

2019

Wetland Health Evaluation Program



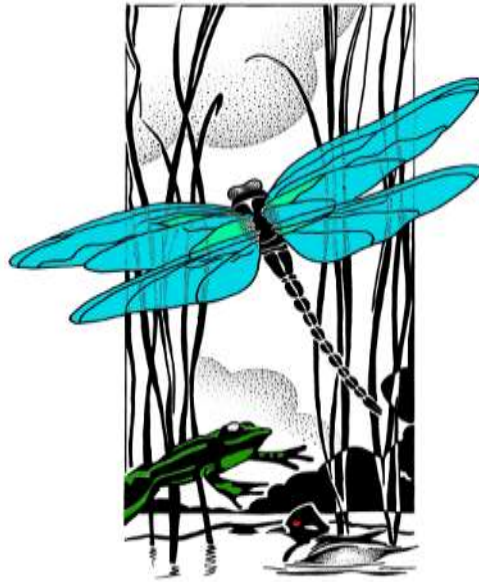
WHEP

Dakota County
Minnesota



2019 Wetland Health Evaluation Program Report

Dakota County, MN



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

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Report
Prepared by:

FORTIN
CONSULTING, INC.
serving the environment

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Dakota County Parks Department
City of Apple Valley
City of Burnsville
City of Eagan
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City of Hastings
City of Lakeville
City of Mendota Heights
City of Rosemount
City of South St. Paul
City of West St. Paul
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Paula Liepold, Dakota County WHEP Coordinator
Mary Karius, Hennepin County WHEP Coordinator
Jeff Korpik, Citizen Monitoring Coordinator
Katie Farber, Carolyn Dindorf; Fortin Consulting

Cover design by:

Paula Liepold

Photos by:

Katie Dennis, Jessie Eckroad, Amy Jo Forslund, Rachel Funke, David Leard, Tom Loretto, Eric Nelson, Cindy Taintor, Dianne Rowse, Rick Schuldt, Darcy Tatham, and Fortin Consulting.

Special thanks to all of the WHEP volunteers who donated their time and were out in the wetlands or behind the microscopes.

For more information on the Dakota County Wetland Health Evaluation Program or for a copy of this report, please contact the Dakota County Environmental Resources Department or visit www.mnwhep.org.

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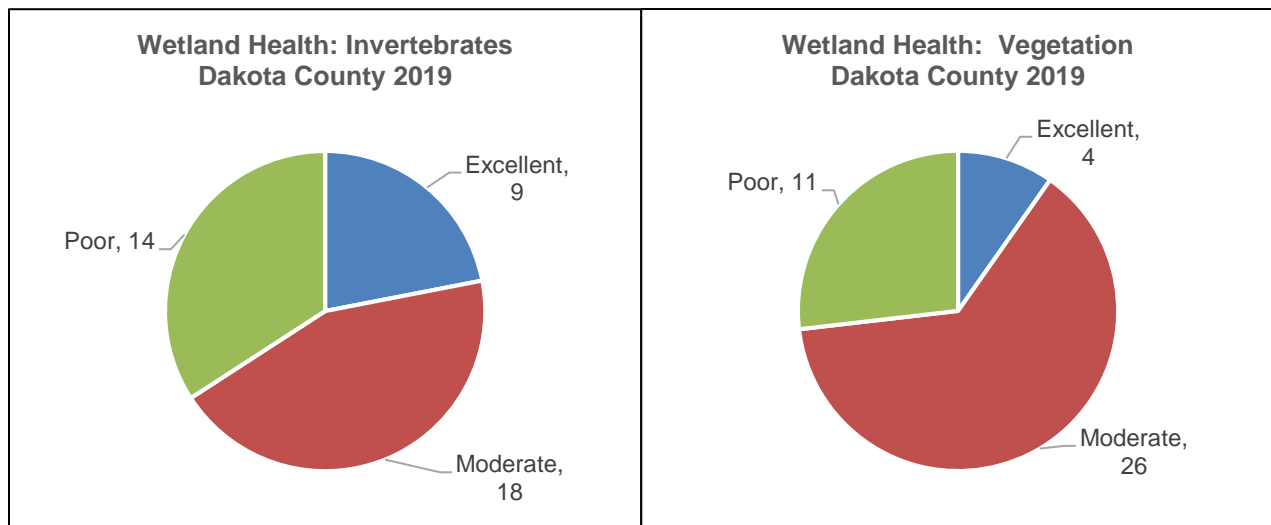
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Executive Summary

Dakota County Wetland Health Evaluation Program 2019

Dakota County began sponsoring the Wetland Health Evaluation Program (WHEP) in 1997. Since then, 197 wetlands have been monitored by many volunteers across the County. In 2019, ten cities, one watershed management organization, and Dakota County Parks sponsored WHEP teams, monitoring 41 different wetlands. Three of these wetlands were monitored for the first time in 2019, including sites from Burnsville and Eagan. Trained volunteers collected data on the macroinvertebrates (insects and other small animals without backbones) that live in the wetlands as well as the vegetation (plants) in the wetlands. The invertebrates and vegetation identified by the volunteers were then used to calculate an Index of Biotic Integrity (IBI). This IBI can be used to estimate the health of each wetland.

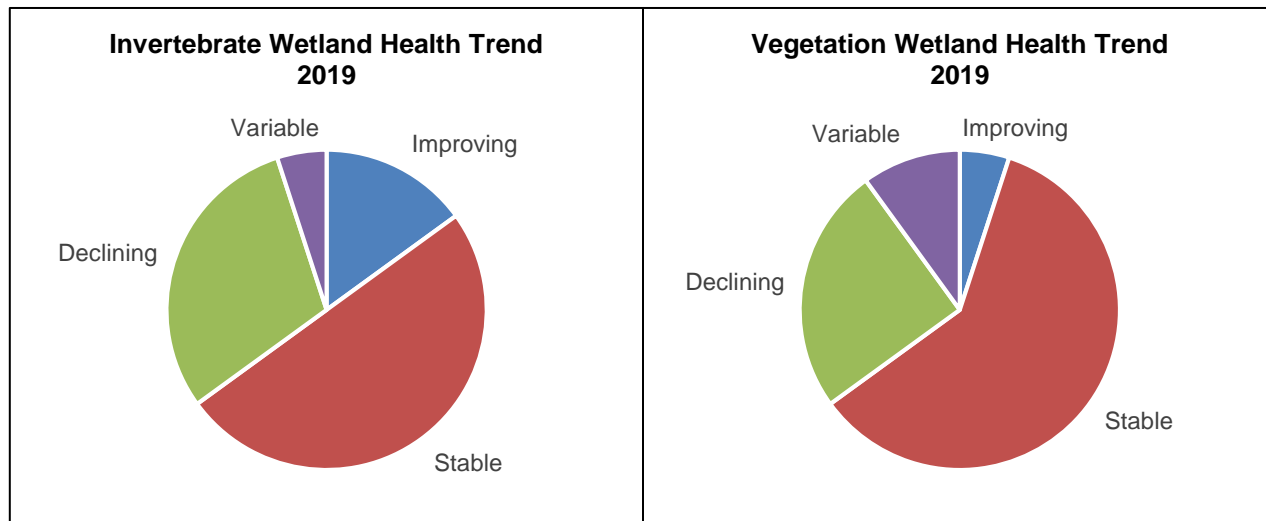


The results of the monitoring for 2019 showed a variety of wetland conditions. The Index of Biotic Integrity was used to determine wetland health ranging from poor to excellent. The majority of wetlands were in the moderate category for both macroinvertebrates (44%) and the moderate category for vegetation (66%). Nine wetland sites rated excellent for macroinvertebrates: Crystal Lake West (B-1), Crystal Lake West Alternate (B-1A), BB's Wetland (DC-6), Lilypad Pond (DC-7) Trinity Pond (E-22), City Hall Orchard Heights (MH-20), Loretto Wetland (NCR-1), Schwarz Pond (R-4), and Mud Lake (WSP-1). Four wetland sites rated excellent for vegetation: Trinity Pond (E-22), Copperfield (MH-2), WMP #306 (R-25), and Erickson Pond (R-26). The City of Eagan's Trinity Pond had the highest invertebrates score (28), and the City of Rosemount's WMP #306 had the highest vegetation score (31) in 2019.

A trend analysis was conducted for each of the wetlands monitored in 2019 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, three of the wetlands appear to be improving, six are declining, ten are stable, and one have variable data trends. For vegetation, one of the wetlands appear to be improving, five are declining, 12 are stable, and two have variable data trends. Twenty-one 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.

2019 Dakota County Wetland Health Trends*



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

In 2019, 124 Dakota County WHEP volunteers donated more than 2,280 hours in training, sample collection and sample identification in completion of this valuable monitoring. 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, 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



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

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.

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 both Dakota and Hennepin counties, 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 creation 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

There are many hands involved in the success of the Dakota County Wetland Health Evaluation Program (WHEP). It is invaluable to have a dedicated and enthusiastic group of people working together to continue the success and growth of the program each year.



EMILY GABLE AND PAULA LIEPOLD

Dakota County employees, Paula Liepold and Emily Gable, manage the Wetland Health Evaluation Program. They are proud to carry on a program that engages volunteer citizen scientists in learning about wetlands, evaluating them and understanding why the work is important. Volunteers are vital to the program, and every volunteer brings their own unique skills, perspective, and motivation. Thank you to all the volunteers, team leaders, partners, and sponsors.



JEFF KORPIK

Jeff Korpik is the Field Coordinating Monitor for Dakota County WHEP. He has been involved in WHEP since 2007 as a volunteer, team leader, and Field Monitoring Coordinator. Jeff commented, “I really enjoy my time as field supervisor. My favorite part is traveling all around the county and seeing all of the sites, good and bad, the cities pick for monitoring. I want to thank all of the dedicated volunteers and team leaders, and especially hope some of the younger team leaders stay active in the program. I still miss being part of a team, but I got to help several times this summer when team leaders were short of volunteers. Looking forward to next season!”

2.0 Methods

2.1 Training

Training for citizen monitors is arranged by Dakota and Hennepin counties and taught by technical experts from the MPCA and Fortin Consulting. Both classroom and field sessions are held. 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



MICHAEL BOURDAGHS

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."



JOEL CHIRHART



JOHN GENET

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

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 (U.S.EPA www.epa.gov/bioindicators/html/about.html). 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)

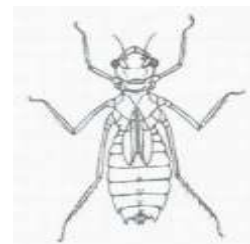
Vegetation is analyzed using a 100 square meter releve plot. All species within the sampling plot are identified to the genus level, and documented on the field data sheet. Vegetation is divided into categories based on their ecological function or relationship. The categories include nonvascular, woody, 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. 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

Each city is responsible for evaluating one wetland in another city as a means of providing a cross-check. The citizen cross-check provides a second sample for the selected wetland. The purpose of the cross-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 Citizen Monitoring Coordinator (Jeff Korpik) provides advice

regarding proper sampling methods and proper site selection. Fortin Consulting provides Quality Control (QC) review of the completed data sheets. This review identifies and corrects errors in scoring, transfer of data, and data analysis.

Fortin Consulting (FCI), the technical expert, provides quality assurance and report preparation. FCI has been working with Dakota County on the WHEP program since 2007. FCI conducts QC checks on the wetlands sampled by reviewing the vegetation sample plot that was selected and evaluated by the citizen team. FCI also checks the invertebrate identification of the citizen team for the invertebrate IBI; therefore, the invertebrate QC is not a second invertebrate sample of the same wetland site, but a review of the sample collected and evaluated by the citizen team.



CONNIE FORTIN, CAROLYN DINDORF,
LAUREN SCHULZETENBERG,
KATIE FARBER, ROMAN ROWAN;
FRONT: LINDSEY WOOD,
AVERY ROWAN, JESSICA JACOBSON

Over the duration of the project, the work of each citizen team has been reviewed on a rotational basis. The technical expert reviews 10 percent of the vegetation plots and one invertebrate collection from each team. In 2019, Fortin Consulting cross-checked the vegetation plots of four wetlands, one in Apple Valley (AV-1), Dakota County Parks (DC-3), Eagan (E-45), and South St. Paul (SSP-1). Fortin Consulting also reviewed the invertebrate samples from sites AV-1, B-1, DC1-3, DC2-5, E-22, F-7, H-6, L-8, MH-2, NCR-1, R-4, SSP-1, and WSP-1. 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 both the scoring checks and the technical quality control checks. The official data scores are derived from the City team's data incorporating any corrections made during the technical quality control checks (invertebrate identification review, vegetation cross-check, and datasheet review) conducted by FCI. Data for the cross-check's conducted by another City team is presented in Section 3.2.

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 2019 Sampling Season Results

During the 2019 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 41 wetlands in ten cities in Dakota County. 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.

Figure 3.1.1 Dakota County Wetland Ratings

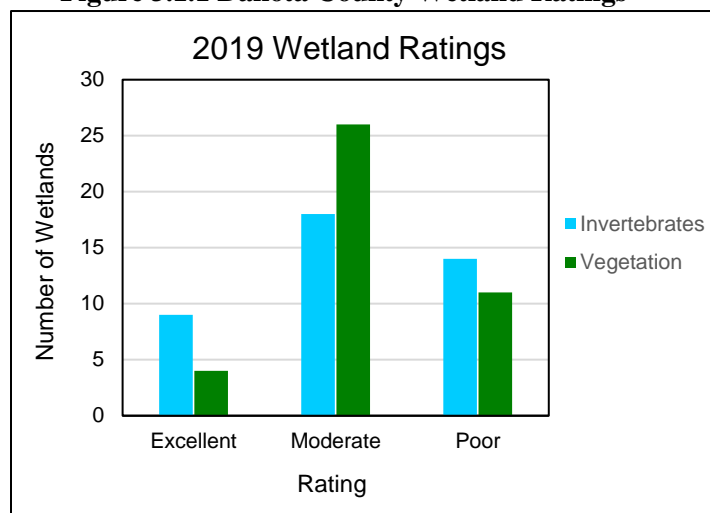


Figure 3.1.1 and Table 3.1.1 show the invertebrate and vegetation ratings for all of the wetlands assessed during the 2019 sampling season. Based on invertebrate scores, nine of the wetlands rated excellent, 18 of the wetlands were rated moderate, and 14 rated poor. Invertebrate scores ranged from 10 to 28 out of a maximum of 30 points.

The vegetation analysis resulted in four wetlands rating excellent, 26 rating moderate and 11 poor. Vegetation scores ranged from 13 to 31 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, including Eagan's Trinity Pond which showed an excellent wetland health rating for both invertebrates and vegetation. 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.



WHEP TEAMS AT INVERTEBRATE TRAINING



WHEP TEAMS AT INVERTEBRATE TRAINING

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) | 2/0 | 2/4 | 0/0 |
| Burnsville (B) | 0/1 | 2/3 | 2/0 |
| Dakota County (DC) | 3/1 | 3/7 | 2/0 |
| Eagan (E) | 2/0 | 0/2 | 1/1 |
| Farmington (F) | 2/1 | 1/2 | 0/0 |
| Hastings (H) | 1/3 | 3/1 | 0/0 |
| Lakeville (L) | 0/0 | 2/2 | 0/0 |
| Mendota Heights (MH) | 0/0 | 1/1 | 1/1 |
| North Cannon River (NCR) | 0/1 | 1/1 | 1/0 |
| Rosemount (R) | 1/1 | 2/1 | 1/2 |
| South Saint Paul (SSP) | 2/2 | 0/0 | 0/0 |
| West Saint Paul (WSP) | 1/1 | 1/2 | 1/0 |
| Totals | 14/ 11 | 18/ 26 | 9/ 4 |

Figures 3.1.2 and 3.1.3 show the distribution of wetland health ratings for each site monitored in 2017.

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



WHEP TEAMS AT INVERTEBRATE TRAINING



WHEP TEAMS AT INVERTEBRATE TRAINING

Figure 3.1.2 2019 Invertebrate Scores

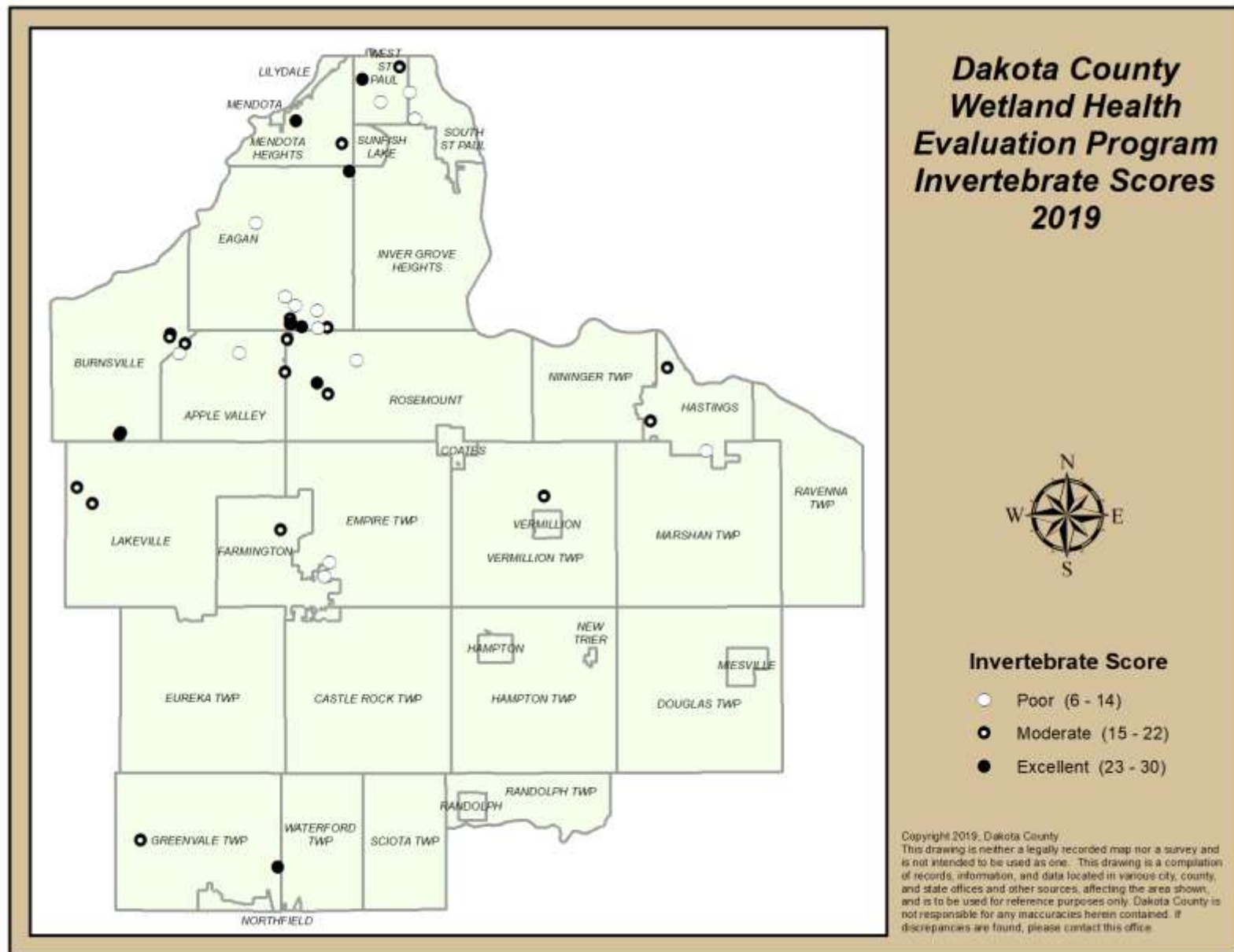
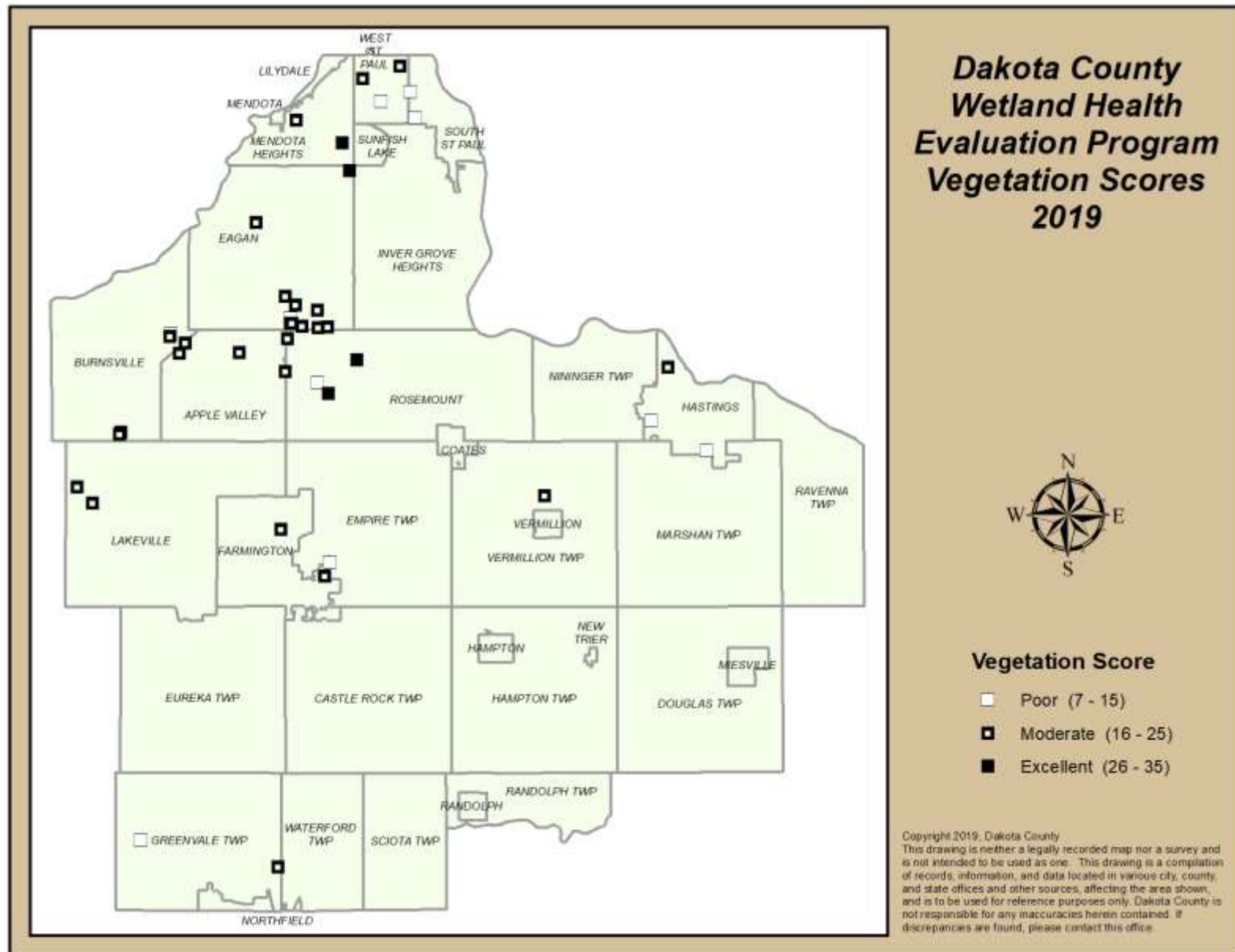


Figure 3.1.3 2019 Vegetation Scores



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.

WHEP teams are expected to report the presence of invasive species in the wetlands that they monitor. Findings in 2019 were as expected. Many of the WHEP wetlands have been found to contain invasive species, but no early detection species were observed in 2019. Reed canary grass (*Phalaris arundinacea*) and purple loosestrife (*Lythrum salicaria*) are two common wetland invaders. Curly-leaf pondweed (*Potamogeton crispus*) and Chinese mystery snails (*Cipangopaludina chinensis*) were also observed in wetlands monitored in 2019. Reed canary grass was found in 78 percent of the wetlands, purple loosestrife was found in 12 percent of the wetlands, curly-leaf pondweed was found in 2 percent of the wetlands, and Chinese mystery snails were found in 10 percent of the wetlands. In addition, buckthorn was reported in 17 percent of the wetlands, spotted knapweed and Japanese hedge parsley were each reported in one wetland. It is possible that other invasive species exist in wetlands, but were not observed near monitoring sites at each wetland. 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 B). 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 6, 8, 8. The highest invertebrate scores, respectively, are 30, 28, 26. The lowest vegetation scores for created, stormwater, and natural wetlands, respectively, are 11, 9, 11. The highest vegetation scores, respectively, are 27, 31, 27.

Wetland health scores vary from year to year. In 2019, 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.

At this time, there is no statistical data indicating a decreased invertebrate community in natural versus disturbed or created 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.

¹Schueler, 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 2019 within the vegetation plot sites. The lowest water level measured within the plots in 2019 was zero feet, the highest water level was 4.9 feet (1.5 m), and the average water level was 1.8 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.

3.2 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 2019 Cross-checks

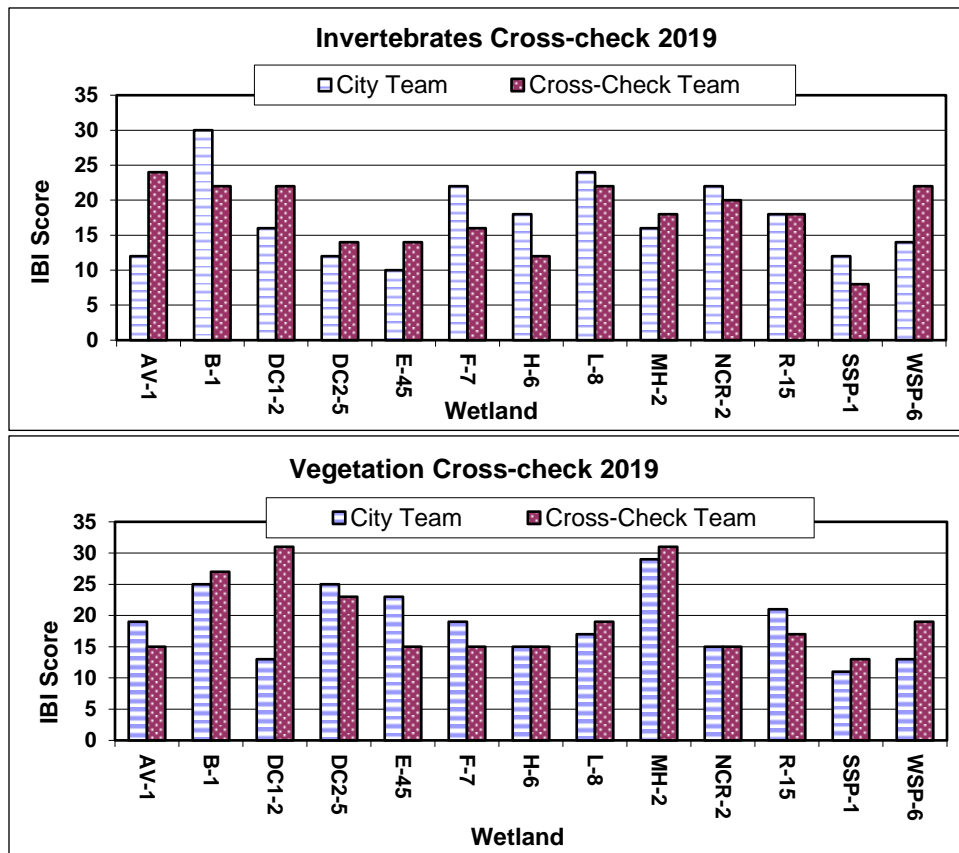
Each city team was responsible for evaluating one wetland in another city (Table 3.2.1). This citizen cross-check provides a second sample for the selected wetland. The purpose of this check is to determine if two different samples provide similar results for the vegetation and invertebrate IBI. Large 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 AV-1, B-1, and WSP-6 were inconsistent, differing by 12, 8, and 8 points, respectively. Vegetation scores for site DC-2 and E-45 were inconsistent, differing by 18 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 City team is used for the individual wetland analysis in Section 4.0 of this report. Invertebrate scores between City team and cross-check team for site R-15 were identical. Vegetation scores between City team and cross-check team for sites H-6 and NRC-2 were identical. Many scores were close in comparison.

