12 | 0 | 11 | 11 | 0 |
| | F-9 | 18 | 18 | 0 | 13 | 13 | 0 |
| | WSP-1 cc* | 12 | 12 | 0 | 7 | 7 | 0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Hastings | H-4 | 14 | 14 | 0 | 19 | 19 | 0 |
| | H-6 | 20 | 20 | 0 | 25 | 25 | 0 |
| | H-56 | 18 | 18 | 0 | 15 | 15 | 0 |
| | H-57 | 20 | 20 | 0 | 17 | 17 | 0 |
| | SSP-3 cc* | 12 | 12 | 0 | 19 | 19 | 0 |
| Lakeville | L-7 | 14 | 14 | 0 | 25 | 25 | 0 |
| | L-8 | 10 | 10 | 0 | 21 | 21 | 0 |
| | AV-1 cc* | 16 | 16 | 0 | 19 | 19 | 0 |
| Mendota Heights | MH-2 | 22 | 22 | 0 | 17 | 17 | 0 |
| | MH-20 | 18 | 18 | 0 | 17 | 17 | 0 |
| | B-1 cc* | 20 | 20 | 0 | 23 | 23 | 0 |
| NCRWMO | NC-1 | 16 | 16 | 0 | 17 | 17 | 0 |
| | NC-3 | 14 | 14 | 0 | 21 | 21 | 0 |
| | L-8 cc* | 8 | 8 | 0 | 17 | 19 | 1 |
| Rosemount | R-1 | 16 | 16 | 0 | 19 | 19 | 0 |
| | R-2 | 12 | 12 | 0 | 15 | 15 | 0 |
| | R-4 | 14 | 14 | 0 | 17 | 17 | 0 |
| | R-15 | 12 | 14 | 1 | 21 | 21 | 0 |
| | E-24 cc* | 16 | 16 | 0 | 23 | 23 | 0 |
| South St. Paul | SSP-1 | 18 | 18 | 0 | 11 | 11 | 0 |
| | SSP-3 | 12 | 14 | 1 | 11 | 11 | 0 |
| | H-6 cc* | 16 | 16 | 0 | 17 | 15 | 1 |
| West St. Paul | WSP-1 | 22 | 22 | 0 | 15 | 15 | 0 |
| | WSP-3 | 12 | 12 | 0 | 17 | 17 | 0 |
| | WSP-7 | 10 | 10 | 0 | 15 | 15 | 0 |
| | WSP-9 | 14 | 14 | 0 | 13 | 13 | 0 |
| | F-9 cc* | 26 | 26 | 0 | 15 | 15 | 0 |