- *AV-1*: The cross-check team identified a more diverse invertebrate community than the City team. This affected the Leech, Odonata, ETSD, and Total Invertebrate Taxa Metrics.
- *B-1*: The City team identified a more diverse invertebrate community than the cross-check team. This affected the Leech, ETSD, and Snail Metrics.
- *WSP-6*: The cross-check team identified a more diverse invertebrate community than the cross-check team. This affected the Odonata, ETSD, Snail, and Total Invertebrate Taxa Metrics.
- *DC-2*: The cross-check team identified a more diverse vegetation community than the City team. This affected the Vascular, Non-vascular, Grasslike, *Utricularia*, and Aquatic Guild Metrics.
- *E-45*: The City team identified a more diverse vegetation community than the cross-check team. This affected the Vascular, Non-vascular, and Grasslike Metrics.

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

| City Team | Cross-Check Team | Wetland Evaluated | Invertebrate Score Comparison | | Vegetation Score Comparison | |
|----------------------------|----------------------------|-------------------|-------------------------------|-----------|-----------------------------|-----------|
| | | | City | x-Check | City | x-Check |
| Apple Valley | South St. Paul | AV-1 | 12 | 24 | 19 | 15 |
| Burnsville | Lakeville | B-1 | 30 | 22 | 25 | 27 |
| Dakota County Parks Team 1 | Dakota County Parks Team 2 | DC-2 | 16 | 22 | 13 | 31 |
| Dakota County Parks Team 2 | Dakota County Parks Team 1 | DC-5 | 12 | 14 | 25 | 23 |
| Eagan | Mendota Heights | E-45 | 10 | 14 | 23 | 15 |
| Farmington | North Cannon River | F-7 | 22 | 16 | 19 | 15 |
| Hastings | Eagan | H-6 | 18 | 12 | 15 | 15 |
| Lakeville | Burnsville | L-8 | 24 | 22 | 17 | 19 |
| Mendota Heights | Hastings | MH-2 | 16 | 18 | 29 | 31 |
| North Cannon River WMO | Farmington | NCR-2 | 22 | 20 | 15 | 15 |
| Rosemount | West St. Paul | R-15 | 18 | 18 | 21 | 17 |
| South St. Paul | Apple Valley | SSP-1 | 12 | 8 | 11 | 13 |
| West St. Paul | Rosemount | WSP-6 | 14 | 22 | 13 | 19 |

Figure 3.2.1 Cross-check Comparisons of IBI Scores



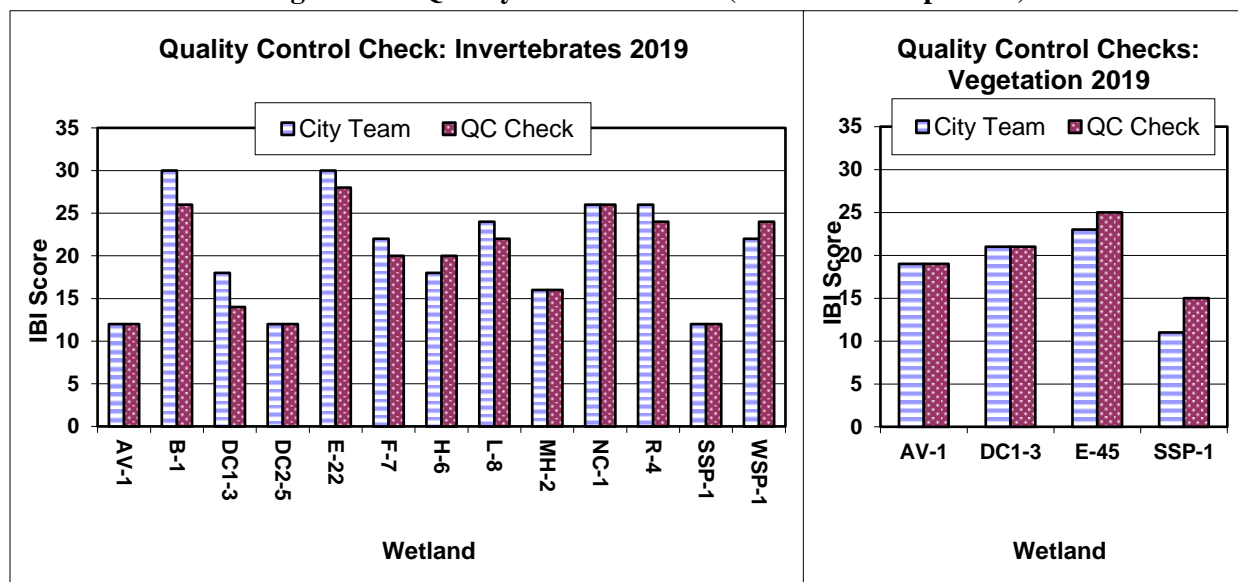
3.2.2 2019 Quality Control Checks

Quality control checks were conducted at four sites for vegetation and thirteen sites for invertebrates in 2019 (Figure 3.3.2) by Fortin Consulting (FCI). The vegetation check was conducted by re-sampling the area marked off by the citizen team using the WHEP procedures and comparing results. For the invertebrates, FCI reviewed the insect samples collected and identified by the teams and completed the lab and metric sheets. The quality control review was done independently of the citizen team. The following sites were checked as a measure of quality control by FCI: AV-1, B-1, DC-3, DC-5, E-22, F-7, H-6, L-8, MH-2, NCR-1, R-4, SSP-1, and WSP-1 were reviewed for invertebrate identification accuracy. AV-1, DC-3, E-45, and SSP-1 were reviewed for vegetation identification accuracy.



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. Table 3.2.2 shows the data sheet review results. There were 10 transfer errors, 4 metric calculation errors, and 3 math errors. 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 four 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.

Table 3.2.2 Data Sheet Review

| | | Invertebrate IBI Scores | | | Vegetation IBI Scores | | |
|--------------|-----------|-------------------------|--------|--------|-----------------------|--------|--------|
| Team Name | Site | Team | Review | Errors | Team | Review | Errors |
| Apple Valley | AV-1 | 12 | 12 | 0 | 19 | 19 | 0 |
| | AV-6 | 14 | 14 | 0 | 17 | 17 | 0 |
| | AV-8 | 16 | 16 | 0 | 17 | 17 | 0 |
| | AV-20 | 16 | 16 | 0 | 17 | 17 | 0 |
| | SSP-1 cc* | 8 | 8 | 0 | 13 | 13 | 0 |
| Burnsville | B-1 | 30 | 30 | 0 | 25 | 25 | 0 |
| | B-1A | 24 | 24 | 0 | 19 | 19 | 0 |
| | B-12 | 20 | 20 | 0 | 15 | 15 | 0 |
| | B-18 | 18 | 18 | 0 | 23 | 23 | 0 |
| | L-8 cc* | 22 | 22 | 0 | 19 | 19 | 0 |
| Dakota Co 1 | DC-2 | 16 | 16 | 0 | 13 | 13 | 0 |
| | DC-3 | 18 | 18 | 0 | 17 | 21 | 1 |
| | DC-6 | 24 | 24 | 0 | 25 | 25 | 0 |
| | DC-7 | 26 | 26 | 0 | 23 | 23 | 0 |
| | DC-5 cc* | 14 | 14 | 0 | 23 | 23 | 0 |
| Dakota Co 2 | DC-4 | 18 | 18 | 0 | 25 | 25 | 0 |
| | DC-5 | 12 | 12 | 0 | 25 | 25 | 0 |
| | DC-8 | 20 | 20 | 0 | 23 | 23 | 0 |
| | DC-9 | 14 | 14 | 0 | 25 | 25 | 0 |
| | DC-2 cc* | 22 | 22 | 0 | 31 | 31 | 0 |
| Eagan | E-22 | 30 | 30 | 0 | 27 | 27 | 0 |
| | E-44 | 18 | 14 | 3 | 23 | 23 | 0 |
| | E-45 | 10 | 10 | 0 | 23 | 23 | 0 |
| | H-6 cc* | 12 | 12 | 0 | 15 | 15 | 0 |
| | | | | | | | |
| Farmington | F-3 | 10 | 10 | 0 | 21 | 21 | 0 |
| | F-7 | 22 | 22 | 0 | 19 | 19 | 0 |

| | | Invertebrate IBI Scores | | | Vegetation IBI Scores | | |
|-----------------|----------|-------------------------|--------|--------|-----------------------|--------|--------|
| Team Name | Site | Team | Review | Errors | Team | Review | Errors |
| | F-9 | 14 | 14 | 0 | 13 | 13 | 0 |
| | NC-2 cc* | 20 | 20 | 0 | 15 | 15 | 2 |
| Hastings | H-4 | 16 | 16 | 0 | 13 | 13 | 0 |
| | H-6 | 18 | 18 | 1 | 19 | 15 | 1 |
| | H-56 | 22 | 22 | 0 | 21 | 21 | 2 |
| | H-57 | 12 | 14 | 2 | 15 | 15 | 0 |
| | MH-2 cc* | 18 | 18 | 0 | 31 | 31 | 0 |
| Lakeville | L-7 | 20 | 20 | 0 | 19 | 21 | 1 |
| | L-8 | 24 | 24 | 0 | 17 | 17 | 0 |
| | B-1 cc* | 22 | 22 | 0 | 27 | 27 | 0 |
| Mendota Heights | MH-2 | 16 | 16 | 0 | 29 | 29 | 0 |
| | MH-20 | 24 | 24 | 0 | 21 | 21 | 0 |
| | E-45 cc* | 14 | 14 | 0 | 15 | 15 | 0 |
| NCRWMO | NCR-1 | 26 | 26 | 0 | 19 | 19 | 0 |
| | NCR-2 | 22 | 22 | 0 | 15 | 15 | 0 |
| | F-7 cc* | 16 | 16 | 0 | 15 | 15 | 0 |
| Rosemount | R-4 | 26 | 26 | 0 | 15 | 15 | 0 |
| | R-15 | 18 | 18 | 0 | 21 | 21 | 0 |
| | R-25 | 14 | 14 | 0 | 31 | 31 | 0 |
| | R-26 | 22 | 22 | 0 | 27 | 27 | 0 |
| | WSP-6 | 22 | 22 | 0 | 19 | 19 | 0 |
| South St. Paul | SSP-1 | 12 | 12 | 0 | 11 | 11 | 0 |
| | SSP-3 | 12 | 12 | 0 | 13 | 13 | 0 |
| | AV-1 cc* | 24 | 24 | 0 | 15 | 15 | 0 |
| West St. Paul | WSP-1 | 22 | 22 | 3 | 17 | 17 | 0 |
| | WSP-5 | 20 | 20 | 0 | 19 | 19 | 0 |
| | WSP-6 | 12 | 14 | 1 | 13 | 13 | 0 |
| | R-15 cc* | 18 | 18 | 0 | 17 | 17 | 0 |

cc* - indicates cross-check of another team's wetland

3.3 WHEP Historical Data

Since WHEP began in 1997, 197 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 2019 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

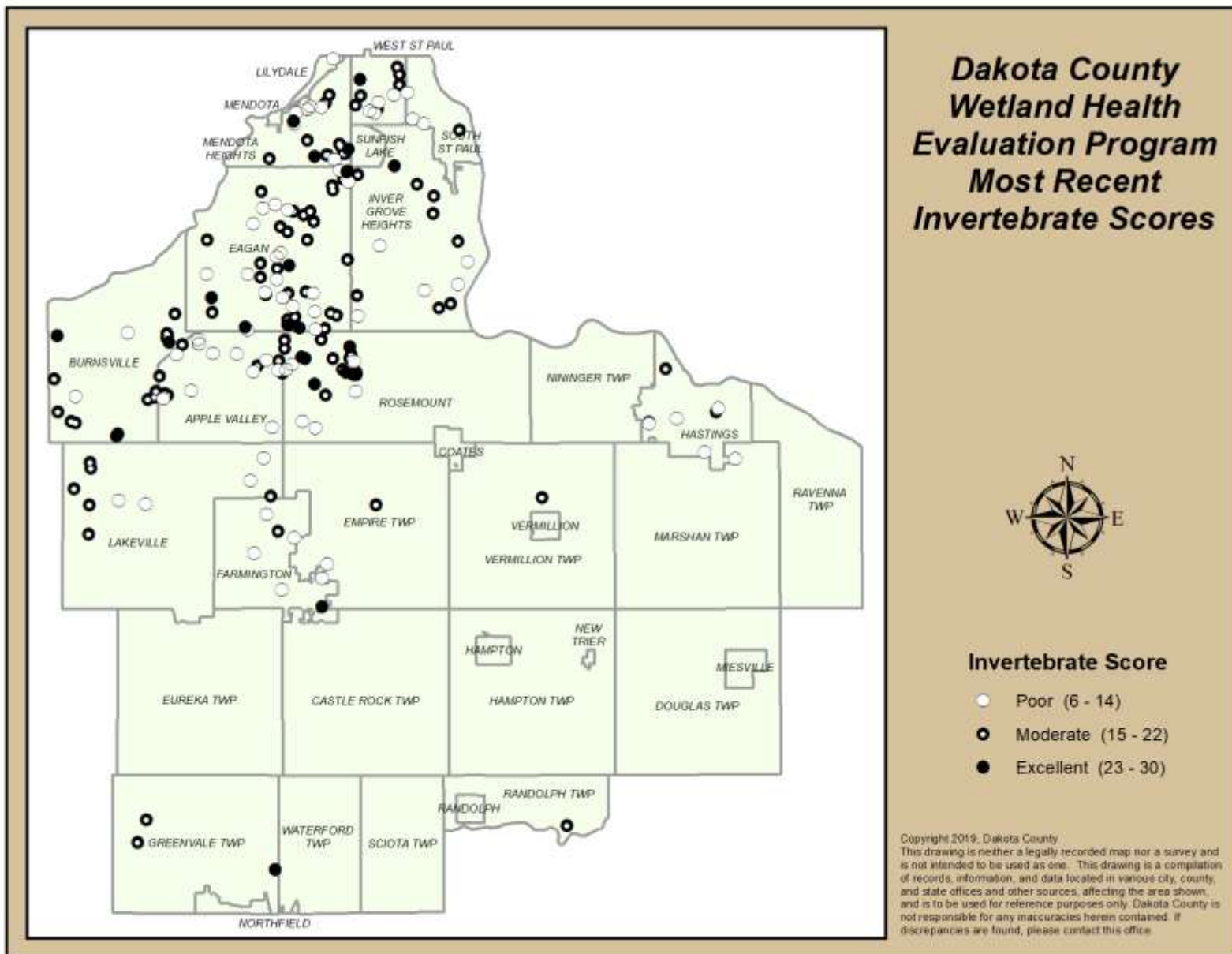
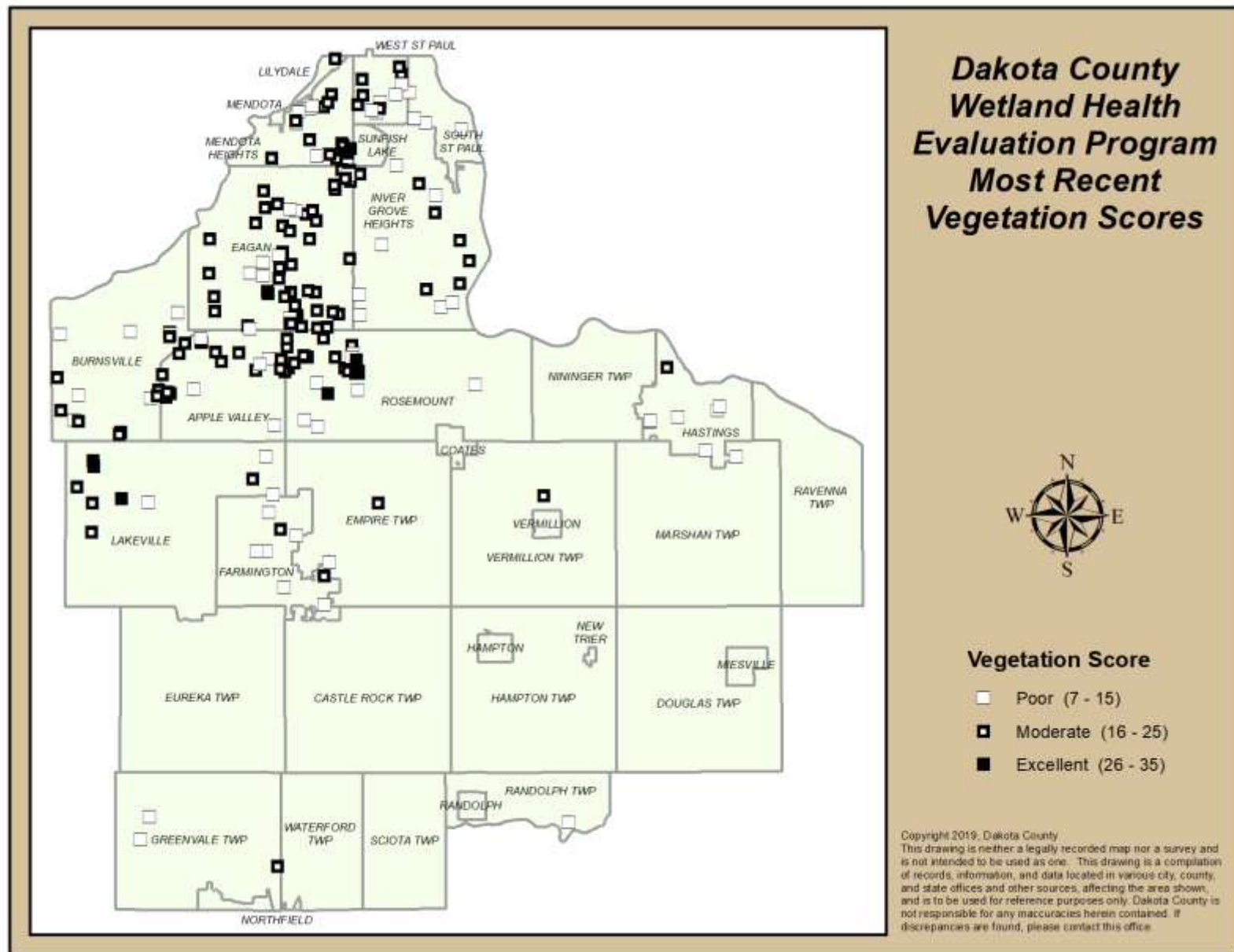


Figure 3.3.2 Most Recent Vegetation Scores



4.0 Wetland Evaluations

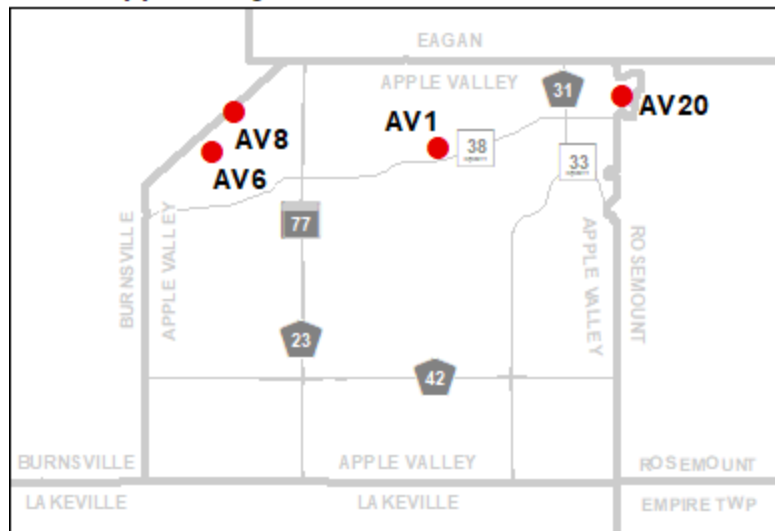
4.1 Apple Valley Wetlands

Four wetlands were monitored within the City of Apple Valley in 2019. This is the 22nd year the City has participated in WHEP! Twenty wetlands have been monitored in Apple Valley since the initiation of WHEP in 1997.

Team Leader: Cindy Taintor

Team Members: Brad Blackett, Brigitt Martin, Bruce Gustafson, Gupthan Namboodiripad, Jim Dooley, Karen Levisen, Leah Michelsen, Roman Martin, Sheethal Marpaka, and Trevor Benson.

Apple Valley WHEP Sites Monitored in 2019



CINDY TAINTOR

Cindy Taintor is the team leader of the Apple Valley WHEP team. This is her third year as team leader; though, she has been volunteering for WHEP since 2009. She said, “My third year as Apple Valley Team Leader has been the best yet. The whole team was curious and eager to learn, ready to don waders, puzzle out the ID for each plant and critter, and to record our findings. We were a bit dismayed at one pond to discover a minnow invasion in every bottle trap. The only invertebrates were 3 leeches. We resampled that pond, with slightly better results. We're hoping the remediation efforts that are in place there will have a positive effect. When we surveyed that pond for plants in July, we found a couple of dragonfly exuviae (the dry shell left after the dragonfly nymph has emerged as an adult), which was something none of us had seen before.

“I've been out in the ponds with WHEP more than a decade, and this was the first time anyone has tipped over because their feet were stuck in the muck. It wasn't too much of a dunking, and good humor prevailed.

“WHEP is a unique opportunity to learn and discover what is living and growing in the ponds around town. It's amazing to see it all close up, and to be able to contribute reliable data for monitoring our wetlands.”

Samantha Berger just began her position at the City of Apple Valley as their Water Resource Specialist. Her role with WHEP is completely new to her, but not to the City of Apple Valley. Her predecessor helped assist in wetland selection and provided administrative assistance needed for the program. Sam is excited to learn more about WHEP and to work with eager volunteers who aren't afraid to get their hands "wet." Sam hopes to learn more about the volunteers in the community and to check out some of the wetlands within the City.

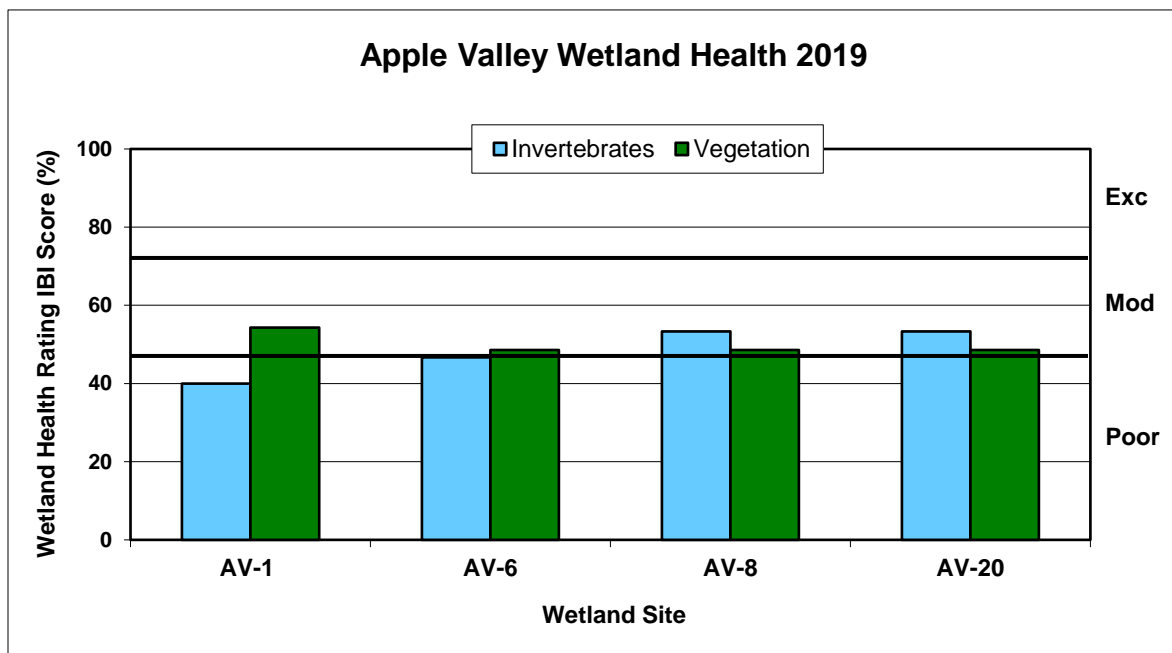


SAMANTHA BERGER

Apple Valley General Wetland Health

Figure 4.1 presents an overall view of wetland health for all of the 2019 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 were consistent for each of the wetlands, except AV-1, which show invertebrate and vegetation scores differing by 14 percent.

Figure 4.1 Apple Valley site scores (percent) for the 2019 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.

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.



BRAD BLACKETT SETTING BOTTLE TRAPS

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. Reed canary grass (*Phalaris arundinacea*) dominated the vegetation plots. Other vegetation present included coontail (*Ceratophyllum* sp.), duckweed (*Lemna* sp and *Spirodela* sp.), and water-meal (*Wolffia* sp.). A non-vascular species, slender Riccia (*Riccia fluitans*), and smartweed (*Polygonum* sp.) were also present. Several species of leeches, dragonflies, damselflies, mayflies, snails, true flies, and crustaceans were collected and/or observed.



GUPTHAN NAMBOODIRIPAD, CINDY TAINTOR,
KAREN LEVISEN, AND BRIGITT MARTIN

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



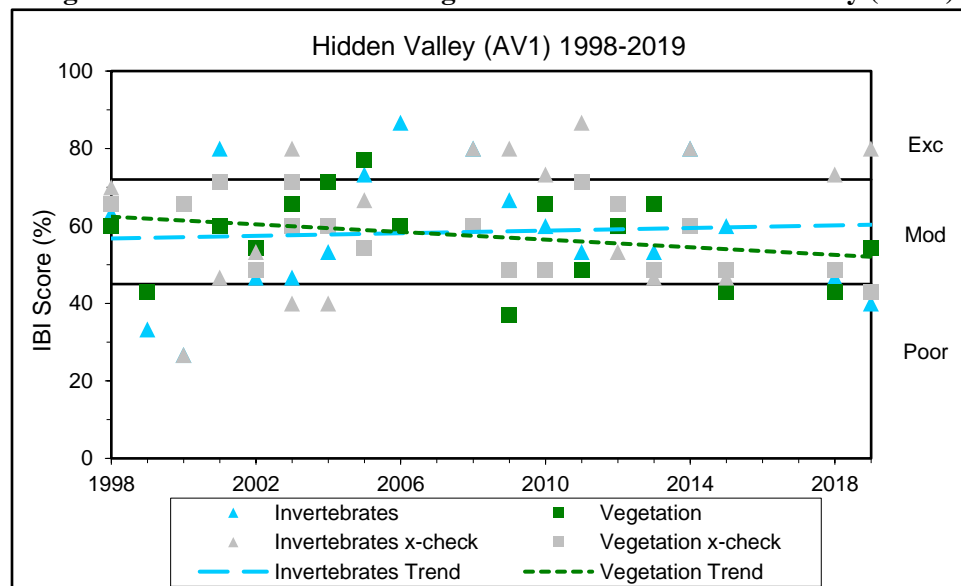
| | Invertebrates  | Vegetation  |
|--|--|---|
| 2019 Data (AV-1) | | |
| Wetland Health Rating (IBI score) | Poor (12) | Moderate (19) |
| Cross-check Rating (IBI score) | Excellent (24) | Poor (15) |
| Trend 1998-2019 | Variable, but improving | Variable, but declining |

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



Site Summary: Hidden Valley has been surveyed 19 times since 1998. The invertebrate and vegetation health scores were inconsistent in 2019. The invertebrate data calculated poor wetland health while the vegetation showed moderate wetland health. Both the invertebrate and vegetation scores have been variable over the years fluctuating between moderate and poor. The extreme fluctuations may be due to factors such as changes in water level and plot placement. There was less of an invertebrate diversity in 2019 than 2018; though the team noted that the bottle traps contained tadpoles when collected. Overall, the invertebrates trend appears to be stable, if not improving slightly, while the vegetation trend appears to be declining. Hidden Valley was cross-checked by another WHEP team in 2019. The scoring between the City team and cross-check team was inconsistent for both invertebrate and vegetation health. The invertebrate scores differed by 40 percent. The City team scored poor while the cross-check team scored excellent for invertebrate health. The cross-check team observed a greater invertebrate diversity than



GUTPHAN NAMBOODIRIPAD
SAMPLING FOR INVERTEBRATES

the City team, including more leeches, dragonflies, mayflies, snails, and true flies. This could be due to a difference in collection area within the wetland. It is also possible that the invertebrate community was disturbed during the first invertebrate collection by the cross-check team, affecting the findings from the City team which collected a few days later. The vegetation scores between the two teams differed by 11 percent. The City's vegetation plot was reviewed by Fortin Consulting. Very similar vegetation species were identified within the vegetation plot by the City Team and Fortin Consulting.

4.1.2 Belmont Park (AV-6)

Belmont Park (AV-6), also known as BD-P10, is a 1.3-acre, type 3 wetland within the BD-10 subwatershed within the Black dog Watershed Management Organization. The wetland watershed includes approximately 202 acres, of which 32 acres drains directly. The watershed has 20 percent impervious surface. There is one inlet at the eastern border, one outlet along the northern border, and one outlet along the southern border. The northern inlet now passes through a filter berm and pretreatment cell. There is a lift station at the northwest corner of the wetland. This wetland is part of the City's stormwater management plan, and is designated as a Manage 1 Restore wetland with a goal to continue monitoring periodically over time.



The surrounding area is residential, and the wetland is immediately surrounded by parkland including natural space and nearby tennis courts. Belmont Road, on the north side of the wetland, was reconstructed in 2017. A small treatment cell was added to pretreat a portion of the road runoff from Belmont Road, Chaparral Drive, and Shoshoni Trail at that time. The pretreatment cell settles out some large sediments before they reach the pond. Some sediment was removed from the pond at that time (delta from northern inlet). The City placed barley straw pellets within the pond in an effort to control algae for several years, but discontinued that practice starting in 2017.

Wetland Health

Site Observations: The wetland slope is gentle and the substrate is mucky. The wetland is adjacent to Interstate 35E. The wetland is surrounded by woods. An oil sheen was noticed on the surface of the water in June. Pondweed (*Potamogeton* sp.) dominated the wetland. Duckweed (*Lemna* sp.), water-meal (*Wolffia* sp.), water plantain (*Alisma* sp.), iris (*Iris* sp.), bulrush (*Scirpus* sp.), and reed canary grass (*Phalaris arundinacea*) were present. Leeches, damselflies, snails, and true flies were collected in 2019.

Table 4.1.2 Belmont Park (AV-6) Wetland Health based on IBI



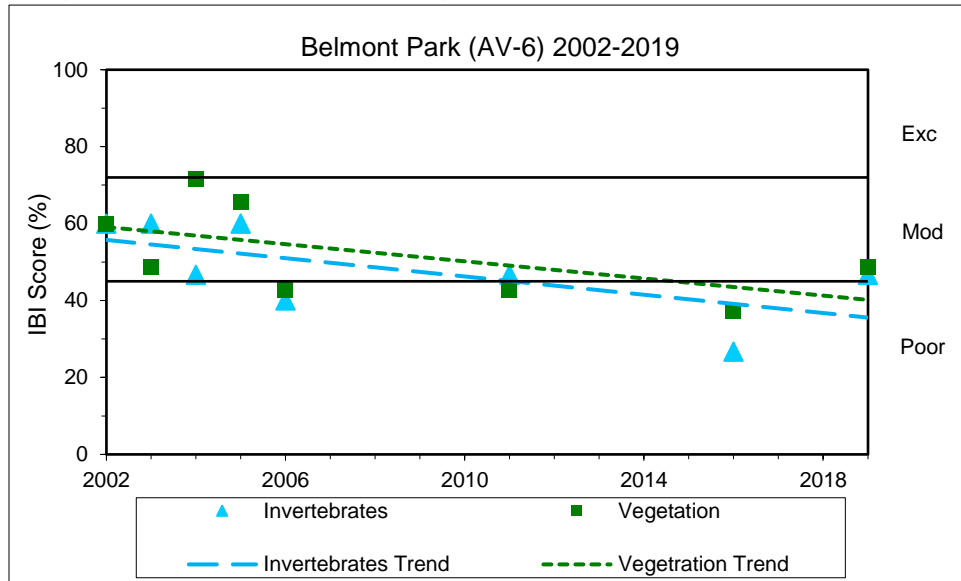
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (AV-6) |  |  |
| Wetland Health Rating (IBI score) | Poor (14) | Moderate (17) |
| Trend 2002-2019 | Declining | Declining |

Figure 4.1.2 Invertebrate and vegetation trends for Belmont Park (AV-6)



Site summary: This is the eighth time that Belmont Park wetland has been monitored since the initial survey in 2002, and was last surveyed in 2016. The invertebrate and vegetation scores were very consistent in 2019, even though the invertebrate health rating is poor while vegetation health rating is moderate. The invertebrate and vegetation trends both appear to be declining since the initial surveys in the early 2000's; however, scores appear stable since 2006.

4.1.3 Chaparral Pond (AV-8)

Chaparral Pond (AV-8), also known as BD-P14, is a 1.5-acre, type 4 wetland within the BD-14 subwatershed within the Black dog Watershed Management Organization. The wetland watershed includes approximately 110 acres, of which 44 acres drains directly. The watershed has 30 percent impervious surface. There is one inlet along the southern border, one inlet along the east side (northern lobe), one equalizer pipe along the west border (southern lobe), and one outlet on the northern end of the wetland that drains towards Burnsville. This wetland is part of the City's stormwater management plan, and is designated as a Manage 1 Restore wetland with a goal to continue monitoring periodically over time.



The area surrounding the wetland is residential. A decent sized buffer surrounds portions of the wetland. Historic aerial photos show increased open water over time. It is possible that a portion of the wetland was excavated in the past, prior to WCA, for stormwater management purposes. There has been nearby road reconstruction in 2016 and 2017. Some sumps to catch sediment were added pond inlets from the street at the time of reconstruction.

Wetland Health

Site Observations: The wetland slope is gentle, and the substrate is very mucky. Very little vegetation was observed at this site. No submergent and emergent forbs were found within the vegetation plot. Dense populations of duckweed (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) covers the wetland surface. Reed canary grass (*Phalaris arundinacea*) was present. Only a few species of leeches, snails, true flies, and crustaceans were observed.



SHETHAL MARPAKA AND TREVOR BENSON PREPARING TO SET BOTTLE TRAPS

Table 4.1.3 Chaparral Pond (AV-8) Wetland Health based on IBI



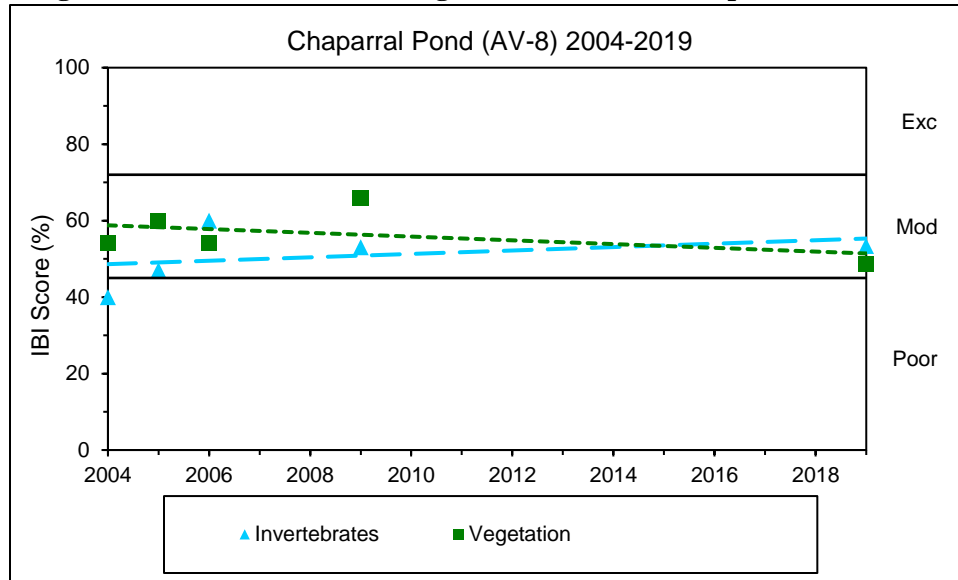
| 2019 Data (AV-8) | Invertebrates  | Vegetation  |
|--|--|---|
| Wetland Health Rating (IBI score) | Moderate (16) | Moderate (17) |
| Trend 2004-2019 | Not enough data | Not enough data |

Figure 4.1.2 Invertebrate and vegetation trends for Chaparral Pond (AV-8)



Site summary: This is the fourth time that AV-8 has been monitored since the initial survey in 2004, but has not been surveyed since 2009. The invertebrate and vegetation scores are consistent, and both showed moderate wetland health. Though invertebrate and vegetation diversity was low in 2019, a high diversity of woody species and leeches, as well as a low *Corixidae* proportion, enhanced the wetland health scores. The health trends appear stable, though more data would help assess a more reliable health trend.

4.1.4 Valleywood Golf Course (AV-20)

Valleywood Golf Course (AV-20), also known as Hole 16 Pond, is a 1.5-acre type 5 wetland located within the Vermillion River Watershed. The wetland watershed directly drains approximately 12 acres. There is no impervious surface that directly affects the watershed. There are no inlets or outlets in the wetland; however, there is overland flow into and out of the wetland. This wetland is not part of the City's stormwater management plan, but is designated as a Manage 2 wetland. Wetlands assigned to this category are characterized by high or exceptional restoration potential.



Valleywood Golf Course wetland is located within the boundaries of the City's golf course. Management of the wetland is consistent with the golf course's practices. The golf course is interested in pursuing Audobon Certification, as well as, in programs like WHEP that can add to their education components.

Wetland Health

Site Observations: The wetland slope is steep, and the substrate is very mucky. Oak trees surround the wetland. Duckweed (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) cover the surface of the wetland. Coontail (*Ceratophyllum* sp.), waterweed (*Elodea* sp.), and a variety of emergent vegetation were also present. Caddisflies, leeches, snails, true flies, and crustaceans were observed.

Table 4.1.4 Valleywood Golf Course (AV-20) Wetland Health based on Index of Biotic Integrity



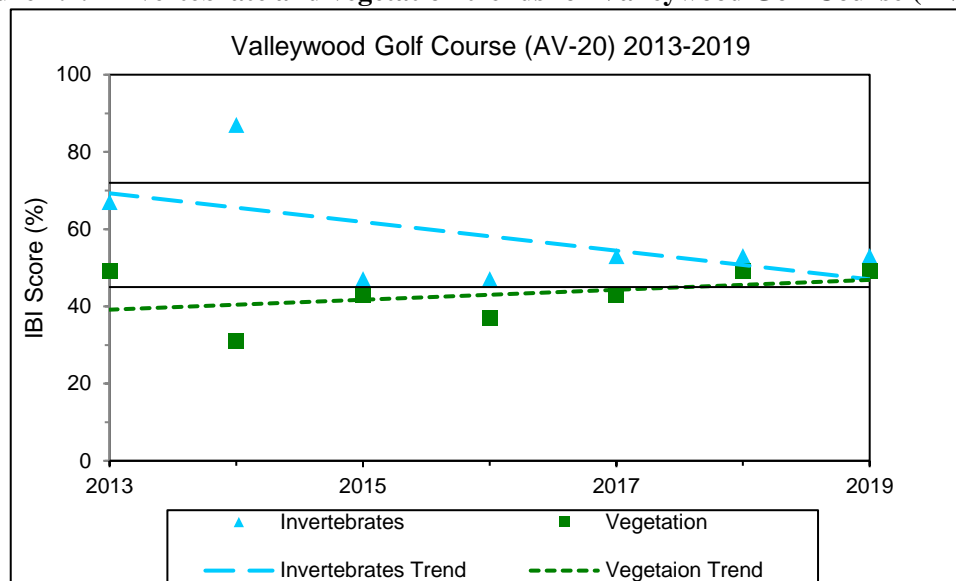
| 2019 Data (AV-20) | Invertebrates  | Vegetation  |
|--|--|---|
| Wetland Health Rating (IBI score) | Moderate (16) | Moderate (17) |
| Trend 2013-2019 | Declining | Stable |

Figure 4.1.4 Invertebrate and vegetation trends for Valleywood Golf Course (AV-20)



Site summary: This is the seventh consecutive year that AV-20 has been monitored through WHEP. The wetland health scores were the same in 2018 and 2019. The invertebrate and vegetation health scores were consistent in 2019, both scoring moderate. Invertebrate and vegetation health scores have been stable the past four years. Overall, the invertebrate trend is declining since first monitored in 2013 while the vegetation trend remains stable.

4.2 Burnsville Wetlands

Four wetlands were monitored within the City of Burnsville in 2019. This is the 23rd year the City has participated in WHEP! Seventeen wetlands have been monitored in Burnsville since the initiation of WHEP in 1997.

Team Leader: Katie Dennis

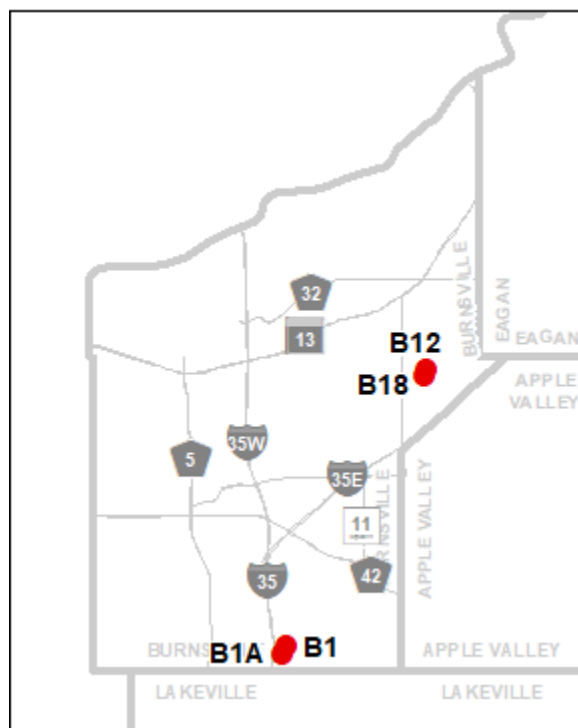
Team Members: Sophia Cajandig, Anna Dennis, Becky Dennis, Jason Glassen, Kylie Glassen, Layla Glassen, Robin Glassen, Kenny Morris, Jeff Redders, Thomas Ward, and Victor Wright.



KATIE DENNIS

Katie Dennis is the Burnsville team leader. She expressed, “Hi! I have been participating in WHEP for three summers now, and am excited to continue with it into the future. I am a graduate of the University of St. Thomas with a degree in Environmental Science. Most of my work as an undergrad involved water chemistry, so the WHEP program really expanded my knowledge of wetlands, as I learned a lot about macroinvertebrates and plants. One of my favorite things about WHEP is the “citizen science” aspect of it. It is great that members of the community from varying age groups can come together and collect such meaningful data for the city.

Burnsville WHEP Sites Monitored in 2019



This was my second year as team leader, and I couldn’t have done it without such a wonderful group of volunteers. I am lucky to have worked with such a diligent group, that also created a fun atmosphere and wasn’t worried about getting a little bit of mud on them. I am excited to work with everyone again!”



LINNEA WIER

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.

“Over the last 23 years, Burnsville’s WHEP volunteers have dedicated significant time gathering information on our local wetlands. The data give us a snapshot of wetland quality over time, which is important considering the environmental value of wetlands, surrounding urbanization and associated impacts, and natural resources restoration within [some of] these local parks. Being able to track wetland health

helps us identify problems, solutions, and positive trends.

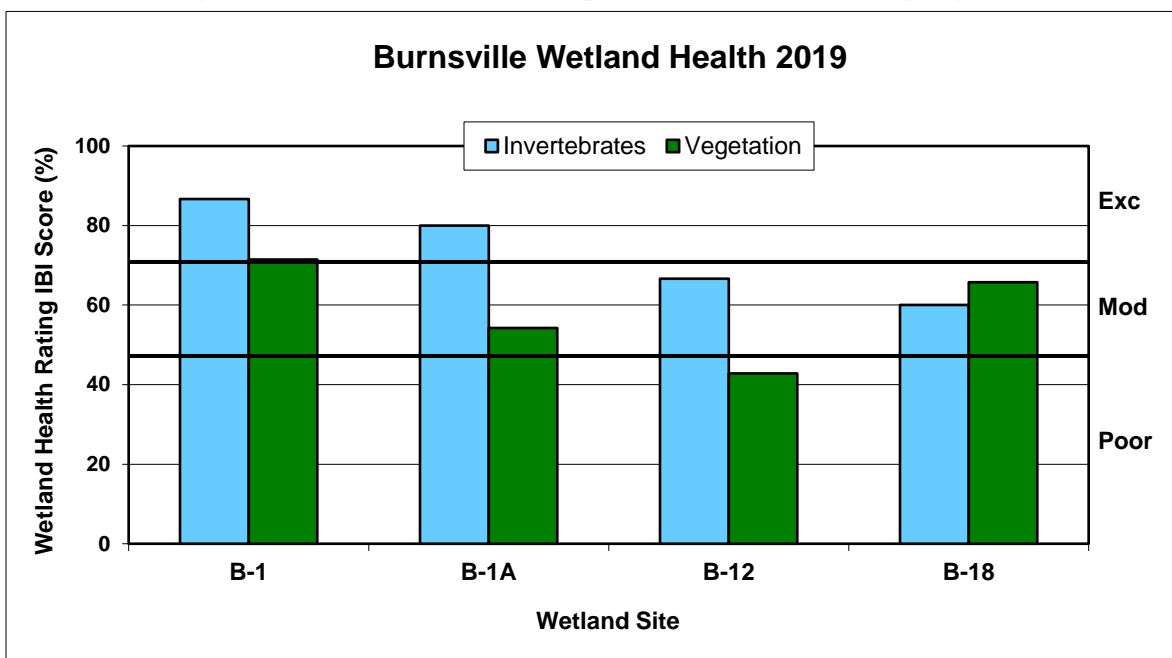
Through the volunteer component of the program, WHEP has helped connect many Burnsville residents over the years with a chance to discover new parks, learn new skills, and get outdoors! I am excited to be part of a program that fosters a connection between people and city nature. This program provides a great opportunity for our residents to become advocates for our local wetlands and natural areas.

I appreciate the efforts and curiosity of team leader Katie Dennis and the entire team of volunteers who dedicated their free time to WHEP this year. Thank you!”

Burnsville General Wetland Health

Figure 4.2 presents an overall view of wetland health for all of the 2019 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 excellent wetland health based on invertebrate and vegetation data. Only wetland B-12 rated poor for vegetation. B-1 and B-1A scored excellent for invertebrates. Invertebrate and vegetation scores were greatly inconsistent for B-1, B-1A, and B-12, differing by 16, 26, and 24 percent, respectively.

Figure 4.2 Burnsville site scores (percent) for the 2019 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: This wetland is located off of a hiking trail system within a densely wooded natural area. The wetland has a gentle slope, and the substrate is very mucky. A ring of reed canary grass surrounds the wetland. The wetland surface is densely covered in duckweed (*Lemna* sp. and *Spirodela* sp.) and white water lilies (*Nymphaea* sp.). Dense submergent vegetation including coontail (*Ceratophyllum* sp.) and pondweed (*Potamogeton* sp.) is present. Several grasslike species and emergent forbs, such as sedges (*Carex* sp.), rushes (*Eleocharis* sp.), and smartweed (*Polygonum*) were also present. A large diversity of invertebrate taxa were collected, including leeches, dragonflies, damselflies, mayflies, caddisflies, snails, true flies, and crustaceans.



JEFF REDDERS, ROBIN GLASSEN, JASON GLASSEN, AND KYLIE GLASSEN IDENTIFYING INVERTEBRATES

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



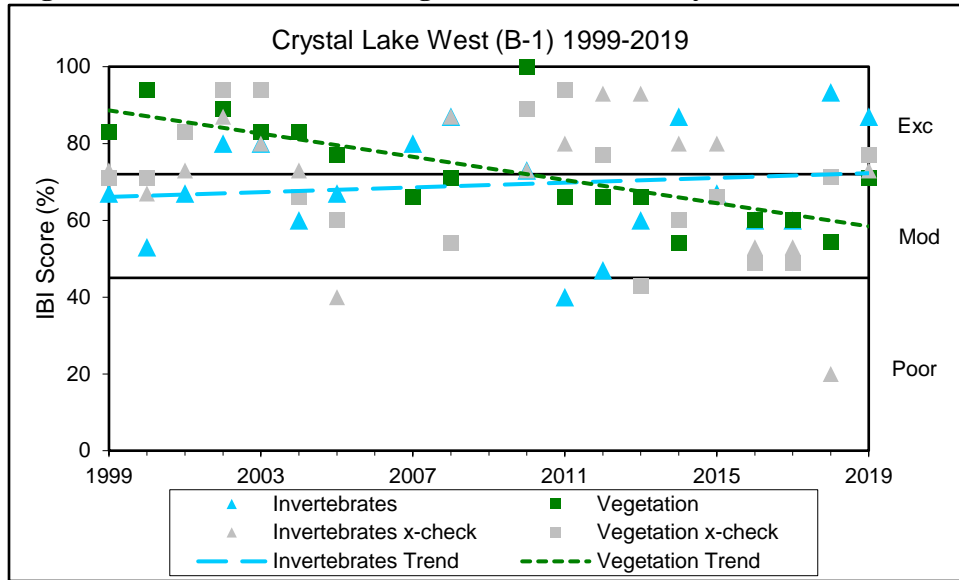
| 2019 Data (B-1) | Invertebrates  | Vegetation  |
|--|--|---|
| Wetland Health Rating (IBI score) | Excellent (26) | Moderate (25) |
| Cross-check Rating (IBI score) | Moderate (22) | Excellent (27) |
| Trend 1999-2019 | Variable, but stable | Declining |

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



Site summary: This is the nineteenth time that B-1 has been surveyed since 1999, and tenth consecutive survey since 2010 (it was not surveyed in 2006 and 2009). The invertebrate and vegetation scores are not consistent, differing by 16 percent. The invertebrate score indicates excellent health, while the vegetation score indicates moderate health. Throughout the years of monitoring, the invertebrate scores have fluctuated between poor and excellent health; however, the health trend appears stable, overall. The vegetation health scores appear to be continually declining; however, in 2019, the vegetation score is at its highest in many recent years. This site was cross-checked by another WHEP team in 2019. The vegetation scores were found to be consistent. Invertebrate scores between the City team and the cross-check team were inconsistent, differing by 14 percent. The Burnsville team found a large diversity of invertebrates, including mayflies and caddisflies.

4.2.2 Crystal Lake West Alternate (B-1A)

Crystal Lake West Alternate (B-1A), 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, and the substrate is solid. The wetland is surrounded by vegetation on most sides. The southeast side is bordered by houses. Crystal Lake is nearby to the east. Many frogs were observed. The vegetation plot was dominated by grass-like, submergent, and floating-leaved aquatic forbs, including bulrush (*Scirpus* sp.), pondweed (*Potamogeton* sp.), coontail (*Ceratophyllum* sp.), duckweeds (*Lemna* sp. and *Spirodela* sp.), and white water-lily (*Nymphaea* sp.). Several emergent plants were also observed. A large diversity of invertebrates were collected, as well, including leeches, dragonflies, damselflies, mayflies, snails, true flies, and crustaceans.



SOPHIA CAJANDIG, ROBIN GLASSEN, AND
KENNY MORRIS

Table 4.2.2 Crystal Lake West Alternate (B-1A) Wetland Health based on Index of Biotic Integrity



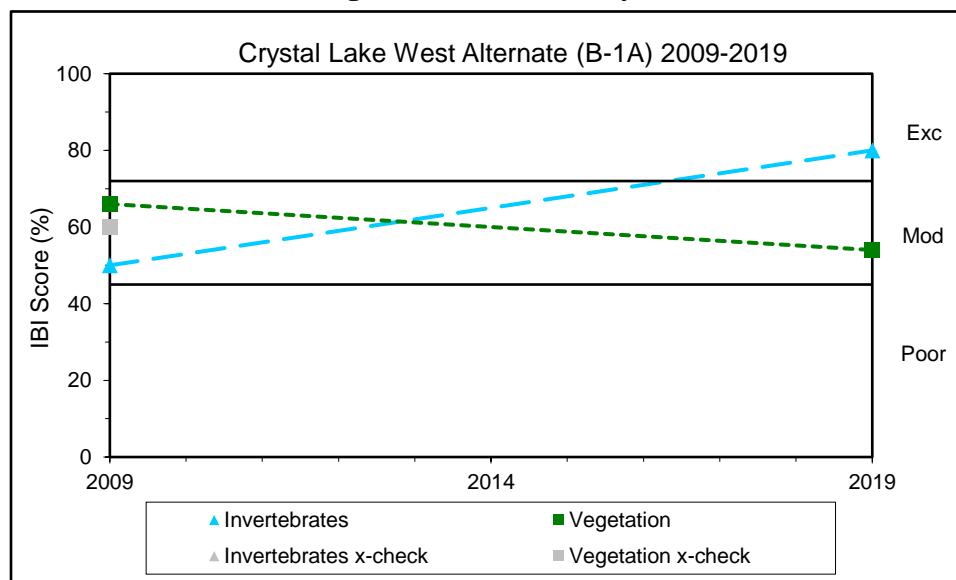
| | Invertebrates  | Vegetation  |
|--|--|---|
| 2019 Data (B-1A) | | |
| Wetland Health Rating (IBI score) | Excellent (24) | Moderate (19) |
| Trend 2009-2019 | Not enough data | Not enough data |

Figure 4.2.2 Invertebrate and vegetation trends for Crystal Lake West Alternate (B-1A)



Site summary: This is the second time that B-1A has been surveyed since 2009. Invertebrate and vegetation scores were inconsistent, differing by 26 percent. More data would help assess a more reliable health trend.

4.2.3 Terrace Oaks Burnsville Parkway (B-12)

Terrace Oaks Burnsville Parkway (B-12), is a 1.7-acre, type 3 wetland located within the E-23 watershed. The drainage area is 68 acres and 5 percent impervious. It has no inlets, but does have one outlet on the north side near Burnsville Parkway. The wetland is part of the City's stormwater management plan, and is designated as an Improvement Class with a wetland management goal to improve the existing habitat.

The wetland is in a depression surrounded by rolling hills, oak savanna, and woodland within Terrace Oaks Park. It is bordered to the north by Burnsville Parkway. Several phases of oak savanna restoration have occurred within the park and the drainage area of the wetland. A 19-acre project within the northwest corner of Terrace Oaks Park began in 2015. The restoration project included tree removal, herbicide use to control invasive plants, brush cutting, native seeding, and prescribed burns. A 26-acre restoration surrounding the wetland began in February 2019, and involves invasive species and weedy tree removal, and native grass and wildflower establishment.



BECKY DENNIS AND ROBIN GLASSEN

Wetland Health

Site Observations: The wetland slope is gentle, and the substrate is solid. Burnsville Parkway runs along the northside of the wetland. Woods and a gravel trail surround the rest of the wetland. It is on the edge of a 230-acre natural park area (Terrace Oaks Park) which is undergoing restoration. There is very little vegetation in and around this wetland. Woody trees and brush line the perimeter of the wetland. No submergent or emergent vegetation was found. Duckweed (*Lemna* sp.) covered the wetland. Several species of leeches, dragonflies, damselflies, caddisflies, snails, true flies, and crustaceans were observed.



BURNSVILLE TEAM SETTING BOTTLE TRAPS

Table 4.2.3 Terrace Oaks BV Parkway (B-12) Wetland Health based on Index of Biotic Integrity



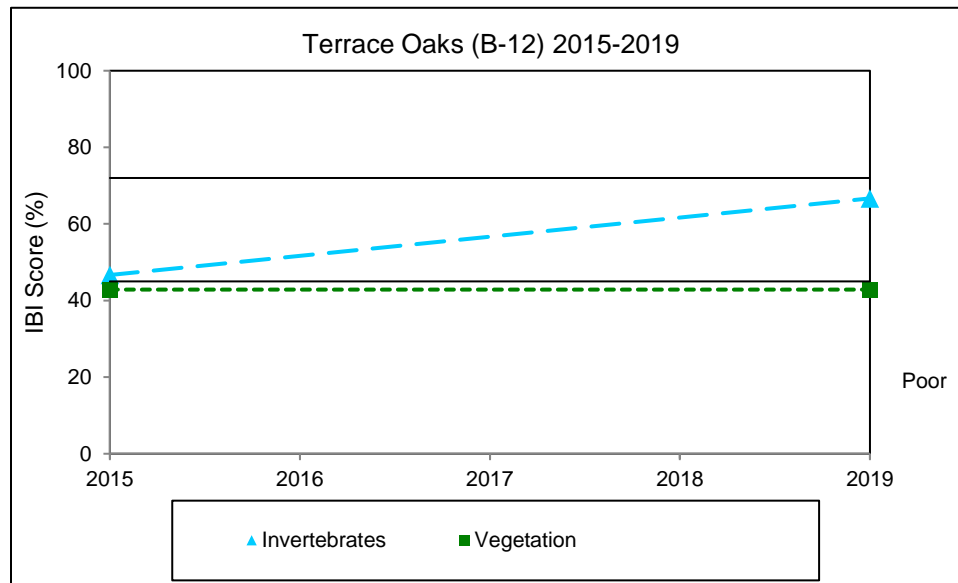
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (B-12) |  |  |
| Wetland Health Rating (IBI score) | Moderate (20) | Poor (15) |
| Trend 2015-2019 | Not enough data | Not enough data |

Figure 4.2.3 Invertebrate and vegetation trends for Terrace Oaks BV Parkway (B-12)



Site summary: This is the 2nd time that B-12 has been surveyed since 2015. Vegetation data is similar. The wetland health based on invertebrate scores has improved. The invertebrate and vegetation scores are greatly inconsistent, differing by 24 percent. More data would help assess a more reliable health trend.

4.2.4 Terrace Oaks Central (B-18)

Terrace Oaks Central (B-18) is a 0.34-acre, type 3 wetland located within the E-23 watershed. The wetland drainage area includes 2.89-acres. There is no impervious surface. There are no inlets or outlets. The wetland is designated as an Improvement Class, and is being managed to maintain and protect current vegetation quality and health.



The wetland is in a depression surrounded in an area with rolling hills, oak savanna, and woodland. Large-scale habitat restoration, including invasive species and weedy tree removal and wildflower establishment, has been ongoing in the park and area surrounding the wetland since 2015.



Wetland Health

Site Observations: The wetland has a fairly gentle slope and a solid substrate. It is located within Terrace Oaks Park. A trail runs along a portion of the wetland. The wetland is dominated by bladderwort (*Utricularia* sp.), coontail, (*Ceratophyllum* sp.), duckweed (*Lemna* sp.), and water-plantain (*Alisma* sp.). Some trees, emergent forbs, and reed canary grass (*Phalaris arundinacea*) were also present. Several species of leeches, damselfly, snails and true flies, were observed.

Table 4.2.4 Terrace Oaks Central (B-18) Wetland Health based on Index of Biotic Integrity

| | Invertebrates | Vegetation |
|-----------------------------------|---|---|
| 2019 Data (B-18) |  |  |
| Wetland Health Rating (IBI score) | Moderate (18) | Moderate (23) |
| Trend 2019 | Not enough data | Not enough data |

Site summary: This is the first time that Terrace Oaks Central has been surveyed. The invertebrate and vegetation scores were consistent with each other, showing moderate wetland health. More data is necessary to determine a reliable health trend.

4.3 Dakota County Parks Wetlands

Two teams monitored eight wetlands for Dakota County Parks in 2019. This is the fifth year that Dakota County has monitored wetlands with WHEP. Ten wetlands have been monitored for the Parks Department since 2015.

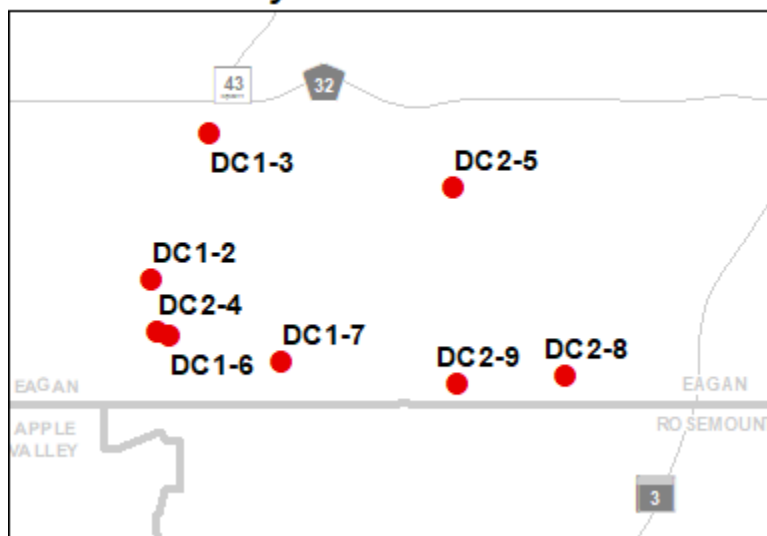
Team Leaders:

David Leard (Team 1) and
Dianne Rowse (Team 2)

Team 1 Members:

Angela Begosh, Claire Freesmeier,
James Kellgren, Lauren Meckle, Betsy
Pribyl, and Marnie Sciamanda

Dakota County WHEP Sites Monitored in 2019



Team 2 Members: Pete Curtis, Patrick Eiden, Pat Graham, Doris Ikier, Mike Lynn, Jeff Richards, and Nick Rowse.

Dave Leard is the Team Leader for the Dakota County Parks Team 1. This was his first year as a WHEP Team Leader. He has been working with the Lakeville WHEP Team since 2011. Dave is also a Master Water Steward volunteering with the Vermillion River Watershed Joint Powers Organization. He has a degree in Environmental Engineering from Penn State and is a retired Army Reserve Engineer Officer. He commented, “the team’s biggest discovery of the year was the amount of hiking involved in surveying the wetlands of Lebanon Hills Regional Park.”



DAVID LEARD



DIANNE ROWSE

Dianne Rowse is the team leader for Dakota County Parks- Team 2. She led the Farmington and Burnsville teams between 1998 and 2007, and then took a break to lead the statewide dragonfly survey for two years. She returned to WHEP in 2016, and she led the new Dakota County Parks- Team 2 with the enhanced plant survey focus for the last two seasons. She is retiring from WHEP now to pursue other outdoor passions.

Dianne is a retired Professional Naturalist who enjoys wading into wetlands and sharing the experience with others. You may find her leading Forest Bathing (mindfulness) groups and dragonfly surveys next summer. She hopes her fantastic volunteer team will continue with WHEP!



CHRIS KLATT

Chris Klatt is Dakota County Parks’ WHEP contact. He said, “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 1000 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. This was the fifth year Dakota County Parks has participated in the WHEP program. We are grateful for the opportunity 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.”

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 level.

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.

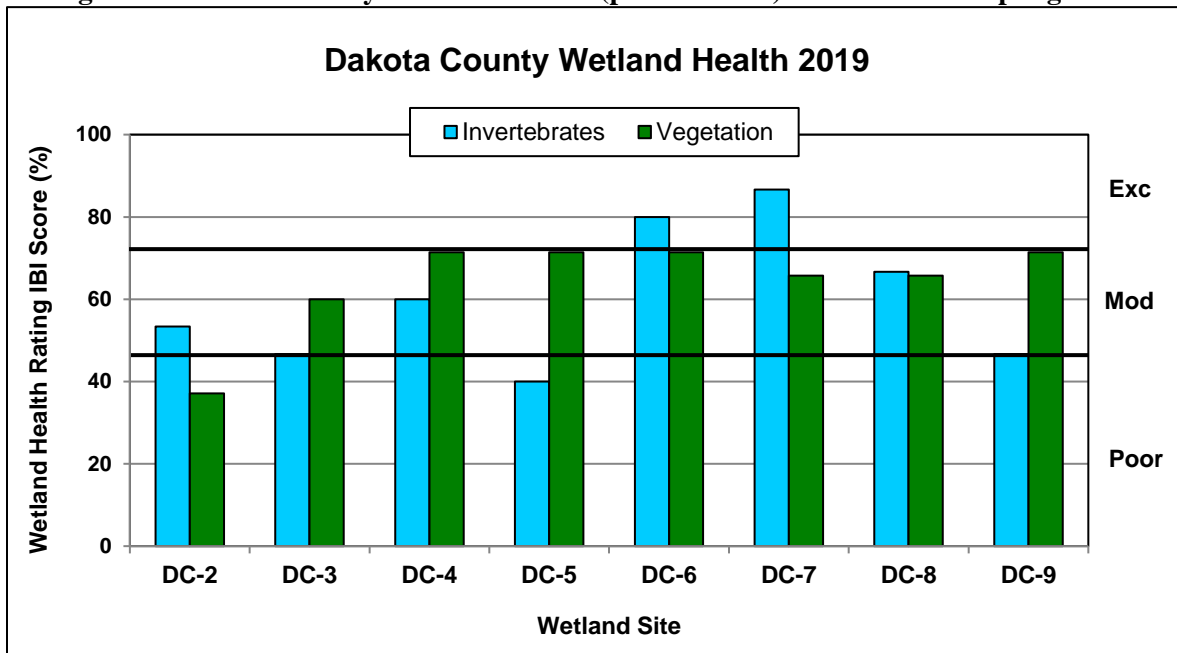
These modifications came after a trial of the Rapid Floristic Quality Assessment (rFQA) was completed in the Dakota County Parks wetlands in 2018. Modifications of the WHEP protocol in 2019 were made in hopes that moderately trained and/or experienced naturalists are able to complete the surveys.

The two Dakota County Parks teams cross-checked each other for both macroinvertebrates (using standard WHEP protocols) and plants (using modified protocols).

Dakota County Parks General Wetland Health

Figure 4.3 presents an overall view of wetland health for all of the 2019 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 Dakota County wetlands exhibited poor to moderate wetland health based on invertebrate and vegetation data. Invertebrate and vegetation scores for all wetlands except DC-6 and DC-8 were inconsistent. Most of the wetland health scores are moderate. Wetlands DC-6 and DC-7 scored excellent for invertebrates. Wetland DC-2 scored poor for vegetation, and DC-3, DC-5, and DC-9 scored poor for invertebrates.

Figure 4.3 Dakota County Parks site scores (percent form) for the 2019 sampling season



4.3.1 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". It is surrounded by smooth brome-dominated uplands and overgrown savanna/woodland. It was likely grazed historically. The wetland was previously dominated by reed canary grass (*Phalaris arundinacea*), and deposition from the surrounding land had caused build-up in the wetland covering the native emergent vegetation with fine sands.



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 will monitor the effects of the project on the wetland.

Wetland Health

Site Observations: The wetland slope is gentle. The wetland substrate is solid with very little muck. Water levels were high in 2019. Submergent and floating leaved aquatic forbs dominated the vegetation plot, including coontail (*Ceratophyllum* sp.), pondweed (*Potamogeton* sp.), duckweed (*Lemna* sp.), water smartweed (*Persicaria* sp.), and water-meal (*Wolffia* sp.). Very little emergent grasses and forbs were present in the vegetation plot. Reed canary grass (*Phalaris arundinacea*) is present along the edges of the wetland. Leeches, damselflies, true flies, and crustaceans were present. Tadpoles were found in the bottle traps.

Table 4.3.1 Buck Pond (DC-2) Health based on Index of Biotic Integrity



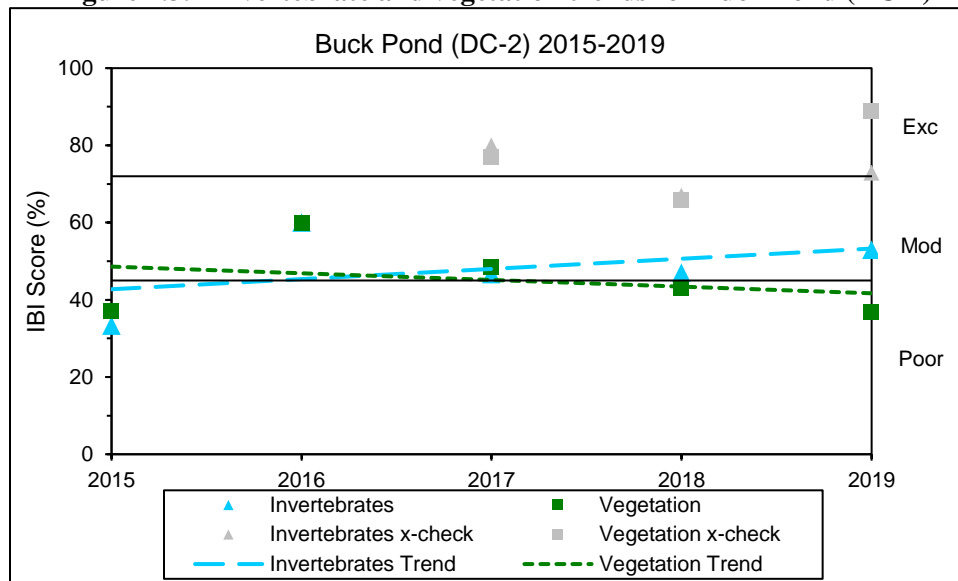
| | Invertebrates  | Vegetation  |
|--|--|---|
| 2019 Data (DC-2) | | |
| Wetland Health Rating (IBI score) | Moderate (16) | Poor (13) |
| Cross-check Rating (IBI score) | Moderate (22) | Excellent (31) |
| Trend 2015-2019 | Improving | Stable |

Figure 4.3.1 Invertebrate and vegetation trends for Buck Pond (DC-2)



Site summary: This is the sixth consecutive year that Buck Pond has been monitored by WHEP. The invertebrate and vegetation scores were inconsistent, differing by 16 percent. The vegetation scores have remained stable. The invertebrate health trend appears to be improving slightly. This wetland was cross-checked by another WHEP team in 2019. The scores between teams were inconsistent for both invertebrates and vegetation, differing by 20 percent and 52 percent, respectively. The scores of the cross-

check team indicate excellent wetland health for both invertebrates and vegetation. The cross-check team identified a larger diversity of invertebrates than the Host team, including more dragonflies, mayflies, and snails which enhanced their invertebrates score. The cross-check team identified a larger diversity of vegetation species, including non-vascular species (*Riccia* sp. and *Ricciocarpus* sp.), as well as, bladderwort (*Utricularia* sp.) and several more species of woody plants and emergent forbs.

4.3.2 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.



Tamarack Swamp is a 24-acre basin that contains a remnant Tamarack Swamp in Lebanon Hills Regional Park. It 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. 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. This is a large wetland, but the vegetation releve contained a plant community representative of the northern and eastern portion of the wetland. A stand of trees exists west of the wetland. Duckweed (*Lemna* sp.) and water-meal (*Wolffia* sp.) cover the wetland surface. Arrowhead (*Sagittaria* sp.), spikerush (*Eleocharis* sp.), pondweed (*Potamogeton* sp.), and bladderwort (*Utricularia* sp.) were prevelant. Leeches, snails, true flies, and scuds were observed.

Table 4.3.2 Tamarack Swamp (DC-3) Health based on Index of Biotic Integrity



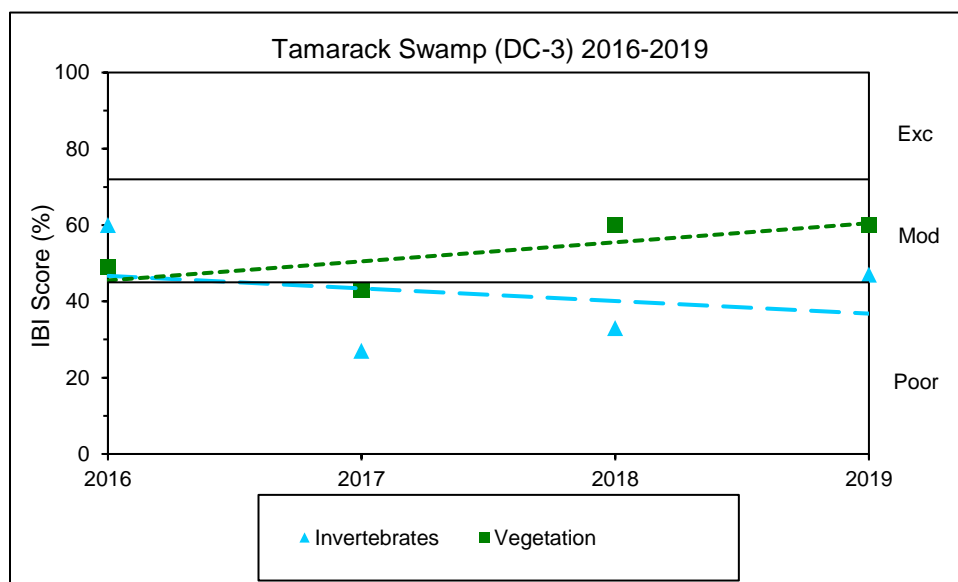
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (DC-3) |  |  |
| Wetland Health Rating (IBI score) | Poor (14) | Moderate (21) |
| Trend 2016-2019 | Not enough data | Not enough data |

Figure 4.3.2 Invertebrate and vegetation trends for Tamarack Swamp (DC-3)



Site summary: This is the fourth consecutive year that Tamarack Swamp has been monitored by WHEP. The invertebrate and vegetation scores were not consistent with each other, differing by 13 percent. The invertebrate data is variable. The vegetation score remained the same as in 2018. More years of monitoring are needed to determine reliable wetland health trends.



MARNIE SCIAMANDA AND ANGELA BEGOSH



BETSY PRIBYL, LAUREN MECKLE, MARNIE SCIAMANDA, AND CLAIRE FREESMEIER

4.3.3 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/alterd 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.



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 Southern Mesic Oak-Basswood 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. Monitoring over time will help the County determine how upland native plant restoration impacts downslope wetlands. Turtle surveys are also conducted in the area.

Wetland Health

Site Observations: The wetland slope is gentle, and the wetland substrate is mucky. The surrounding area is forested up to the wetland perimeter. The wetland is covered with white and yellow water-lilies (*Nymphaea* sp. and *Nuphar* sp.) and duckweed (*Lemna minor*, *Lemna trisulca*, and *Spirodela polyrrhiza*). Coontail (*Ceratophyllum* sp.) grows densley below the water's surface. Several emergent grasses and forbs are also present. Leeches, dragonflies, damselflies, caddisflies, snails, and crustaceans were observed.

Table 4.3.3 Jensen Lake East (DC-4) Health based on Index of Biotic Integrity



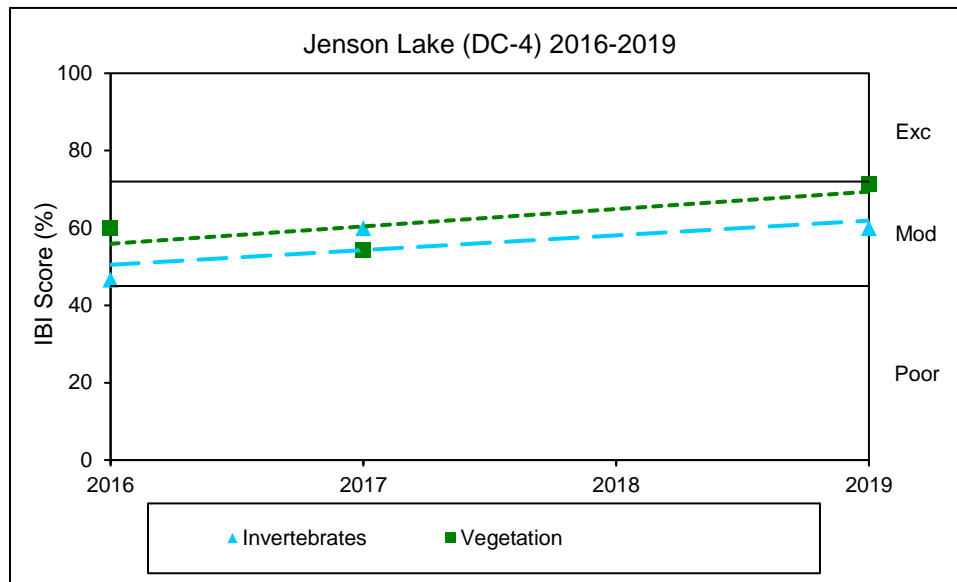
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (DC-4) |  |  |
| Wetland Health Rating (IBI score) | Moderate (18) | Moderate (25) |
| Trend 2016-2019 | Not enough data | Not enough data |

Figure 4.3.3 Invertebrate and vegetation trends for Jensen Lake East (DC-4)



Site summary: This is the third year that Jensen Lake East has been monitored by WHEP. The invertebrate and vegetation scores were inconsistent with each other, differing by 11 percent. More years of monitoring are needed to determine reliable wetland health trends.

4.3.4 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, and the wetland substrate is mucky. A hiking trail runs along the northern portion of the wetland. Coontail (*Ceratophyllum* sp.) and bulrush (*Sparganium eurycarpum*) dominated the wetland vegetation. Duckweed (*Lemna* sp. and *Spirodela* sp.), water lily (*Nymphaea* sp.), bladderwort (*Utricularia* sp.), waterweed (*Elodea canadensis*), pondweed (*Potamogeton* sp.), and arrowhead (*Sagittaria latifolia*) were also present. Leeches, dragonflies, damselflies, snails, and crustaceans were observed.

Table 4.3.4 Wood Pond (DC-5) Health based on Index of Biotic Integrity



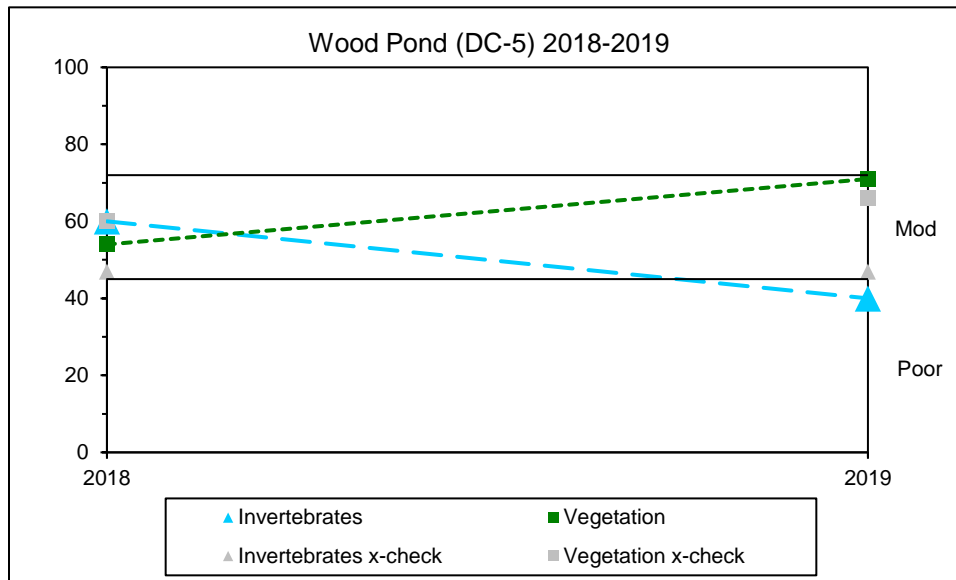
| | Invertebrates  | Vegetation  |
|--|--|---|
| 2019 Data (DC-5) | | |
| Wetland Health Rating (IBI score) | Poor (12) | Moderate (25) |
| Cross-check Rating (IBI score) | Poor (14) | Moderate (23) |
| Trend 2018-2019 | Not enough data | Not enough data |

Figure 4.3.4 Invertebrate and vegetation trends for Wood Pond (DC-5)



Site summary: This is the second year that Wood Pond has been monitored by WHEP. The invertebrate and vegetation scores were very inconsistent with each other, differing by 31 percent. This wetland was cross-checked by another team in 2019. The scores were consistent with each other. The submergent and floating vegetation identified by each team was similar. More years of monitoring is needed to determine reliable wetland health trends.

4.3.5 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.



Wetland Health

Site Observations: The wetland slope is gentle, and the wetland substrate is very mucky. A hiking trail runs along the northern portion of the wetland. Coontail (*Ceratophyllum* sp.), white water lily (*Nymphaea* sp.), smartweed (*Polygonum* sp.), spikerush (*Eleocharis* sp.), and bulrush (*Scirpus* sp.) dominates the wetland vegetation. Bladderwort (*Utricularia* sp) and sedges (*Carex* sp.) were also present. Leeches, dragonflies, damselflies, caddisflies, snails, trueflies, and crustaceans were observed.



JIM KELLGREN

Table 4.3.5 BB's Wetland (DC-6) Health based on Index of Biotic Integrity



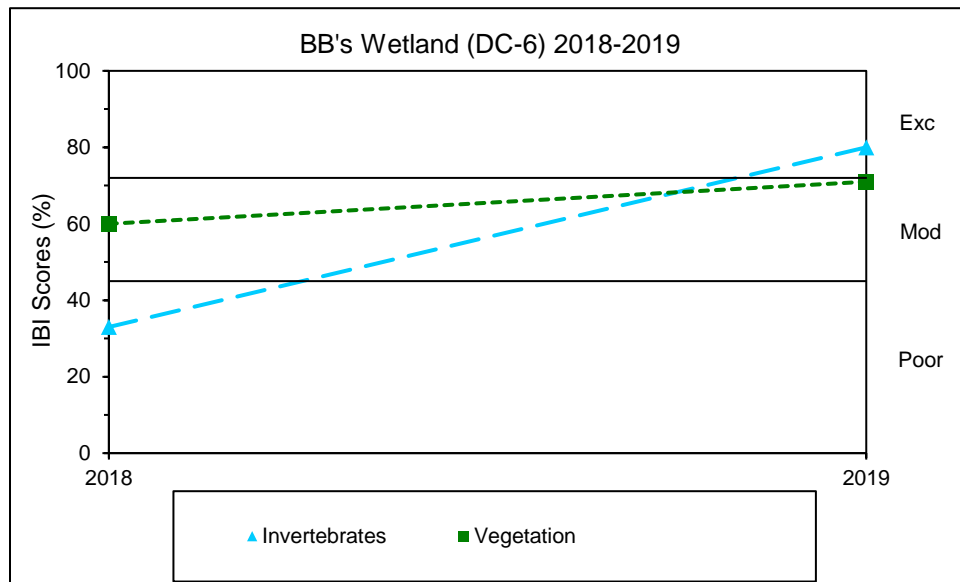
| | Invertebrates | Vegetation |
|-----------------------------------|---|---|
| 2019 Data (DC-6) |  |  |
| Wetland Health Rating (IBI score) | Excellent (24) | Moderate (25) |
| Trend 2018-2019 | Not enough data | Not enough data |

Figure 4.3.5 Invertebrate and vegetation trends for BB's Wetland (DC-6)



Site summary: This is the second year that BB's Wetland has been monitored by WHEP. The invertebrate and vegetation scores were consistent with each other. The invertebrate score indicates excellent wetland health. A larger diversity of vegetation and invertebrates were found in 2019. More years of monitoring are needed to determine reliable wetland health trends.

4.3.6 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. 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 gentle, and the wetland substrate is solid with a layer of muck. A hiking trail runs along the northern portion of the wetland. Coontail (*Ceratophyllum* sp.), white and

yellow water-lilies (*Nymphaea* sp. and *Nuphar* sp.), bur-reed (*Sparganium* sp.), and sedges (*Carex* sp.) dominated the wetland vegetation. Leeches, dragonflies, damselflies, mayflies, caddisflies, snails, true bugs, and crustaceans were observed.

Table 4.3.6 Lilypad Pond (DC-7) Health based on Index of Biotic Integrity



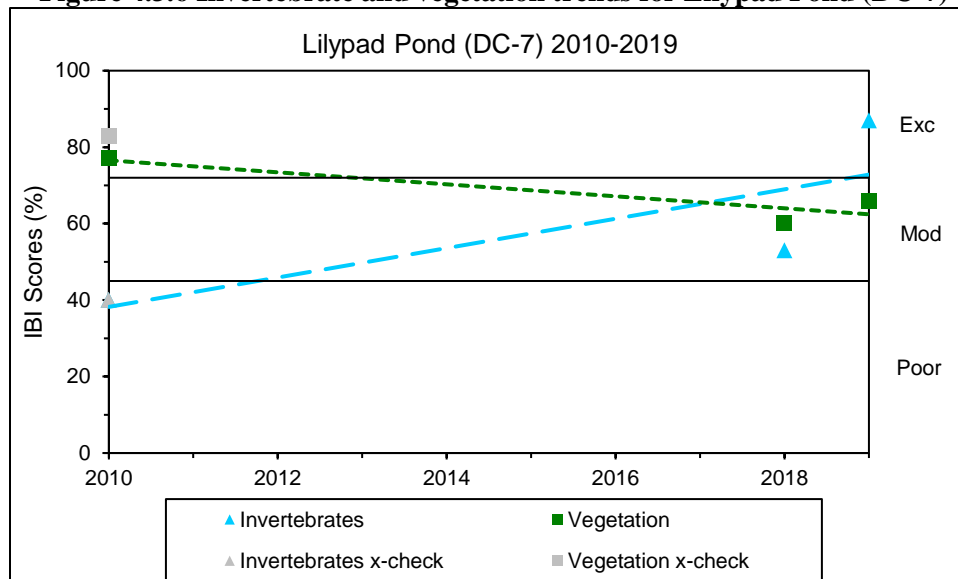
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (DC-7) |  |  |
| Wetland Health Rating (IBI score) | Excellent (26) | Moderate (23) |
| Trend 2010-2019 | Not enough data | Not enough data |

Figure 4.3.6 Invertebrate and vegetation trends for Lilypad Pond (DC-7)



Site summary: This is the third 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 inconsistent with each other, differing by 21 percent. Invertebrate data indicates an excellent wetland health in 2019. The dominating vegetation species changed a lot in 2019 from 2018. More species of mayflies and caddisflies were also found in 2019. The shallow lake portion of the wetland was surveyed in 2019. More years of monitoring are needed to determine reliable wetland health trends.

4.3.7 Star 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 solid. A ring of cattails (*Typha* sp.) and reed canary grass (*Phalaris arundinacea*) surround the wetland. Duckweed (*Lemna* sp.) covers the wetland surface. Bladderwort (*Utricularia* sp.) is also present. Leeches, damselflies, caddisflies, snails, true flies, and crustaceans were observed.

Table 4.3.7 Star East (DC-8) Health based on Index of Biotic Integrity

| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (DC-8) |  |  |
| Wetland Health Rating (IBI score) | Moderate (20) | Moderate (23) |
| Trend 2018-2019 | Not enough data | Not enough data |

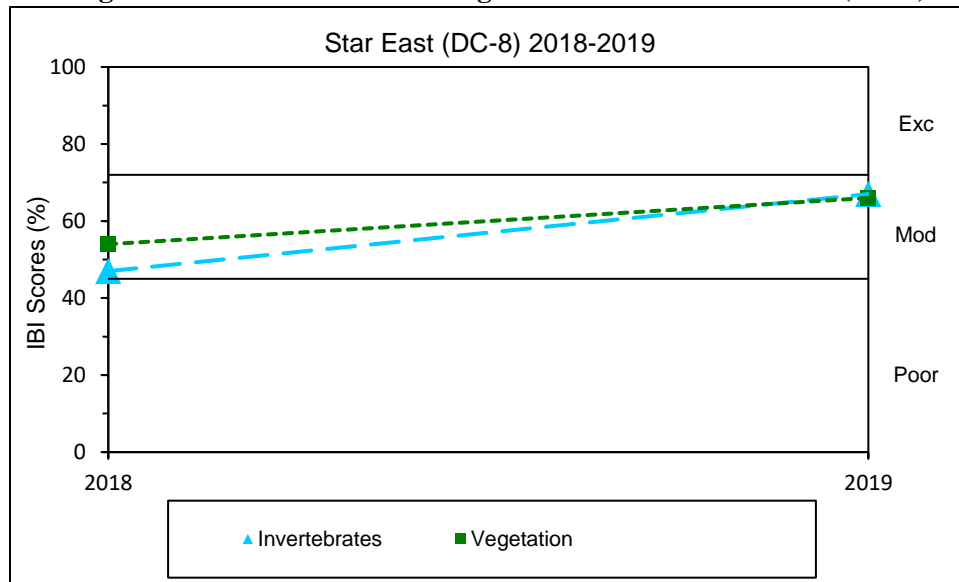


PETE CURTIS AND NICK ROWSE



PATRICK EIDEN, MIKE LYNN,
AND DIANNE ROWSE

Figure 4.3.7 Invertebrate and vegetation trends for Star East (DC-8)



Site summary: This is the second year that Star East has been monitored by WHEP. The invertebrate and vegetation scores were very consistent with each other, both indicating moderate wetland health. More years of monitoring are needed to determine reliable wetland health trends.

4.3.8 Star West (DC-9)

Star West (DC-9) is a 0.8-acre, type 5 wetland located in the Lower Minnesota River watershed. Water flows into the wetland from a stream/ditch on the north side. Water flows out of the wetland from a natural outlet on the south side of the wetland, and toward Star Pond East from a natural outlet on the northeast side.



This wetland is within Lebanon Hills Regional Park. A dirt road (120th Street) lies nearby to the south of the wetland. The wetland is in good condition. A fringe of hybrid cattail (*Typha* sp.) lines the southern shoreline. Reed canary grass (*Phalaris arundinacea*) is also present in the wetland.

Wetland Health

Site Observations: The wetland slope is gentle, and the wetland substrate is somewhat mucky. Cattail (*Typha* sp.) and reed canary grass (*Phalaris arundinacea*) surround the wetland. Coontail (*Ceratophyllum* sp.), bladderwort (*Utricularia* sp.), pondweed (*Potamogeton* sp.), and Canadian waterweed (*Elodea canadensis*) dominate the submergent vegetation. Duckweed (*Lemna* sp. and *Spirodela* sp.) and watermeal (*Wolffia* sp.) cover the wetland surface. Leeches, damselflies, snails, true flies, and crustaceans were observed.

Table 4.3.8 Star West (DC-9) Health based on Index of Biotic Integrity



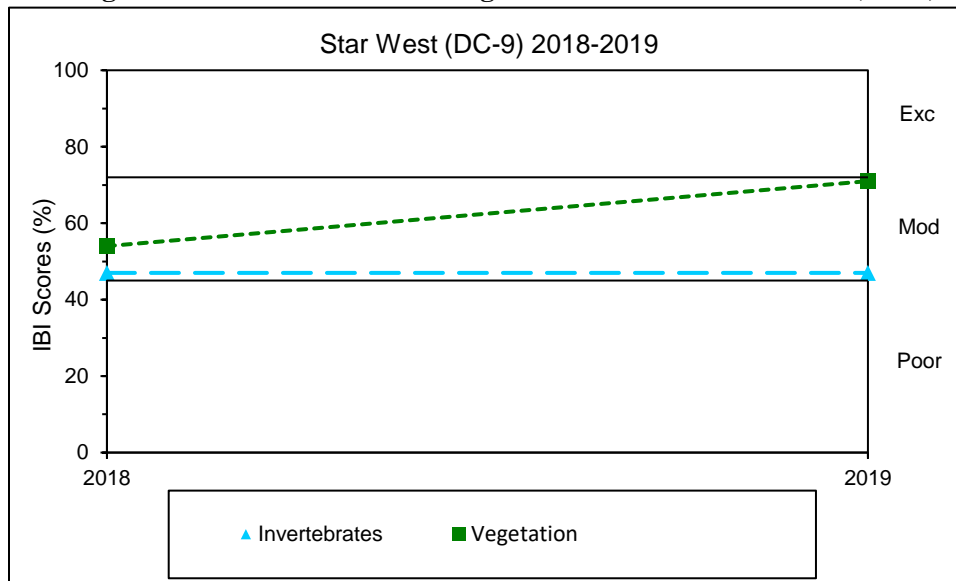
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (DC-9) |  |  |
| Wetland Health Rating (IBI score) | Poor (14) | Moderate (25) |
| Trend 2018-2019 | Not enough data | Not enough data |

Figure 4.3.8 Invertebrate and vegetation trends for Star West (DC-9)



JEFF RICHARDS, DORIS IKIER, AND
PAT GRAHAM

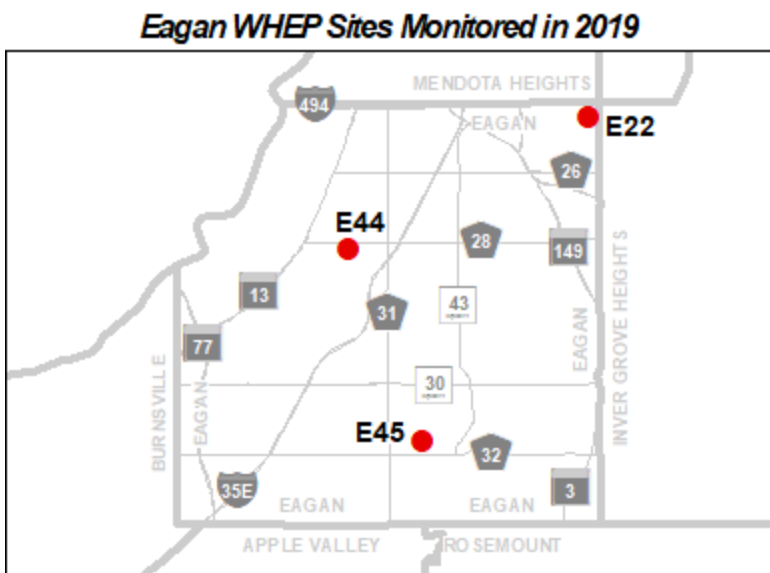
Site summary: This is the second year that Star West has been monitored by WHEP. The invertebrate and vegetation scores were very inconsistent with each other, differing by 24 percent. A 1.5 inch rain event occurred the day before collecting the dipnet sample. This may have adversely affected the invertebrate sample. Live minnows and crayfish were found in the bottle traps, which could have consumed the invertebrates present in the bottle trap collection. 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 2019. The City has 22 years of data! Forty-four wetlands have been monitored in Eagan since the initiation of WHEP in 1997.

Team Leaders: Marianne Buck

Team Members: Toyin Akisanya, Kenneth Britton, Rita Britton, Larry Cox, Molly Davis, Nicole Deziel, Tom Doran, Jonna Dunst, Hannah Figura, Robert Giefer, Craig Harnagel, Bill Larson, Randi Martin, Ava McKeon, Mark Niznik, Jill Paddock, John Porter, Siri Rea, Ben Speakman, Helena Speakman, Blake Udem, and Cathy Udem.



Marianne Buck has been involved in WHEP since 2007, and has been Eagan's team leader since 2011. She commented, "I feel like I have more fun every year leading WHEP and look forward to spending my summers in the wetlands with my volunteers. I love watching new citizen scientists discover the wetlands and especially what's hiding below the surface. I couldn't ask for a more dedicated and efficient team!"



JESSIE KOEHLE

Jessie Koehle is the Water Resources Specialist for the City of Eagan, and has a background in aquatic biology and fisheries management. She explained, "I have been involved with selection of Eagan's WHEP sites since I joined the City of Eagan in 2007. Throughout the year, I communicate frequently with Marianne to help plan and strategize the WHEP sampling season. Whenever I am able to meet volunteers in the field, I enjoy getting to know them and practicing my plant and invertebrate identification. We are building a group of wetland ambassadors that are an invaluable resource to our program and the Eagan community."



MARIANNE BUCK

"At the City of Eagan, WHEP data are used as a qualitative, informative source of support for protection or improvement as needed for development projects, as well as historical recordkeeping for future changes. We have a unique challenge of tracking the health of our 820-some natural waterbodies! It can be difficult

to choose just a few to sample, but we feel it's a good problem to have. Thanks to all the WHEP staff and volunteers for your dedication and time spent on this excellent program."

Since 1999, Eric Macbeth has managed Eagan's water resources programs that focus on protecting and improving lakes, conserving wetlands, and preventing stormwater pollution. "The City of Eagan has supported WHEP from the beginning, when we helped develop the program with Dakota County in 1997," he says. "WHEP gives residents a wonderful opportunity to be involved and learn about wetlands. Volunteers literally get their hands wet," he says. "With over 700 lakes and wetlands and over 400 storm basins in Eagan, most residents live very near surface water or regularly visit parks with wetlands. WHEP helps strengthen our community's appreciation of these resources and enhances public support of our programs."

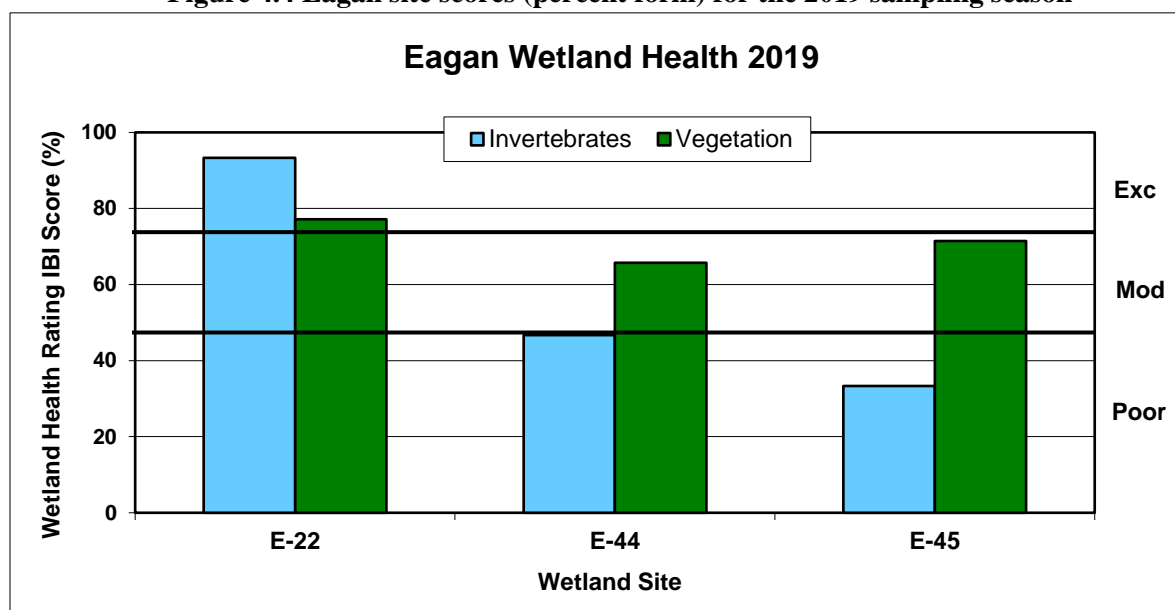


ERIC MACBETH

Eagan General Wetland Health

Figure 4.4 presents an overall view of wetland health for all of the 2019 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 2019. The invertebrates and vegetation scores for E-22, E-44, and E-45 were inconsistent, differing by 16 percent, 19 percent, and 38 percent, respectively. However, Eagan's Trinity Pond (E-22) scored excellent wetland health for both invertebrates and vegetation.

Figure 4.4 Eagan site scores (percent form) for the 2019 sampling season



4.4.1 Trinity Pond (E-22)

Trinity Pond (E-22), also known as FP-11.6, is a 0.6-acre, type 5 wetland within the Eagan-Inver Grove Heights Watershed. The wetland watershed receives 4 acres of direct drainage which includes approximately 10 percent impervious surface. The wetland also receives stormwater from nearby ponds within approximately 25 acres of the surrounding area. There is one inlet on the northern shore of the wetland and one inlet on the western shore. There is no storm structure outlet; however, water flows over a field to the south when levels are high enough. The wetland is part of the City's stormwater management plan, and is designated as a "Class W1 – Protect". The City has a general wetland management plan. 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 wetland is shallow with mostly open water containing emergent vegetation on all sides. It is surrounded by multiple wetlands. Raised berms are built between the wetlands to the west and north. A constructed wetland immediately to the west and a storm pond across the road to the west help protect the wetland. A wooded area exists east of the wetland, containing moderate slopes. Trinity School property lies to the north of the wetland, and students occasionally use wetlands for outdoor education exercises. At one time, this wetland was noted to be wood frog spawning habitat, although, they have not been heard calling for several years.



EAGAN TEAM AT
WHEP INVERTEBRATE TRAINING

Wetland Health

Site Observations: The wetland slope is gentle, and the substrate is mucky. A dense cover of floating-leaved forbs, including duckweeds (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) exists on the water's surface. Arrowhead (*Sagittaria* sp.), bur-reed (*Sparganium* sp.), and reed canary grass (*Phalaris arundinacea*) dominate the vegetation plot. Bladderwort (*Utricularia* sp.), slender riccia (*Riccia fluitans*), purple-fringed riccia (*Ricciocarpus natans*), and bulrush (*Scirpus* sp.), as well as, several woody plants were also present. Several species of leeches, dragonflies, damselflies, caddisflies, snails, true flies, and crustaceans were observed.

Table 4.4.1 Trinity Pond (E-22) Wetland Health based on Index of Biotic Integrity



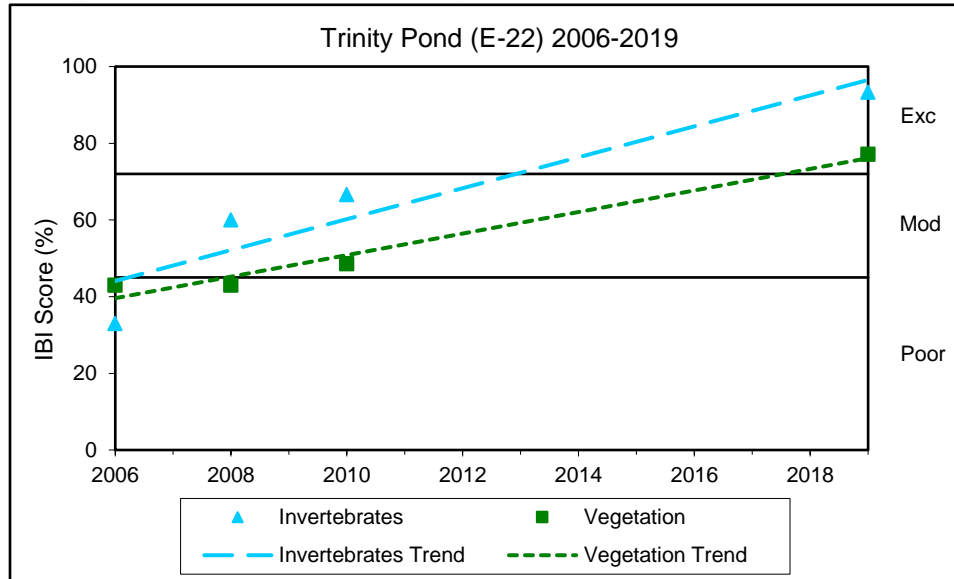
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (E-22) |  |  |
| Wetland Health Rating (IBI score) | Excellent (28) | Excellent (27) |
| Trend 2006-2019 | Not enough data | Not enough data |

Figure 4.4.1 Invertebrate and vegetation trends for Trinity Pond (E-22)



Site summary: This is the fourth time that Trinity Pond has been surveyed since 2006, and the first time since 2010. The invertebrates and vegetation scores were inconsistent, differing by 16 percent, even though both scores indicate excellent wetland health. The scores have improved since the original data was collected. A high diversity of aquatic forbs, along with the presence of bladderwort (*Utricularia* sp) and non-vascular species (*Riccia fluitans* and *Ricciocarpus natans*) helped to enhance the vegetation health score. More years of data will determine reliable health trends.

4.4.2 Oak Hills Church Pond (E-44)

Oak Hills Church Pond (E-44), also known as CP-1A, is a 1.5-acre, type 4 wetland within the Eagan-Inver Grove Heights Watershed. The watershed is 87 acres with approximately 60 percent impervious surface. There are two stormwater inlets (away from the open water): one on the east and northeast of the wetland. Exiting water flows across a berm to CP-1B and then out through a storm structure on the northwest corner of CP-1B. The wetland is included in the City’s stormwater management plan, and is designated as a “Class W5 – Manage A”. The City has a general wetland management plan. 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 immediate surrounding area is fairly level, open, and grassy. There is a dense population of cattails enclosing the open water year round. Oak Hills Church and wetland CP-1B is to the west of the wetland. Oak Hills Church Pond does not immediately receive water from the church area, but it does receive local runoff from the nearby wooded area and residential housing and street areas to the east and southeast, as well as water from half a mile of Yankee Doodle Road, and newly developing commercial and residential areas to the north, piped under Yankee Doodle Road. Stormwater protection practices are in place for the new development, so that silt and runoff should be minimized and stormwater retained on those properties. The City plans to continue to monitor development areas to the north for erosion concerns.

Wetland Health

Site Observations: The wetland slope is gentle, and the substrate is soft mud. Water levels appeared high due to recent rains. The open water was covered with duckweeds (*Lemna* sp. and *Spirodela* sp.) and water-mel (*Wolffia* sp.). A dense population of coontail (*Ceratophyllum* sp.) dominated the submergent vegetation which also included waterweed (*Elodea* sp.). Slender Riccia (*Riccia fluitans*), spike rush (*Eleocharis* sp.) and cattail (*Typha* sp.), as well as a few other emergent forbs were present. Leeches, dragonflies, damselflies, caddisflies, snails, and crustaceans were found. In addition, a muskrat was sighted, and deer tracks were found.

Table 4.4.2 Oak Hills Church Pond (E-44) Wetland Health based on Index of Biotic Integrity

| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (E-44) |  |  |
| Wetland Health Rating (IBI score) | Poor (14) | Moderate (23) |
| Trend 2019 | Not enough data | Not enough data |

Site summary: This is the first time that E-44 has been surveyed for WHEP. Invertebrate and vegetation scores were inconsistent, differing by 19 percent. Portions of this wetland are regularly dry. Recent rains may have allowed for invertebrate sampling in areas of the wetland that may lack adequate invertebrate habitat, which would result in a lower invertebrate score. More years of data will help determine reliable health trends.

4.4.3 Oak Chase Pond (E-45)

Oak Chase Pond (E-45), also known as LP-4.1, is a 0.75-acre, type 5 wetland within the Eagan-Inver Grove Heights Watershed. The wetland watershed is 7.5 acres and approximately 5 percent impervious. There are no existing storm structures. The wetland is part of the City’s stormwater management plan, and is designated as a “Class W3 – Priority A”. The City has a general wetland management plan. 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.





Oak Chase Pond is surrounded by a wooded area with moderate slopes. Five residential backyards are adjacent to the wetland. This wetland does not receive or contribute to the City’s stormwater system. Rainwater is the only source of water for this wetland, and except for a couple large rainfall events in the last several decades, water has remained onsite.

Wetland Health

Site Observations: The wetland slope is gentle, but steeply drops off near the edge. The wetland substrate is very mucky. Duckweeds (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) densely covers the open water. No submergent vegetation was found in the vegetation survey plot. Sparse populations of several species of emergent grasses and forbs were observed. Only leeches and snails were observed during the invertebrate surveys. Dragonflies and damselflies were seen flying around.

Table 4.4.3 Oak Chase Pond (E-45) Wetland Health based on Index of Biotic Integrity

| | Invertebrates  | Vegetation  |
|--|--|---|
| 2019 Data (E-45) | | |
| Wetland Health Rating (IBI score) | Poor (10) | Moderate (25) |
| Cross-check Rating (IBI score) | Poor (14) | Poor (15) |
| Trend 2019 | Not enough data | Not enough data |

Site summary: This is the first year that Oak Chase Pond has been surveyed. The invertebrate and vegetation scores were inconsistent with each other, differing by 38 percent. Invertebrate scores rated poor. Very few organisms were found. It was noted that the water levels were high in 2019, and one of the property owners adjacent to the wetland was pumping water from the wetland. This wetland was cross-checked by another team in 2019. The scores between the teams for both invertebrates and vegetation were inconsistent. However, the invertebrate data for both teams found the wetland health to be poor. The City team found a high diversity of emergent grasses and forbs; the cross-check team identified no emergent vegetation. If water levels fluctuated, this could potentially affect the vegetation plot placement of each team to be different any given day. More years of data will determine reliable health trends.

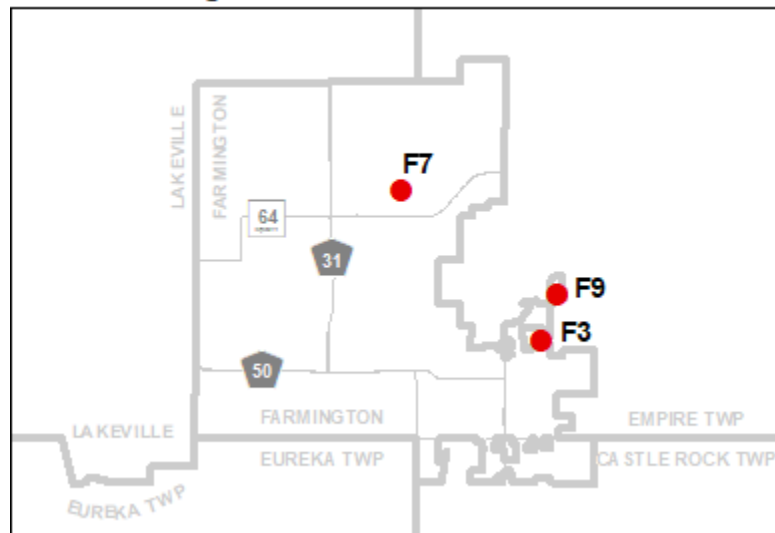
4.5 Farmington Wetlands

Three wetlands were monitored within the City of Farmington in 2019. The City has 22 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, Denise Hennigar, Katie Koch-Laveen, and Marcia Richter.

Farmington WHEP Sites Monitored in 2019



RICK SCHULDT

hiking, bird watching and trout fishing. Needless to say, he is very comfortable working in the outdoors especially dressed in waders.

Rick Schuldt has volunteered for the Farmington WHEP team since 2010. This is his 4th year as team leader. Rick is a retiree of the US Fish and Wildlife Service. His career in the Service's Sea Lamprey Control Program included travels to survey lampreys and other stream life in Great Lakes streams from New York to Minnesota. The program included work in Canada as it is a joint effort of the two nations. He conducted a variety of tasks including surveys of larval lampreys using electrofishing gear, sampling with sand coated granules and SCUBA diving in offshore areas, collecting adult spawning phase lampreys at dams via traps, and evaluating the effects of a lampricides applied to streams to control larval populations. He enjoys

Rick said, “Membership in the Farmington team this year included no new members. The six returning veterans, several with over 10 years of participation, include strong backgrounds in scientific fields. It is unfortunate that we don’t attract new members to spread the word about WHEP and our concerns about impacts of growth and resulting development near our wetlands. We all look forward each year to sharing stories about our families and travels. The sampling this year was done under the highest water levels in recent years. This seemed to have a greater effect on the usually shallow Autumn Glen site versus the lake-like Kral Pond. Plant life was especially reduced in the open waters of Autumn Glen and water backed up into the reed canary grass which surrounds the wetland. As in prior years the continued participation of experienced team members makes the job of the team leader so much more enjoyable.”

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 helps us understand the impacts of development on our natural resources and if there are any additional BMP’s we need to implement in order to better protect them. By utilizing dedicated volunteers the city is able to gather more detailed information than we would otherwise be able. 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 2019 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-7, differing by 27 and 13 percent, respectively.



MARCIA RICHTER, ROLLIE GREENO, DENISE
HENNIGAR, KATIE KOCH-LAVEEN,
RICK SCHULDT

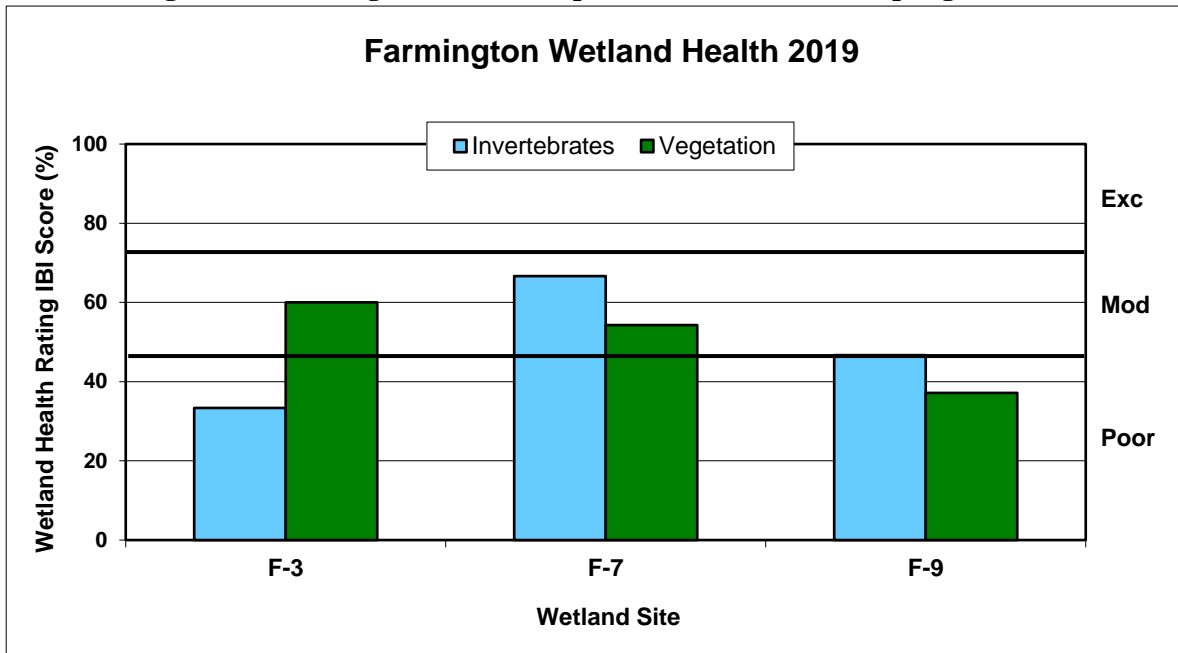


JOSIAH HAKALA AND MARCIA RICHTER



KATIE KOCH-LAVEEN

Figure 4.5 Farmington site scores (percent) for the 2019 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. There is development to the north, south, and west, and agriculture to the east. Wetland buffers are in place. The wetland management goal is to document how land uses impact the man-made wetlands.



Wetland Health

Site Observations: The wetland slope is gentle. The wetland substrate is firm to slightly mucky. This is a large wetland with an extensive stand of cattail. The team finds a rich variety of aquatic plants at the site each year. Duckweed (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) cover the surface of the water. Several species of submergent forbs are present, including coontail (*Ceratophyllum* sp.), milfoil (*Myriophyllum* sp.), pondweed (*Potamogeton* sp.), water-crowfoot (*Ranunculus* sp.), and bladderwort (*Utricularia* sp.). Bulrush (*Scirpus* sp.), arrowhead (*Sagittaria* sp.), cattail (*Typha* sp.), and reed canary

grass (*Phalaris arundinacea*) are present. One genus of damselfly, two genera of snails, one genus of true flies, and one genus of crustacean were observed.

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



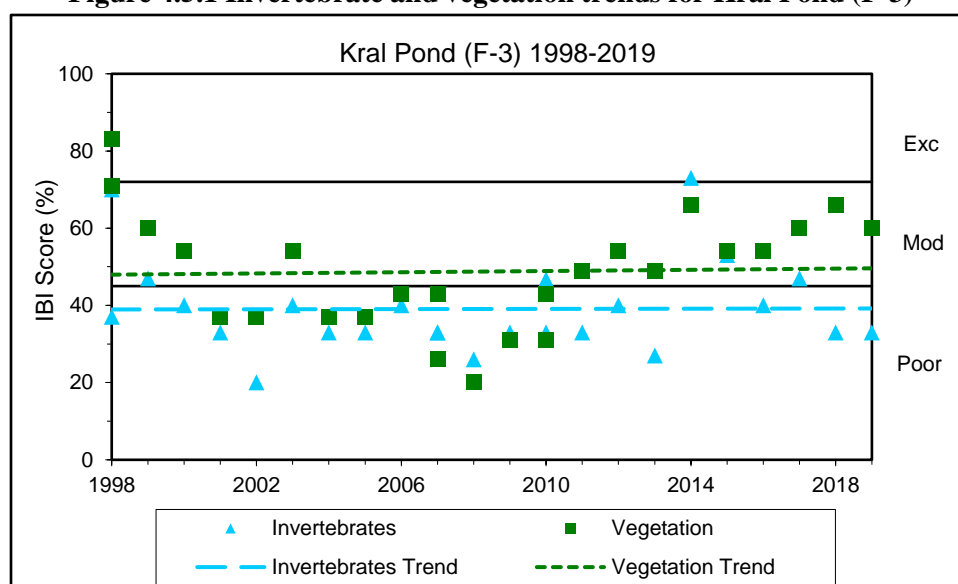
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (F-3) |  |  |
| Wetland Health Rating (IBI score) | Poor (10) | Moderate (21) |
| Trend 1998-2019 | Stable, but variable | Stable, but variable |

Figure 4.5.1 Invertebrate and vegetation trends for Kral Pond (F-3)



Site summary: Kral Pond has been monitored for 22 consecutive years. The invertebrate and vegetation scores were inconsistent in 2019, differing by 27 percent. Invertebrates score indicated poor wetland health while the vegetation score indicated moderate wetland health. This is similar to data in 2018. The data throughout the years has been variable; gradually decreasing from 1998 to 2008 and then rebounding from 2008 to 2019. Vegetation scores are more often higher than invertebrate scores; however, invertebrate and vegetation scores are consistent with each other for many of the years of data and follow a similar pattern. The long-term health trends are 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. The fluctuation in the health trend may be in response to development in the area.

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 and four percent impervious. 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 understand the health of a wetland surrounded by forest, agriculture, and residential homes in an area with potential development. There is development to the north and west, and forest and agriculture 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 solid. A bicycle path runs along the south side of the wetland separated by a wide stand of reed canary grass. Reed canary grass (*Phalaris arundinacea*) surrounds the wetland, and dominated the vegetation plot. Water levels were deeper in 2019, rising into the upland reed canary grass area. The vegetation plot was placed to include deeper water, but was much more challenging to find rooted aquatic vegetation. Small populations of water-nymph (*Najas* sp.) and water-crowfoot (*Ranunculus* sp.) were identified. Dense populations of duckweed (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) covered the water's surface. Very few other vegetation species were identified within the plot. Many leeches were collected in 2019, but all of the same species (*Erpobdella punctata*). Dragonflies, damselflies, caddisflies, snails, true flies, and crustaceans were also present. The site provides ideal breeding habitat for frogs, and attracts hungry egrets and great blue herons.

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



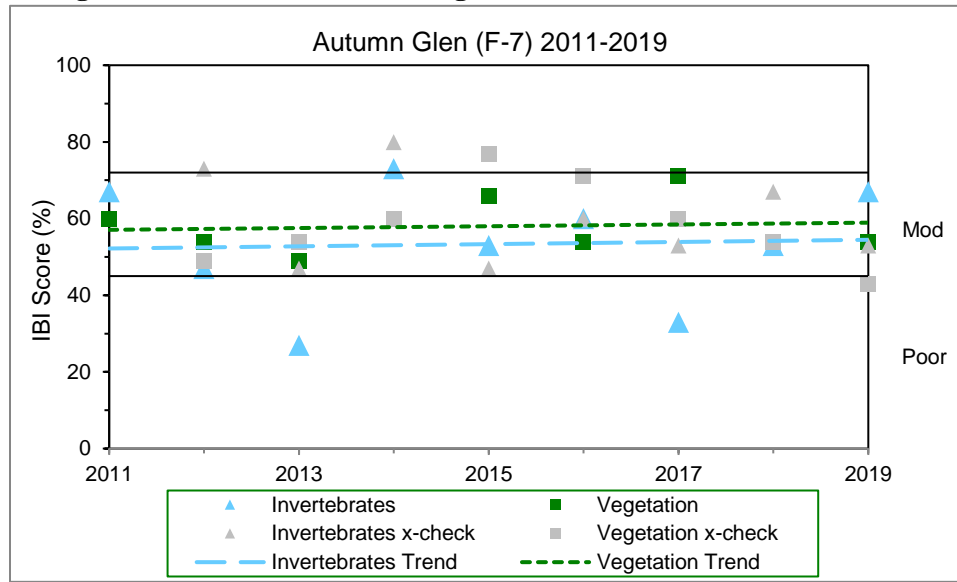
| | Invertebrates  | Vegetation  |
|--|---|--|
| 2019 Data (F-7) | | |
| Wetland Health Rating (IBI score) | Moderate (20) | Moderate (19) |
| Cross-check Rating (IBI score) | Moderate (16) | Poor (15) |
| Trend 2011-2019 | Variable, but stable | Variable, but stable |

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



Site Summary: This is the ninth consecutive year that Autumn Glen has been monitored. The invertebrate and vegetation scores are inconsistent with each other, differing by 13 percent; however, both scores indicate moderate wetland health. Though the data is somewhat variable, the health trends appear stable. In 2019, wetland water levels were high, affecting the vegetation plot placement and invertebrate collection locations; though it does not appear to adversely affected the wetland health scores. This wetland was cross-checked by another WHEP team in 2019. The invertebrate and vegetation scores between teams are not consistent, differing by 14 percent and 11 percent respectively. These differences were minor, but affected the scores. The City team identified a larger diversity of snails than the cross-check team which enhanced the Snail Metric and the Total Taxa Metric. Otherwise, the two teams found similar invertebrate families. The City team identified spike-rush (*Eleocharis* sp.), which the cross-check team did not. This was the minor difference that affected the Vascular Genera Metric and the Grasslike Metric, slightly improving the City team's vegetation score.

4.5.3 Cambodia Avenue (F-9)

Cambodia Avenue (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.



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, though fairly deep wetland, with open water surrounded by concentric rings of white water lilies (*Nymphaea* sp.) and cattails (*Typha* sp.). The wetland is bordered by farm land to the south and east and housing tracts to the north and west. There is an excellent assortment of prairie plants along the shoreline. A dense population of coontail (*Ceratophyllum* sp.) and pondweed (*Potamogeton* sp.) crowd the submergent space. Duckweeds (*Lemna* sp. and *Spirodela* sp.) cover the surface of the water. Bulrush (*Scirpus* sp.) and reed canary grass (*Phalaris arundinacea*) were also present. Only one family of dragonflies, one family of damselflies, one family of caddisflies, two families of snails, and one type of crustacean (scuds) were observed. The water is deeper, in 2019, than in prior years.



DENISE HENNIGAR

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



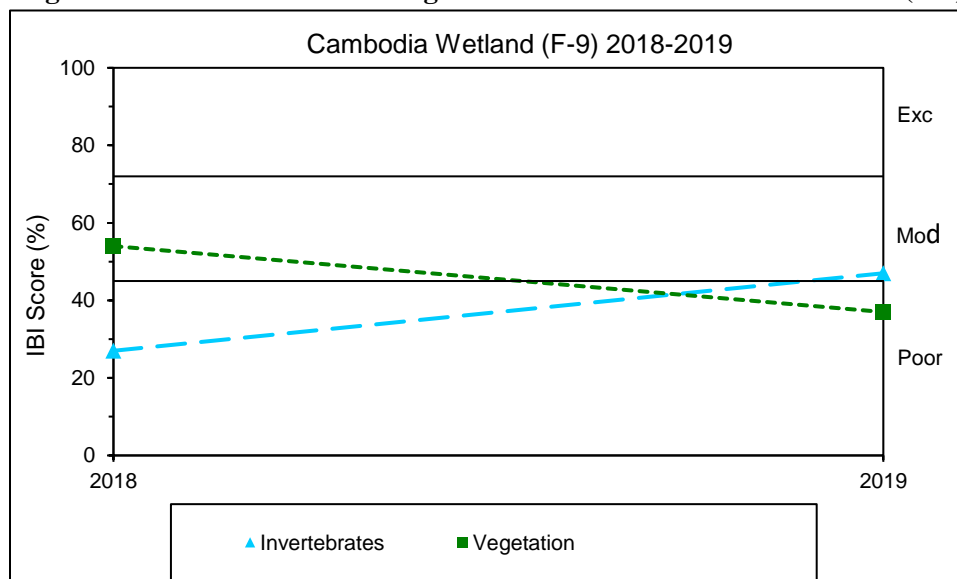
| | Invertebrates | Vegetation |
|--|---|--|
| 2019 Data (F-9) |  |  |
| Wetland Health Rating (IBI score) | Poor (14) | Poor (13) |
| Trend 2018-2019 | Not enough data | Not enough data |

Figure 4.5.3 Invertebrate and vegetation trends for Cambodia Avenue (F-9)



Site Summary: This is the second time that Cambodia Avenue wetland has been surveyed for WHEP. Invertebrate and vegetation scores were consistent with each other, and differed by ten percent. Both scores indicate poor wetland health. The scores from 2018 and 2019 are inconsistent and opposite results. Though the wetland is crowded with vegetation, the diversity is low. High waters may have impacted the surveys. More years of data are needed to determine a reliable health trend.

4.6 Hastings Wetlands

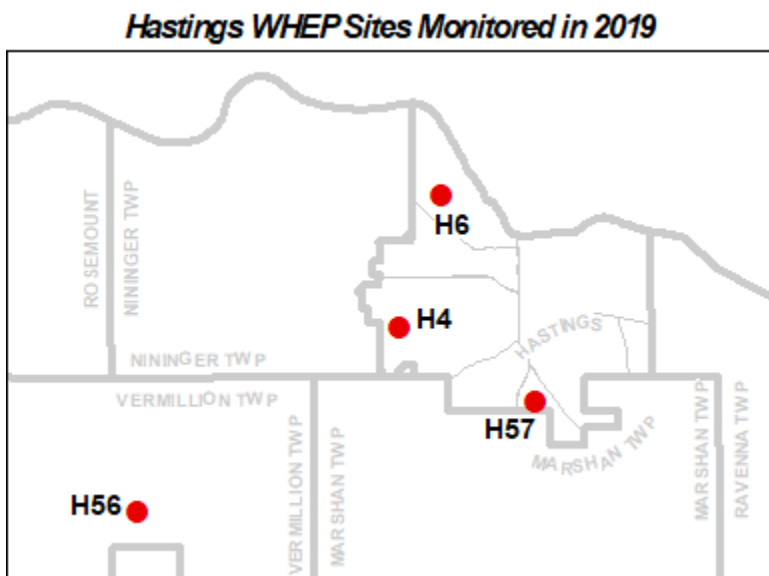
Four wetlands were monitored within the City of Hastings in 2019. The City has 21 years of data! Nine wetlands have been sampled in the City of Hastings through the WHEP program since 1999.

Team Leader: Jessie Eckroad

Team Members: Alex Franzen, Nathan Marxhausen, Mike Nelson, Jesse Slovic, Dwight Smith, and Kevin Smith.



JESSIE ECKROAD



Jessie Eckroad is an environmental educator at Carpenter St. Croix Valley Nature Center and has been the WHEP Hastings Team leader for five years (since 2015). “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. “It also gives me a chance to contribute to the well-being of my community!” Even though she loves the research and science facets of WHEP, her favorite part of her experience has been building relationships with the members of her team. “The people I’ve met through WHEP aren’t just colleagues, they are my friends, and I am so happy to have them in my life.”

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 volunteers have continued the tradition of excellence and are instrumental in the success of this program. Thank you!”

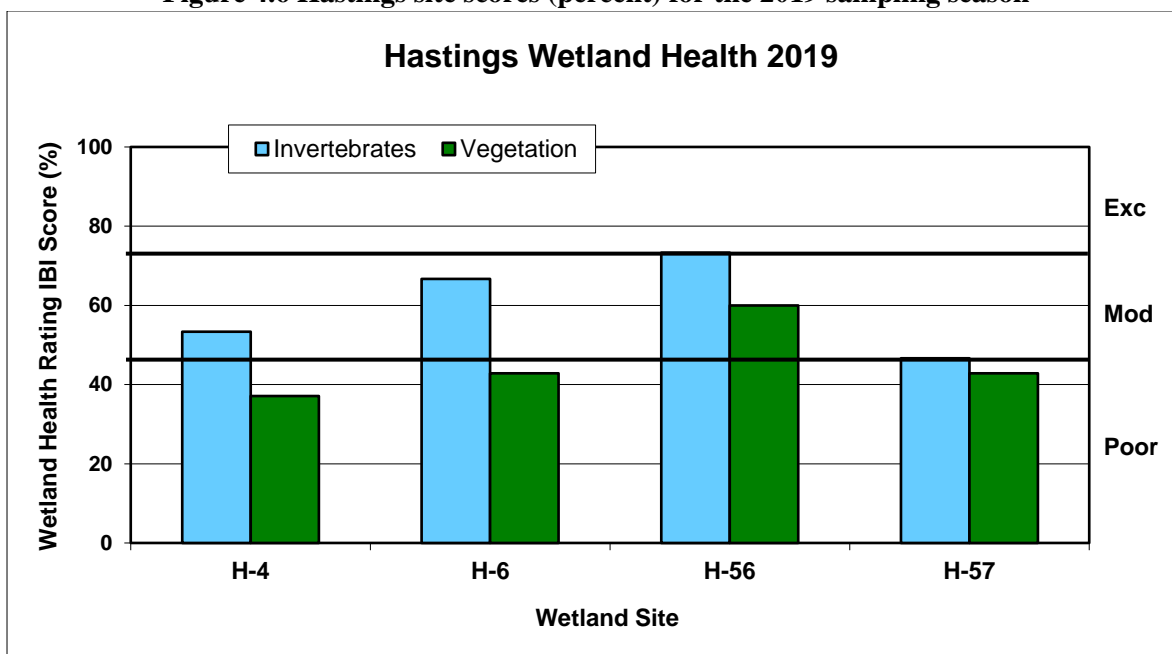


JOHN CAVEN

Hastings General Wetland Health

Figure 4.6 presents an overall view of wetland health for all of the 2019 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 2019. Invertebrate and vegetation scores for H-4, H-6, and H-56 were inconsistent, differing by 16, 24, and 13 percent, respectively.

Figure 4.6 Hastings site scores (percent) for the 2019 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 moderately mucky, but not so viscous that one gets stuck. Willow (*Salix* sp.), maple (*Acer* sp.), dogwood (*Cornus* sp.), and cattail (*Typha* sp.) dominate the shoreline, with the exception of shoreline areas where homeowners mow to the wetland edge. Pondweeds (*Potamogeton* sp.) and duckweed (*Lemna* sp.) were the only submergent and floating-leaved plants found in vegetation plot. Several sparse emergent plants and grasses including reed canary grass (*Phalaris arundinacea*), bugle weed (*Lycopus* sp.) and smartweed (*Polygonum* sp.) were represented. Leeches, dragonflies, damselflies, mayflies, caddisflies, snails, true flies, and crustaceans were collected.

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



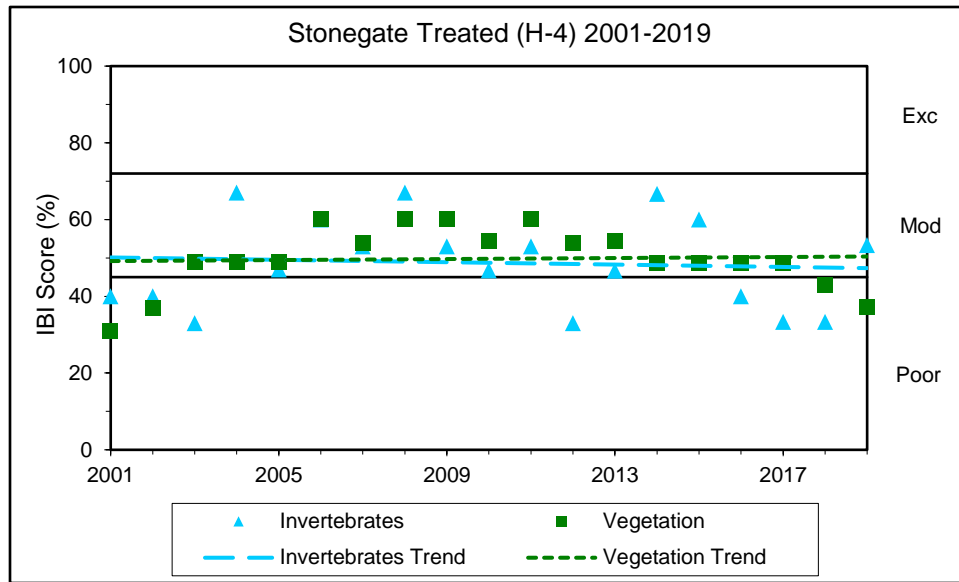
| | Invertebrates  | Vegetation  |
|--|---|--|
| 2019 Data (H-4) | | |
| Wetland Health Rating (IBI score) | Moderate (16) | Poor (13) |
| Trend 2001-2019 | Variable, but stable | Variable, but stable |

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



Site summary: This is the nineteenth consecutive year that Stonegate Treated has been surveyed. The invertebrates and vegetation scores were inconsistent in 2019, differing by 16 percent. The invertebrate score indicates moderate health, while the vegetation score indicates poor health. The vegetation trend appears stable; however, may be gradually declining since 2011. This is after vegetation health scores appeared to be steadily improving since the first survey in 2001, and maintaining mid-moderate health for several years. Varying strategies of shoreline management per residence may be affecting vegetation scores. The invertebrate data varies from year to year; however, the trend analysis indicates stable invertebrate health. The City team speculates that changes in the nearshore vegetation are affecting invertebrate habitat.

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 moderate, but many submerged logs create tripping hazards. The substrate is very mucky in the shallow areas, but more solid in deeper 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. Duckweed (*Lemna* sp.), and water-meal (*Wolffia* sp.) floated on the surface of the water. No submergent vegetation was found in the vegetation plot. Arrowhead (*Sagittaria* sp.), bur-reed (*Sparganium* sp.), cattail (*Typha* sp.), beggar-ticks (*Bidens* sp.), purple loosestrife (*Lythrum salicaria*), Sedges (*Carex* sp.), and bulrush (*Scirpus* sp.) were present.. Leeches, dragonflies, damselflies, snails, true flies, and crustaceans were observed.

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



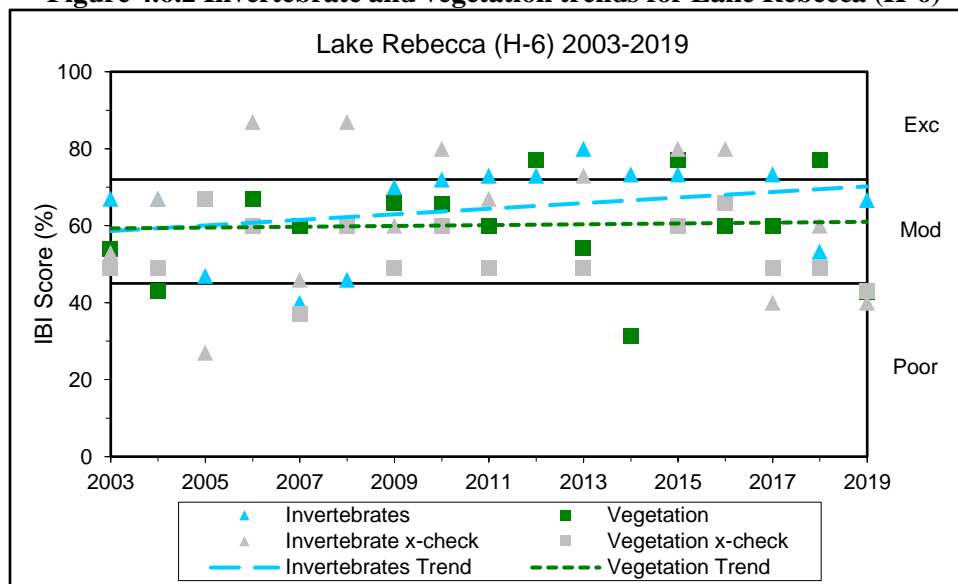
| | Invertebrates  | Vegetation  |
|--|--|--|
| 2019 Data (H-6) | | |
| Wetland Health Rating (IBI score) | Moderate (20) | Poor (15) |
| Cross-check Rating (IBI score) | Poor (12) | Poor (15) |
| Trend 2003-2019 | Stable | Variable, stable |

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



Site summary: This is the seventeenth consecutive year of monitoring for Lake Rebecca. Invertebrate and vegetation scores are inconsistent, differing by 24 percent. There was a lot of variability in the invertebrate data prior to 2009; however, data from 2009 until 2017, the invertebrate health has remained stable with moderate to excellent health. In 2018, the invertebrate score declined, but rebounded in 2019. The vegetation data is variable and declined greatly from 2018 to 2019; however, the long term trend appears stable. The area was flooded in 2019, which likely impacted the vegetation plot placement. There were no submergent vegetation present in the plot in 2019 which impacted the vegetation health score for the year. This wetland was cross-checked by another WHEP team in 2019. The invertebrate scores between the two teams were inconsistent. The City team identified a larger diversity of invertebrates. According to the City team, water levels fluctuated dramatically from day to day during bottle trap set-up and collection. The cross-check team had very few specimen collected in bottle traps. This may have affected the invertebrate score. The vegetation scores were the same for each team, and species presence was similar.



DWIGHT SMITH AND MIKE NELSON

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.



ALEX FRANZEN, NATHAN MARXHAUSEN, AND KEVIN SMITH

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. There is a concern that when the ponds are dry, the landowners may put the land into production. 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 on surrounding land, and wildlife habitat management to be practiced in the wetland areas.

Wetland Health

Site Observations: Collection locations for both invertebrates and vegetation were not in the usual sites due to high water. The vegetation releve was not truly reflective of the plant community, especially the submergent vegetation. Plots were set near the road due to flooding, so the water depth drops-off quickly at the edge of the road, and then levels out. The substrate is firm. Duckweeds (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) spread widely over the surface of the water. Only a small amount of coontail (*Ceratophyllum* sp.) was found in the vegetation plot, representing the submergent vegetation class. Willow (*Salix* sp.), cattail (*Typha* sp.), reed canary grass (*Phalaris arundinacea*), arrowhead (*Sagittaria* sp.), bur-reed (*Sparganium* sp.), sedges (*Carex* sp.), and bulrush (*Scirpus* sp.) were represented. Leeches, dragonflies, damselflies, caddisflies, snails, true flies, and crustaceans were collected.



FLOODING OF 180TH STREET MARSH 2019

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



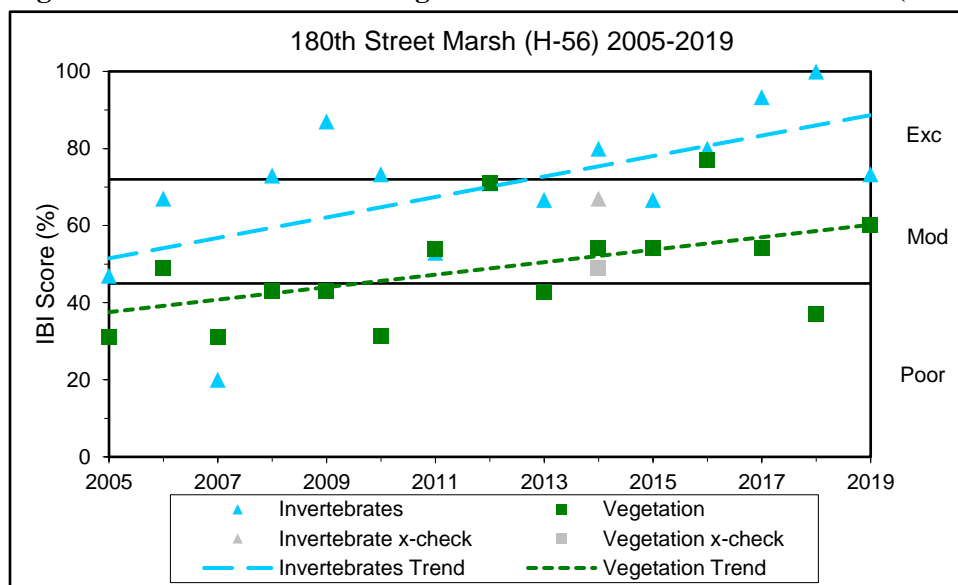
| | Invertebrates  | Vegetation  |
|--|--|--|
| 2019 Data (H-56) | | |
| Wetland Health Rating (IBI score) | Moderate (22) | Moderate (21) |
| Trend 2005-2019 | Variable, but improving | Variable, but improving |

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



Site summary: This is the fifteenth consecutive year that H-56 has been monitored. The invertebrate and vegetation scores are inconsistent, differing by 13 percent; however, both scores indicate moderate wetland health. High water affected the collection location for both invertebrates and vegetation in 2019. This may not be a true reflection of the wetland invertebrate and vegetation community. The data is variable, but the both health trends appear to be improving.

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 gentle, and the substrate is very mucky. The wetland is surrounded by homes and a nearby park. Trees overhang portions of the wetland shoreline. Cattails (*Typha* sp.) dominated the shoreline. Duckweed (*Lemna* sp.) covered much of the wetland surface. Pondweed (*Potamogeton* sp.) was the only submergent vegetation found in the vegetation plot. Cattail (*Typha* sp.), bulrush (*Scirpus* sp.), and reed canary grass (*Phalaris arundinacea*) dominated the shoreline. Leeches, dragonflies, mayflies, snails, true flies, and scuds were observed. There was a lot of trash and the wetland was smelly (similar notes each year since 2016). Chinese mystery snails were found.

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



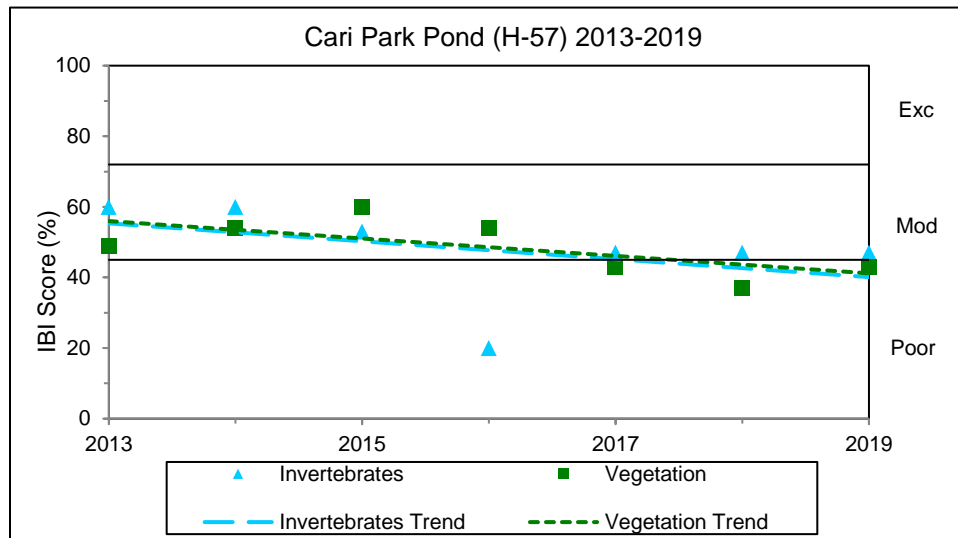
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (H-57) |  |  |
| Wetland Health Rating (IBI score) | Poor (14) | Poor (15) |
| Trend 2013-2019 | Slight decline | Slight decline |

Figure 4.6.4 Invertebrate and vegetation trends for Cari Park Pond (H-57)



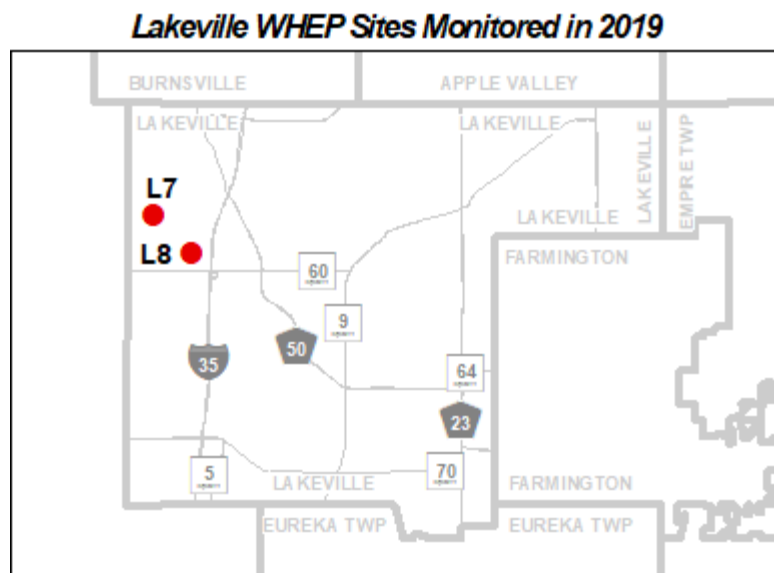
Site summary: This is the seventh consecutive year that Cari Park Pond has been monitored. The vegetation and invertebrate scores were consistent with each other in 2019, both indicating poor wetland health. Both invertebrates and vegetation scores appear to be gradually declining each year; however, data remains similar in 2017, 2018, and 2019. Submergent vegetation was found in 2019; no submergent vegetation was documented in 2018.

4.7 Lakeville Wetlands

Two wetlands were monitored within the City of Lakeville in 2019. The City has 22 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: Nate Barnes, William Barnes, Tom Goodwin, Lindsay Haneman, Lisa Henningsen, Emma Hinson, Emily Pfeiffer, Bud Williams, and Laura Wolf.





STEVE WESTON

Steve Weston has participated in WHEP for over 16 years. He describes himself as a naturalist, and says, "I am best known for my bird observations, but people who join me on field trips realize that I am really interested in all components of the environment. I have little formal biological training."

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



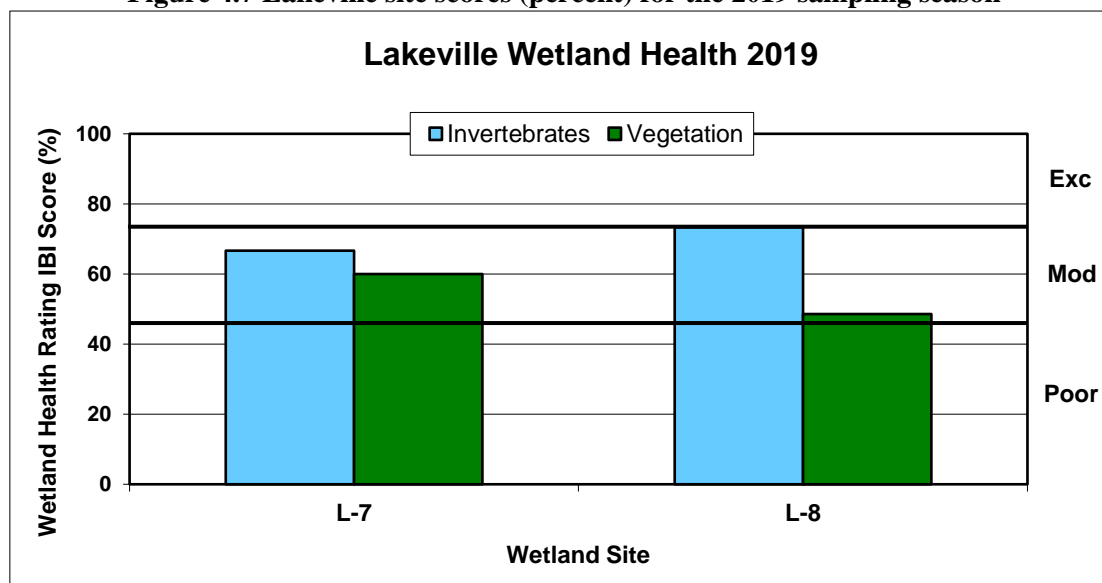
ANN MESSERSCHMIDT

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 our community learn how their actions can directly affect water quality."

Lakeville General Wetland Health

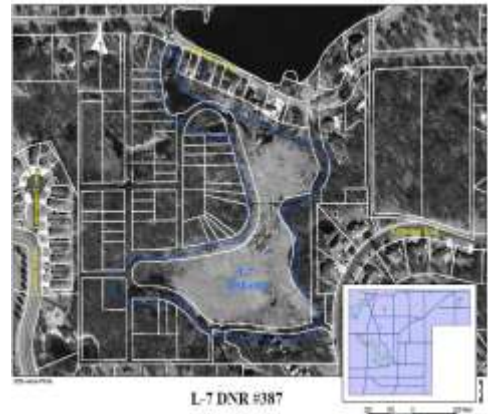
Figure 4.7 presents an overall view of wetland health for all the 2019 monitoring sites in Lakeville based on the IBI scores for invertebrates and vegetation presented as a percent. Figure 4.7 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate and vegetation 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. Though both invertebrate and vegetation scores for site L-8 indicate moderate wetland health, they were inconsistent, differing by 24 percent.

Figure 4.7 Lakeville site scores (percent) for the 2019 sampling season



4.7.1 DNR Wetland #387 (L-7)

L-7, also known as DNR #387, 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 into Orchard Lake. The aeration system is scheduled to run from April to October annually.



Wetland Health

Site Observations: The wetland slope is gentle, and the substrate is very mucky. The team commented that the water levels were high in 2019, which may have affected invertebrate diversity and vegetation plot placement. Bladderwort (*Utricularia* sp.) was not found in 2019. The wetland is dominated by cattails (*Typha* sp.), reed canary grass (*Phalaris arundinacea*), and purple loosestrife (*Lythrum salicaria*), pondweed (*Potamogeton* sp.), and duckweed (*Lemna* sp.). The wetland displays a large diversity of other vegetation, as well, including: sedges (*Carex* sp.), rushes (*Juncus* sp.), arrowhead (*Sagittaria* sp.), water plantain (*Alisma* sp.), and smartweed (*Polygonum* sp.). Biological control insects have been introduced in this wetland to control this invasive purple loosestrife. The beetle population fluctuates according to the availability of food (purple loosestrife) and other natural factors which affects the control of the purple loosestrife year by year. Steve Weston commented, “the purple loosestrife population appears to be at its peak in 2019.” Several genera of leeches, dragonflies, damselflies, caddisflies, snails, true flies, and crustaceans were observed.



LAKEVILLE TEAM AT INVERTEBRATE TRAINING

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



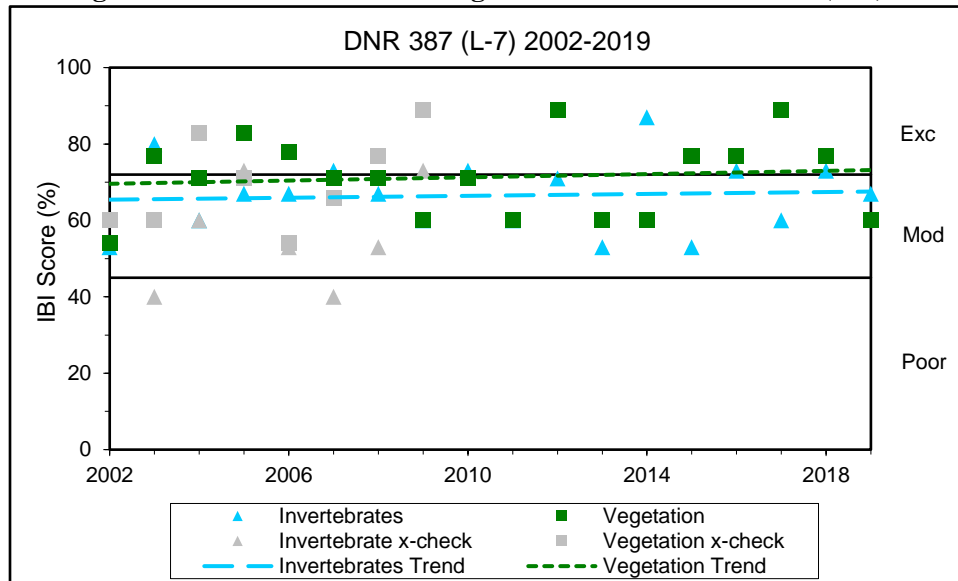
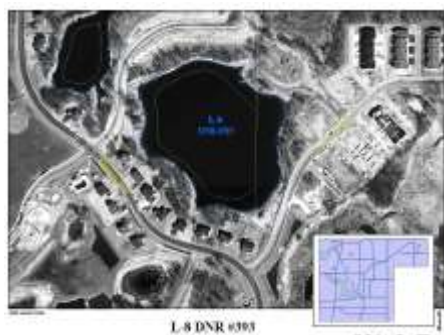
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (L-7) |  |  |
| Wetland Health Rating (IBI score) | Moderate (20) | Moderate (21) |
| Trend 2002-2019 | Variable, but stable | Variable, but stable |

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



Site summary: This is the eighteenth consecutive year that DNR 387 has been monitored. The invertebrate and vegetation scores were consistent again in 2019. The invertebrate and vegetation data is variable from year to year, but the health trends appear stable. The team commented that the water level was high which perhaps affected the invertebrate diversity and vegetation plot placement. Bladderwort (*Utricularia* sp.) was not found in 2019.

4.7.2 DNR #393 (L-8)



L-8, also known as DNR #393, 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. In 2019, the highest water levels in all the years of surveying this wetland was observed. Willows and aspens grow near the water. Dense populations of coontail (*Ceratophyllum* sp.) and pondweed (*Potamogeton* sp.) dominate the submergent vegetation. Water-milfoil (*Myriophyllum* sp.) was also found. Duckweed (*Lemna* sp. and *Spirodela* sp.), water-shield (*Brasenia schreberi*), and smartweed (*Polygonum* sp.) were also well represented. Reed canary grass (*Phalaris arundinacea*) and a few other grasslike emergents were observed. Leeches, dragonflies, damselflies, mayflies, snails, true flies, and crustaceans were collected.

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



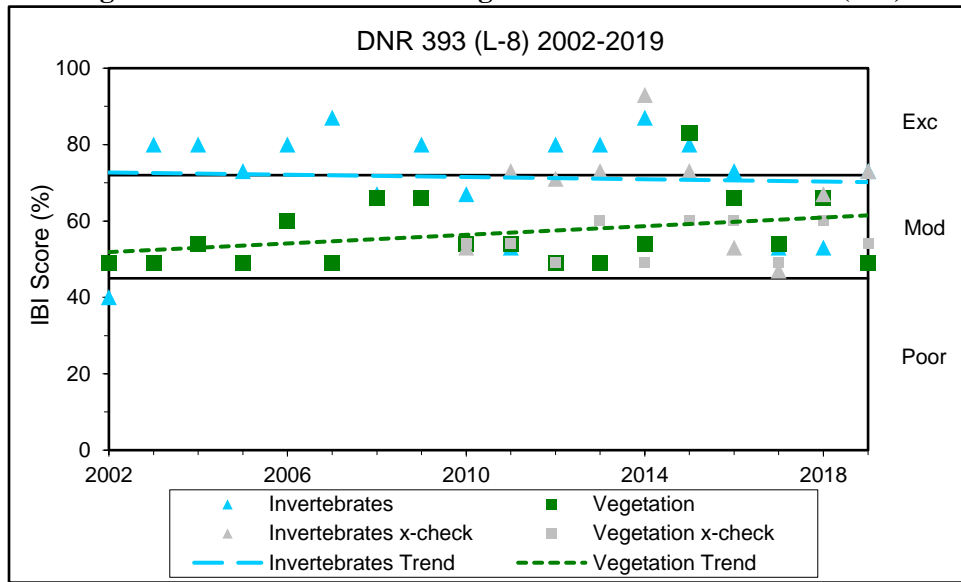
| | Invertebrates  | Vegetation  |
|--|--|---|
| 2019 Data (L-8) | | |
| Wetland Health Rating (IBI score) | Moderate (22) | Moderate (17) |
| Cross-check Rating (IBI score) | Moderate (22) | Moderate (19) |
| Trend 2002-2019 | Variable, but stable | Stable |

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



Site summary: DNR 393 has been monitored eighteen consecutive years. The invertebrate and vegetation scores were inconsistent, differing by 24 percent; however, both scores indicate moderate wetland health. Despite a high score in 2015, the vegetation scores have remained fairly stable. The invertebrate scores were have rated excellent for most years, and the trend appears stable. This wetland was cross-checked by another WHEP team in 2019. The invertebrate and vegetation scores between the two teams were very consistent with each other. In fact, the vegetation and invertebrate communities encountered by each team were nearly the same.

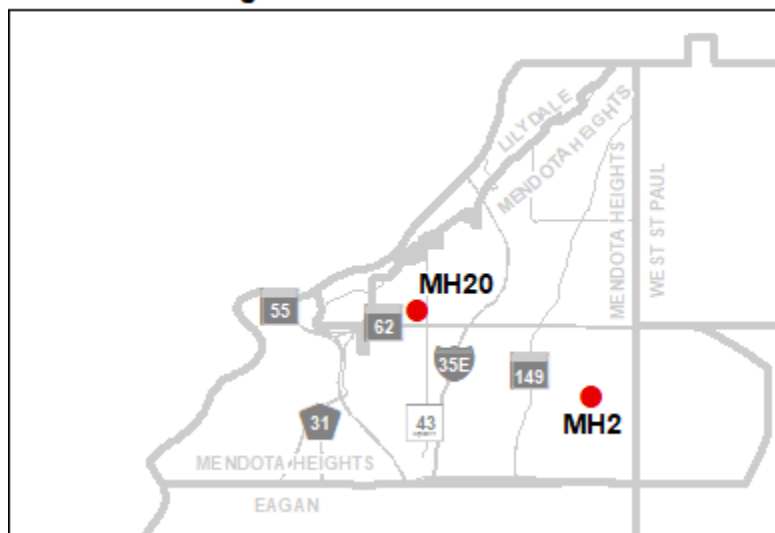
4.8 Mendota Heights Wetlands

Two wetlands were monitored within the City of Mendota Heights, in 2019. The City has 22 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, James Chastek, Gayl Gustafson, Helen Losleben, Joan O'Donnell, Marjorie Savage, Michelle Skog, Mary Stade, David Stuart, Anneliese Tatham, Camille Wang, and Noelle Wang.

Mendota Heights WHEP Sites Monitored in 2019





DARCY TATHAM

Mendota Heights' team leader, Darcy Tatham, has been part of the WHEP for more than 19 years. She stated, "In my many years of being a team leader, we have repeated some of the cross-check ponds, but we have also gone to ones we have not been to before. This year the cross-check pond that was chosen for us in Eagan was one we had not been to before. It was in someone's back yard and they had some concerns about

it. That is not unique, as no one wants an unhealthy pond in their back yard or neighborhood. What is unique is usually the situation and history surrounding the pond.



NOELLE WANG, CAMILLE WANG, GAYL GUSTAFSON, HELEN LOSLEBEN, JOAN O'DONNELL, DARCY TATHAM, MARY STADE, JOHN BOTTOMLEY

"Whether we are monitoring the cross-check pond or one in our own city, we often get to talk to the homeowners or the neighbors and hear their stories. It's great to find people who are concerned and who notice changes to 'their' pond. The changes usually occur slowly, over a period of a few years. Sometimes I would like to see changes happen quicker so people can see the cause and effect of some of their actions quicker and easier. When people question the health of 'their' pond, we get to be the detectives. We sample the macroinvertebrates and plants, and then identify and work out the metrics, in addition to being observant about the site itself. We get to confirm or dispute what they think is happening to the pond with real data. Anyways, there we are, out in the neighborhood, meeting people, being detectives, learning about water quality, and having fun!"



RYAN RUZEK

Ryan Ruzek has been involved in WHEP since 2005. He is currently the Public Works Director for Mendota Heights and selects and coordinates the wetlands to be monitored. Ryan has served as a volunteer on the Mendota Heights team in the past to gain a better understanding of the program. He commented, "Mendota Heights monitors two wetlands every year. One wetland is monitored year after year, and the city selects a second wetland where future BMP's are proposed to be installed. The City will then monitor that wetland again to see if the BMP was a success. WHEP has also been a great community involvement and education tool. Residents regularly stop by and inquire about the project."

Krista Spreiter is the Natural Resources Technician for Mendota Heights. She commented, "This is the first time I have been involved with the WHEP program, and I am very impressed by the quality of data that is obtained, and the time and effort that is put forth by our volunteers! I have learned that the City has been involved with the WHEP program for 22 years! It is invaluable to have data that exists throughout that length of time. It provides an



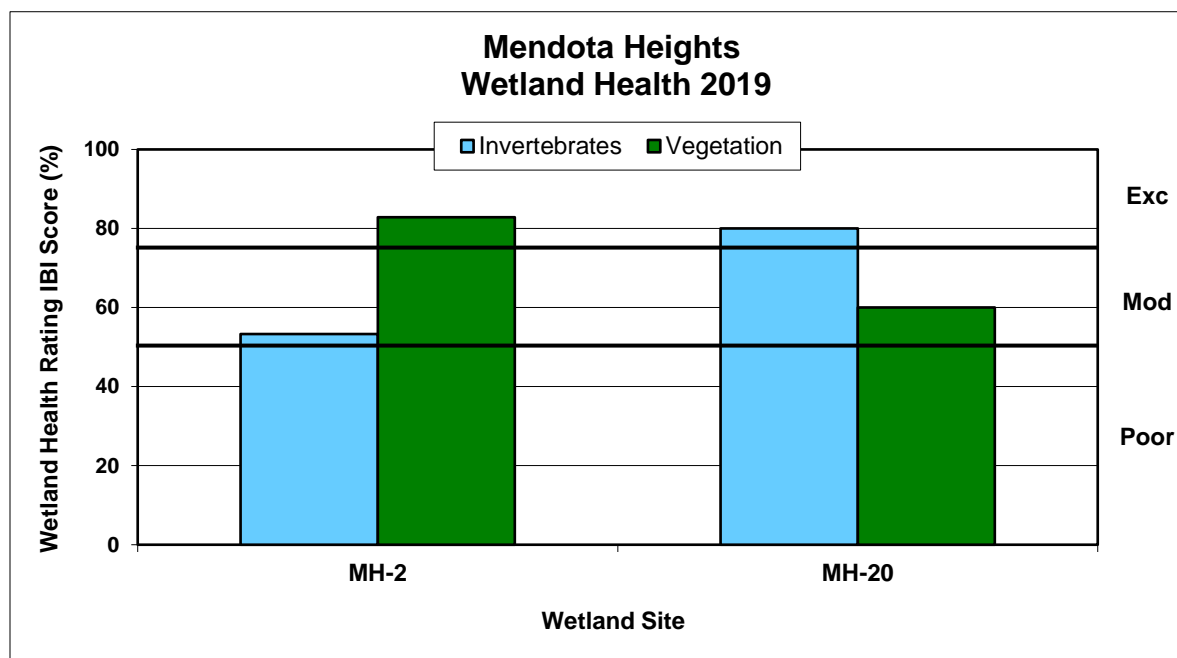
KRISTA SPREITER

incredibly useful gauge for the water quality of our wetlands and surface waters throughout Mendota Heights.”

Mendota Heights General Wetland Health

Figure 4.8 presents an overall view of wetland health for all of the 2019 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 2019. Invertebrate and vegetation scores ranged from moderate to excellent wetland health. Invertebrate and vegetation scores for MH-2 and MH-20 were inconsistent with each other, differing by 30 percent and 20 percent, respectively.

Figure 4.8 Mendota Heights' site scores (percent) for the 2019 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-PABG. The pond serves as a natural resource with a surrounding paved trail and gravel nature trail. The wetland management goal is to maintain water quality and flood rate control. 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 and garlic mustard are present in the area. 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 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, goldenrod around the water's edge. The wetland slope is uneven, and the substrate is very mucky. The pond is heavily vegetated with submerged and floating-leaved forbs including: duckweed (*Lemna* sp. and *Spirodela* sp.), water-meal (*Wolffia* sp.), white water-lily (*Nymphaea* sp.), coontail (*Ceratophyllum* sp.), water-nymph (*Najas* sp.), pondweed (*Potamogeton* sp.), and bladderwort (*Utricularia* sp.). Purple loosestrife (*Lythrum salicaria*) and reed canary grass (*Phalaris arundinacea*) were also observed. Dragonflies, snails, midges, and scuds were present. Leeches, caddisflies, snails, true flies, and crustaceans were collected.

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



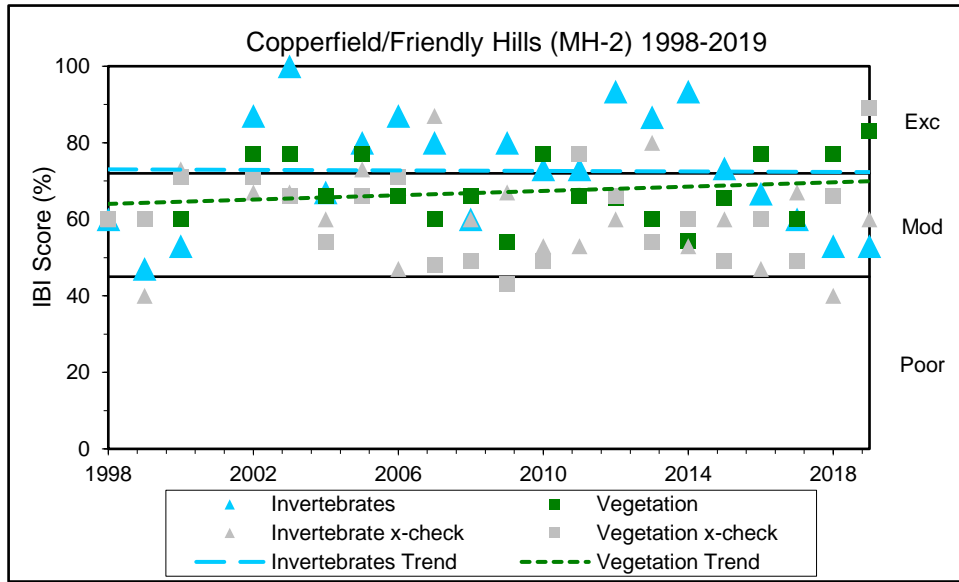
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (MH-2) |  |  |
| Wetland Health Rating (IBI score) | Moderate (16) | Excellent (29) |
| Cross-check Rating (IBI score) | Moderate (18) | Excellent (31) |
| Trend 1998-2019 | Variable | Variable |

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



Site Summary: This is the 21st year that MH-2 has been monitored since 1998. There is a lot of variability in the data throughout the years of monitoring. In 2019, the invertebrate and vegetation scores were inconsistent, differing by 30 percent. This is similar to 2018. This wetland was cross-checked by another WHEP team in 2019. The invertebrate and vegetation scores for the cross-check team were also inconsistent; however, the invertebrate and vegetation scores of each team were very consistent with each other. In fact, the invertebrate and vegetation species found by each team was very similar.

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 965.4 acres and 30.1 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 designed as NWI – PUBG/PEM1F/PEM1C, as a Public Water on the Minnesota DNR's PWI. The wetland management goal is to maintain water quality and flood rate control.



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, nearly complete. Curb-cut raingardens were completed in the neighborhood to the east, in summer 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.



MENDOTA HEIGHTS TEAM LEND A HAND

Wetland Health

Site Observations: The wetland slope is gentle, and the substrate mucky. Duckweed (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) cover the surface of the water. Coontail (*Ceratophyllum* sp.) dominates the water column. Cattail (*Typha* sp.), spike-rush (*Eleocharis* sp.), and purple loosestrife (*Lythrum salicaria*) are prevalent. Several species of leeches, dragonflies, damselflies, mayflies, caddisflies, snails, true flies, and crustaceans were collected.

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



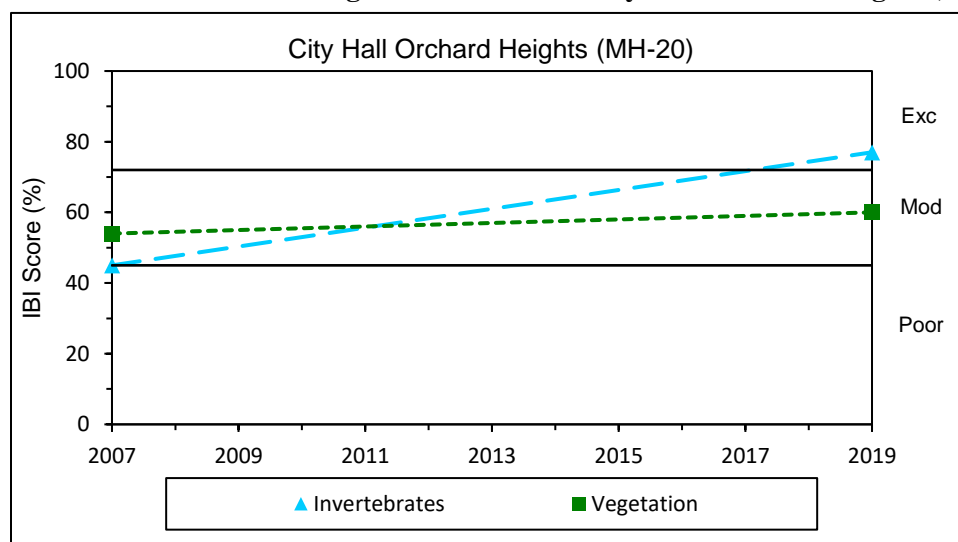
| | Invertebrates | Vegetation |
|--|--|--|
| 2019 Data (MH-20) |  |  |
| Wetland Health Rating (IBI score) | Excellent (24) | Moderate (21) |
| Trend 2007-2019 | Not enough data | Not enough data |

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



Site summary: This is the second time that MH-20 has been monitored for WHEP since 2007. The invertebrate and vegetation scores are inconsistent with each other, differing by 20 percent. More years of data collection will help determine a more reliable health trend.



DARCY TATHAM, JOAN O'DONNELL, HELEN LOSLEBEN, NOELLE WANG, JIM CHASTEK, CAMILLE WANG, DAVID STUART, GAYL GUSTAFSON



MARY STADE AND NOELLE WANG COLLECTING INVERTEBRATES



HELEN LOSLEBEN, DARCY TATHAM, GAYL GUSTAFSON, CAMILLE WANG, NOELLE WANG, JIM CHASTEK, JOHN BOTTOMLEY

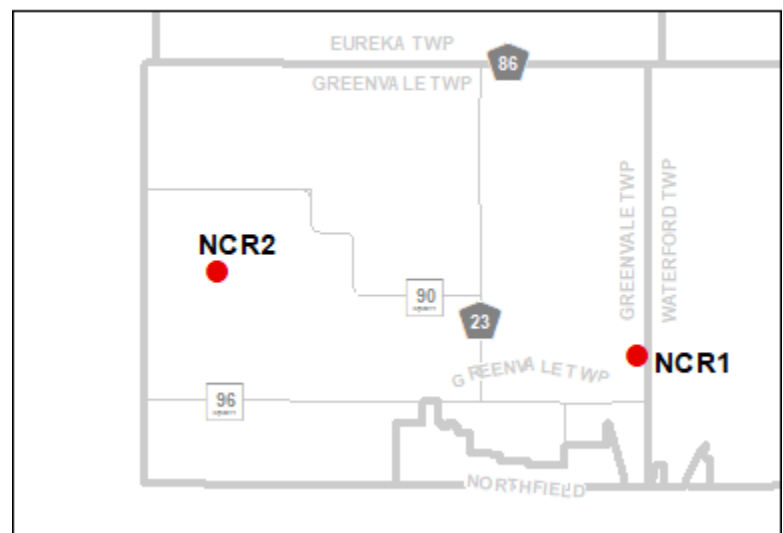
4.9 North Cannon River Watershed Management Organization

Two wetlands were monitored for North Cannon River Watershed Management Organization in 2019. This is the third year that North Cannon River WMO has monitored wetlands with WHEP.

Team Leaders: Tom Loretto

Team Members: Henry Meyer Garvey, Makeen Loretto, Daniel Taylor, and Colleen Vitek.

North Cannon River WMO WHEP Sites Monitored in 2019





TOM LORETTO

Tom Loretto is the team leader for North Cannon River Watershed Management Organization. Tom stated, “I have worked with WHEP for three summers. My family has a partnership with Main Street Project – a regenerative agriculture non-profit based in Northfield. Main Street Project has a partnership with Dakota County; I was put in touch with WHEP through our work with Dakota County’s conservation easement program. We lease the southern end of the land to Main Street Project for their demonstration farm. It is classified RIM (Reinvest in Minnesota) land by the Minnesota Board of Water and Soil Resources. One of the wetlands our WHEP team is responsible for is on this RIM land.

Tom said, “This year we had a great crew of volunteers on our team, including a high-school science teacher in our school district working on his Masters degree in entomology, and one of his students, who is passionate about the outdoors. Our forays in waders, in the muck, through the canary grass and cattails, proved most enjoyable to our team, as we retrieved and located flora and fauna which were – for them - bounty. With the data we collected, we are in good position to monitor the health trends of RIM and other wetlands within the Cannon River watershed.”



MAKEEN LORETTO, HENRY MEYER-GARVEY, AND DANIEL TAYLOR



ASHLEY GALLAGHER

Ashley Gallagher is a 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. NCRWMO chose the same two wetlands to be monitored in 2018 in order to establish some trends in data. In the future this data can help the NCRWMO achieve another goal, which is ‘to protect wetlands from destruction or deterioration due to development, drainage, agriculture, and other adverse activities’.”

North Cannon River WMO General Wetland Health

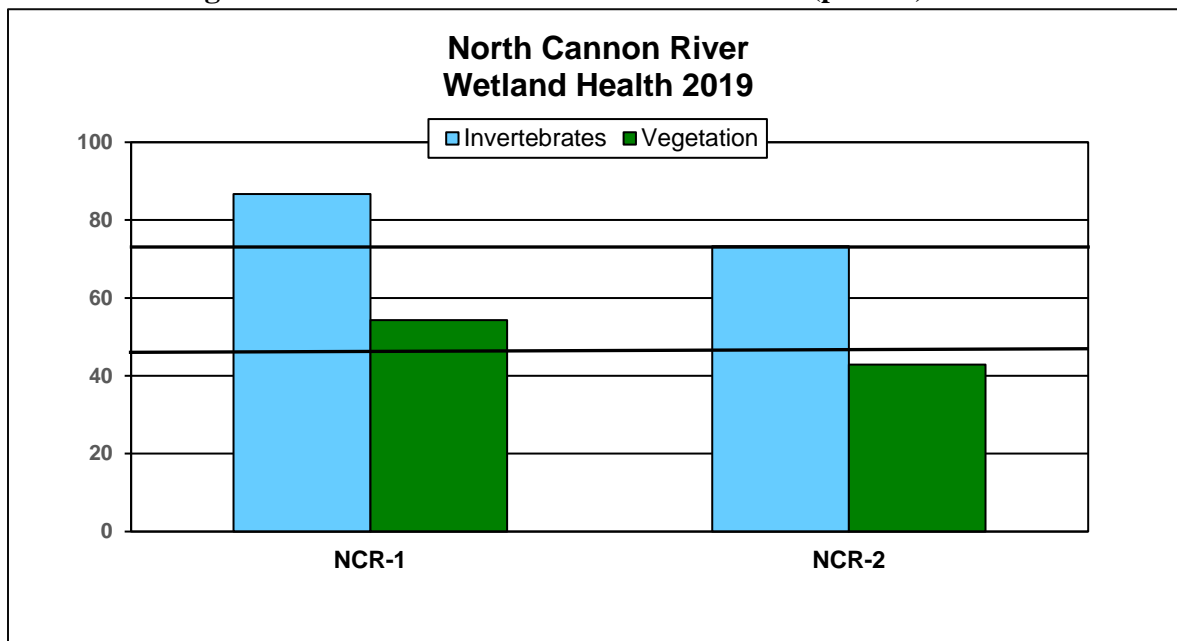
Figure 4.9 presents an overall view of wetland health for all the 2019 monitoring sites in North Cannon River WMO based on the scores for invertebrates and vegetation presented as a percent. Figure 4.9 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate

Dakota Co. WHEP

February 2020

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 for NCR-1 and NCR-2 were inconsistent with each other, differing by 33 percent and 30 percent, respectively.

Figure 4.9 North Cannon River WMO site scores (percent) for 2019



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 firm. Cattails (*Typha* sp.), reed canary grass (*Phalaris arundinacea*), and duckweed (*Lemna* sp. and *Spirodela* sp.) dominate the near shore. Pondweed (*Potamogeton* sp.), bur-reed (*Sparganium*), bulrush (*Scirpus* sp.), spike-rush (*Eochocharis* sp.), and water-meal (*Wolffia* sp.) were prevalent. Leeches, dragonflies, damselflies, snails, true flies, and crustaceans were present.

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

| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (NCR-1) |  |  |
| Wetland Health Rating (IBI score) | Excellent (26) | Moderate (19) |
| Trend 2017-2019 | Not enough data | Not enough data |

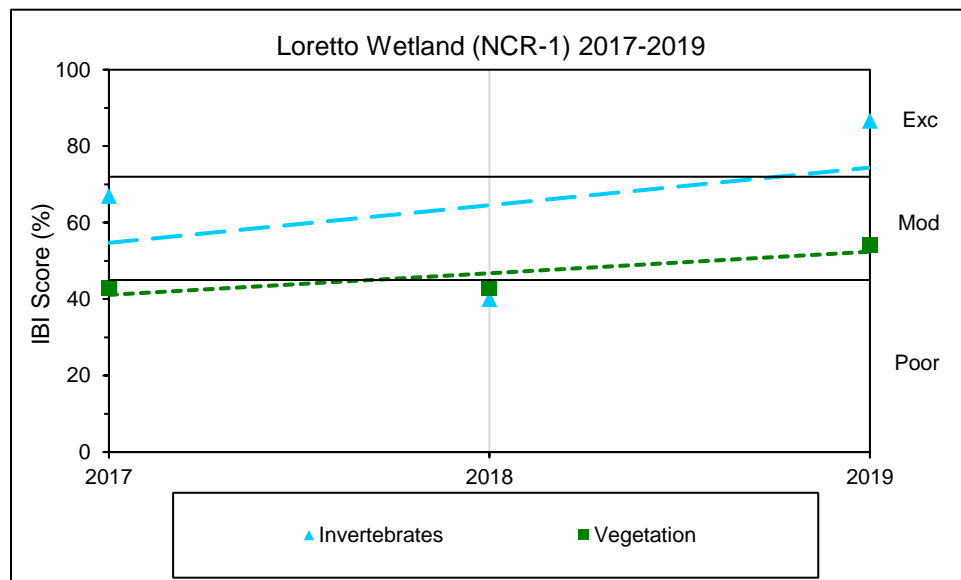


HENRY MEYER-GARVEY, DANIEL TAYLOR, AND MAKEEN LORETTO



DANIEL TAYLOR AND TOM LORETTO

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



Site summary: This is the third year that Loretto Wetland has been monitored by WHEP volunteers. The invertebrate and vegetation health scores were inconsistent, differing by 33 percent. The invertebrate score

has bounced each year of survey while the vegetation score is remaining stable. More years of data will help determine a more reliable health trend.

4.9.2 Peterson (NCR-2)

Peterson (NCR-2) is a 2-acre, type 5 wetland within the Cannon River watershed. The wetland watershed is 55 acres with no impervious surface. It is an excavated wetland. The wetland may be affected by the flow changes of nearby Dutch Creek.

This wetland is located within the Greenvale Township in southwestern Dakota County. The surrounding area is predominately agricultural.



Wetland Health

Site Observations: The wetland slope is deep entering from the roadside ditch. The wetland substrate is very mucky and difficult to traverse. The NC team commented, “[sampling] has become problematic over the last two years. The culvert causes a current that prevents sampling in the deeper water near the road, and the remainder of the wetland, where we sample, is very shallow and mucky.” Dense algae was present which made invertebrate sampling a challenge. Water is flowing in the roadside ditch adjacent to the wetland. Cattails (*Typha* sp.) and reed canary grass (*Phalaris arundinacea*) surround this open water wetland in the middle of farm fields. Dense populations of coontail (*Ceratophyllum* sp.) and pondweed (*Potamogeton* sp.) were the only submergent vegetation. Duckweed (*Lemna* sp.) and water-meal (*Wolffia* sp.) cover the surface of the wetland. Leeches, dragonflies, damselflies, mayflies, snails, true flies, and crustaceans were collected.

Table 4.9.2 Peterson (NCR-2) Wetland Health based on Index of Biotic Integrity



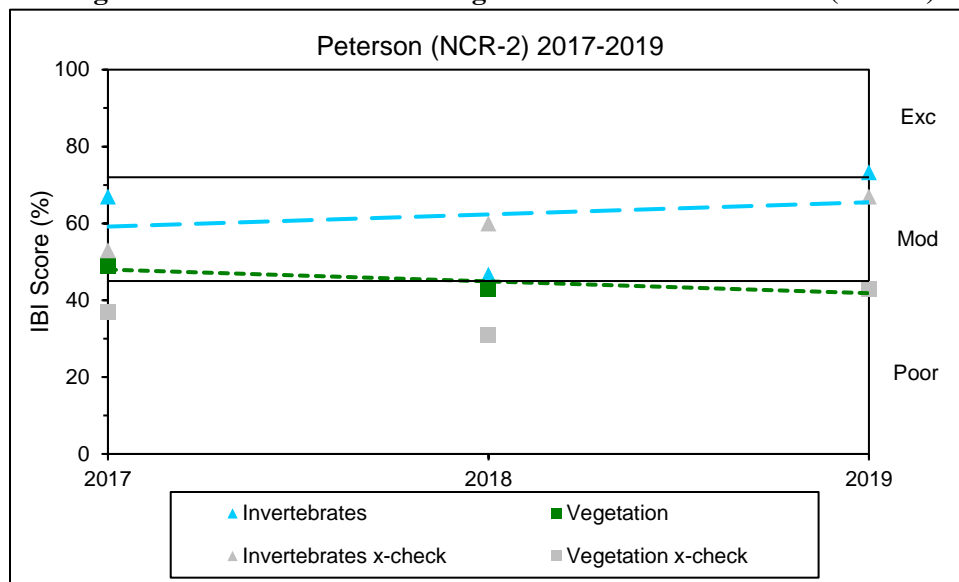
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (NCR-2) |  |  |
| Wetland Health Rating (IBI score) | Moderate (22) | Poor (15) |
| Cross-check Rating (IBI score) | Moderate (20) | Poor (15) |
| Trend 2017-2019 | Not enough data | Not enough data |

Figure 4.9.2 Invertebrate and vegetation trends for Peterson (NCR-2)



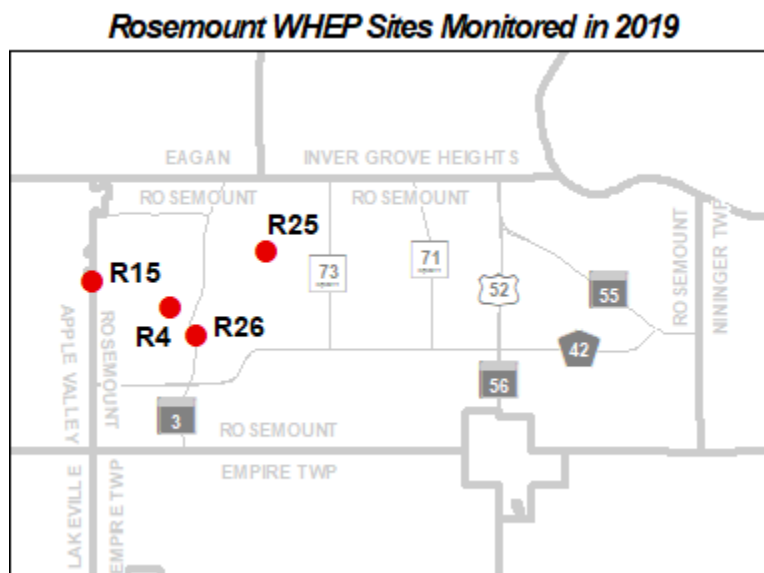
Site summary: This is the third year that Peterson wetland has been monitored by WHEP volunteers. The invertebrate and vegetation scores were inconsistent, differing by 30 percent. The invertebrate data indicated excellent wetland health, while the vegetation data indicated poor wetland health. The invertebrate scores are fluctuating from year to year. In 2019, the invertebrate diversity was poor; however, the great abundance and diversity of snails found enhanced the invertebrate score. The vegetation scores are remaining stable, so far. This wetland was cross-checked by another WHEP team in 2019. The invertebrate and vegetation scores for the cross-check team were also inconsistent, differing by 24 percent; however, the invertebrate and vegetation scores of each team are consistent with each other. In fact, the teams found similar vegetation species. 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 2019. The City has 22 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: Andy Bach, Maisy Bach, Faryn Benedict, Hailey Benedict, Gregory Dina, Sophie Dina, Fred Downes-Grainger, Kaelee Henrichs, Caleb Jones, Nicole Jones,



Tim Jones, Agnes Kramer, Ashley Mollers, Eric Nelson, Jane Porterfield, Kathie Rowland, Andy Simon, Peyton Simon, Aster Sissel, Dan Smucker, Amber Wessels, and Denise Wilkens.



AMY JO FORSLUND

Amy Jo Forslund is the co-team leader for Rosemount. She explained, “This was my fourth year being the Rosemount team leader. I was a WHEP volunteer on the Eagan team for seven years, from 2007 to 2012, and asked to come back as a team leader for Rosemount. In my work life I am a substitute preschool teacher and an environmental educator. I have worked at many Metro area parks including Three Rivers Park District, Dakota County Parks, and Tamarack Nature Center. 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 wetland and lab skills. I also want to thank Lisa Wolfe for stepping in as co-leader this year. I love our team! It is honor to be a part of such a wonderful Citizen Science project.”

Lisa Wolfe is the co-team leader for the Rosemount team. She said, “I started volunteering for WHEP two summers ago, and really loved the program. It was so well organized and very adaptive to the interests and commitment levels of the volunteers. When our wonderful leader Amy Jo asked for help in leading our Rosemount team, I was so happy to volunteer. I graduated with a degree in Biology from Colorado State University just 3 years ago, and I saw the WHEP program as a good way to utilize some of what I learned during that time. The program is so open to anyone who wants to be involved in any way. My cousin, Fred, visited from England this summer and even joined our team for the 2 weeks that he was here! 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.”



LISA WOLFE AND
FRED DOWNES-GRAINGER



GREG LUND

Greg Lund assisted in selecting the wetlands in 2019. This is second year of involvement in the program, but has been an active volunteer in the WHEP program since 2016. He said, “The City of Rosemount considers its wetlands to be a critical part of its natural resources. We have been participating in the WHEP program since it began, as it provides essential data that would otherwise be difficult to obtain with our limited staff time and resources.

“Over the years, volunteers have allowed us to track local trends and impacts on our wetlands, which lets us make critical decisions with surface water management.

“The City of Rosemount and I greatly appreciate the Rosemount WHEP Team. This program gives our community the opportunity to experience natural resources within their own city!”



JESSICA BRAUN

Jessica Braun was the WHEP City contact for Rosemount in 2019. She serves as a Minnesota GreenCorps member, and is a member of the Green Infrastructure Improvements Track serving with the City of Rosemount. Her projects include identifying inadequate buffers to surface water bodies in the City, targeting best management practices to improve and protect ponds and lakes, and working to improve public lands through invasive species removal, shoreline restoration, and expanding the number of rain gardens in the City. She wrote, “Preserving and protecting this watershed is imperative to the health of the surrounding lands.”



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.

| <u>Wetland designation</u> | <u>Required buffer</u> |
|----------------------------|--|
| 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 Rosemount site scores (percent) for 2019

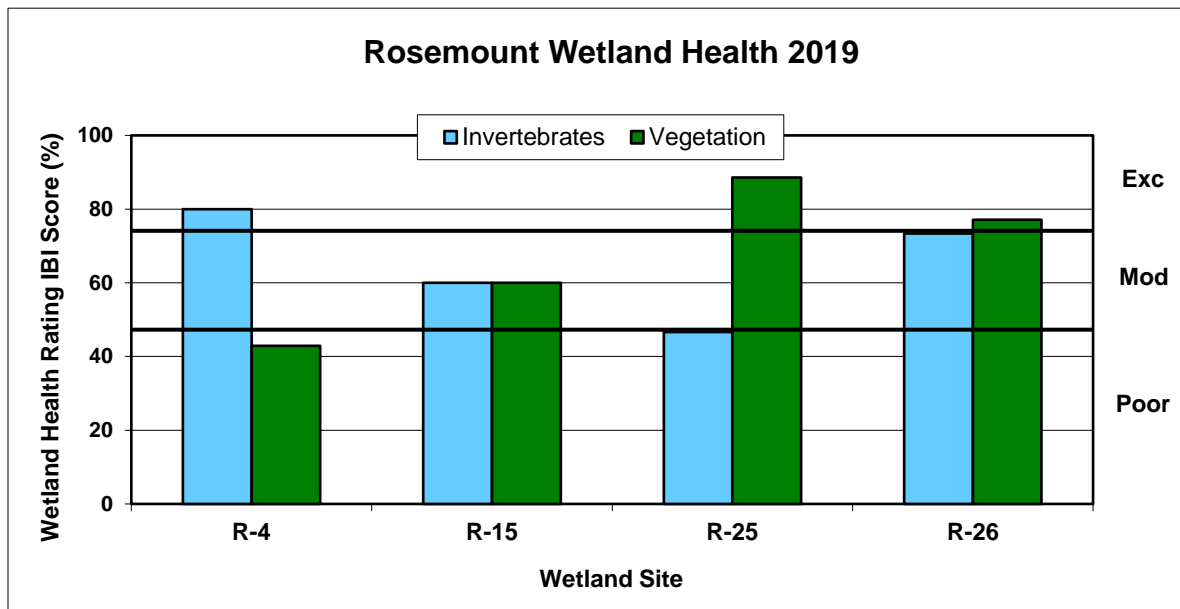


Figure 4.10 presents an overall view of wetland health for all the 2019 monitoring sites in Rosemount based on the scores for invertebrates and vegetation presented as a percent. Figure 4.10 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate 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 poor to excellent health. The invertebrate and vegetation scores for wetland sites R-4 and R-25 were inconsistent, differing by 37 percent, and 42 percent, respectively.

4.10.1 Schwarz Pond (R-4)

Schwarz Pond (R-4), also known as WMP #431, is an 10.855-acre, type 5 wetland in the Erickson Pond watershed. The watershed is 1,832 acres with 1.78 percent impervious surface. The wetland has no inlet, but has one outlet on the east side. 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.

Schwarz Pond sits in a depressional area surrounded by wooded areas to the north and west. It is surrounded by mesic prairie, mature and young oak woodland, grassland, and mowed turf. The oak woodland contains 45 invasive species including buckthorn and garlic mustard. The wetland contains non-native cattail and reed canary grass. There are baseball fields to the east and Rosemount High School to the south. There are no dedicated buffers, and excess nutrient runoff may occur from turf maintenance of the baseball fields.

Schwarz pond is part of a large restoration project, in partnership with Great River Greening and the City. The restoration will include invasive species removal and native plant restoration.

Wetland Health

Site Observations: The wetland slope is gentle. The wetland substrate is mucky. There is a lot of reed canary grass (*Phalaris arundinacea*). Pondweed (*Potamogeton* sp.), duckweed (*Lemna* sp.), arrowhead (*Sagittaria* sp.), and smartweed (*Polygonum* sp.) were present, as well as several woody and emergent plants along the shoreline. Leeches, dragonflies, damselflies, caddisflies, snails, true flies, and crustaceans were collected.



ROSEMOUNT TEAM IDENTIFYING
INVERTEBRATES

Table 4.10.1 Schwarz Pond (R-4) Wetland Health based on Index of Biotic Integrity



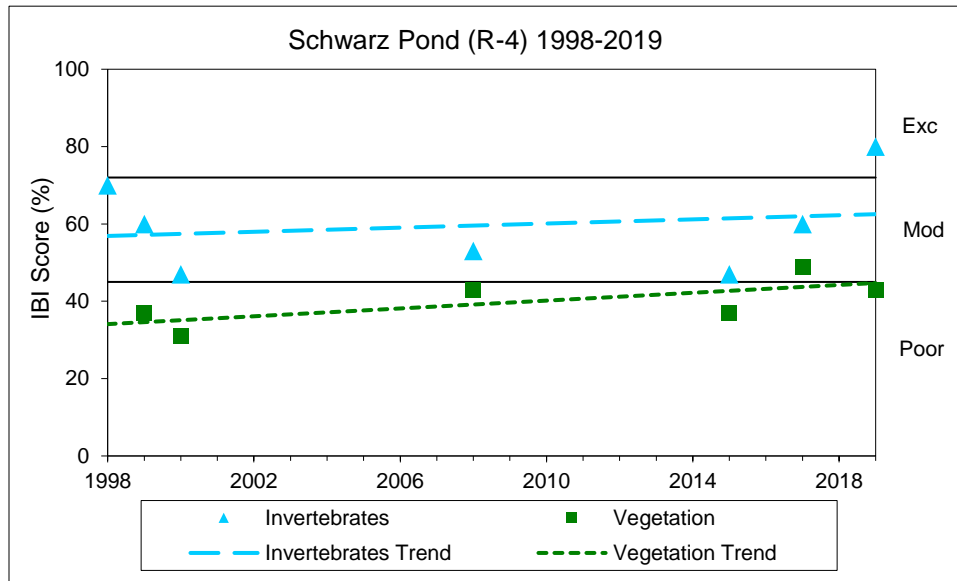
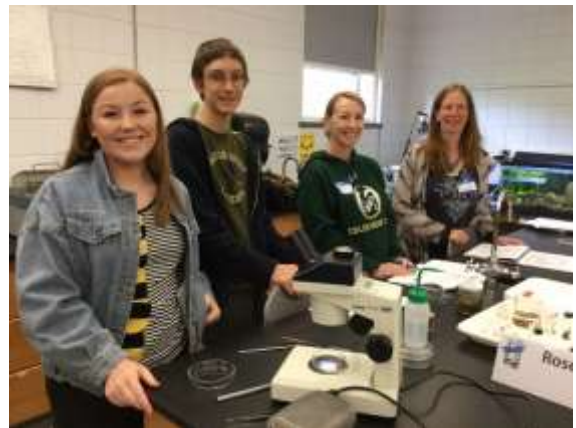
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (R-4) |  |  |
| Wetland Health Rating (IBI score) | Excellent (24) | Poor (15) |
| Trend 1999-2019 | Stable | Stable |

Figure 4.9.1 Invertebrate and vegetation trends for Schwarz Pond (R-4)



Site summary: This is the seventh time Schwarz Pond has been monitored since 1999. The invertebrate and vegetation health scores were inconsistent, differing by 37 percent. The invertebrate score indicates excellent wetland health while the vegetation score indicates poor wetland health. The invertebrate and vegetation data trend have both remained fairly stable with minor fluctuation. An abundant population, but low diversity of submergent vegetation provides good habitat for invertebrates, but depresses the vegetation health score.



ROSEMOUNT TEAM AT INVERTEBRATE TRAINING

4.10.2 Birger Pond (R-15)

Birger Pond (R-15), also known as WMP #380 is a 27-acre, type 5 open water wetland within the Birger Pond watershed. The watershed is approximately 61 acres with 14 percent impervious surface. There are five inlets dispersed around the wetland. The outlet is a lift station. Birger Pond is part of the City's stormwater management plan and is designated to preserve with a management goal to decrease runoff of phosphorus and chloride that enters the wetland. Runoff is received from Diamond Path Road. High chloride and phosphorus levels were found during water quality testing in 2014, 2016, and 2018.

Birger Pond is surrounded by a city park and a few smaller subdivisions. There is a 75-foot buffer around the wetland.



Wetland Health

Site Observations: The wetland slope is gentle. The wetland substrate is solid. Waterweed (*Elodea* sp.) and coontail (*Ceratophyllum* sp.) was dense and dominated the wetland vegetation. Some duckweed (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) floats on the surface of the water. Little to no emergent forbs were observed. The shoreline has a buffer of overhanging trees including willow (*Salix* sp.) and cottonwood (*Populus* sp.). Curly leaf pondweed (*Potamogeton crispus*) was found in the wetland. Leeches, dragonflies, damselflies, mayflies, caddisflies, snails, true flies, and crustaceans were present.

Table 4.10.2 Birger Pond (R-15) Wetland Health based on Index of Biotic Integrity



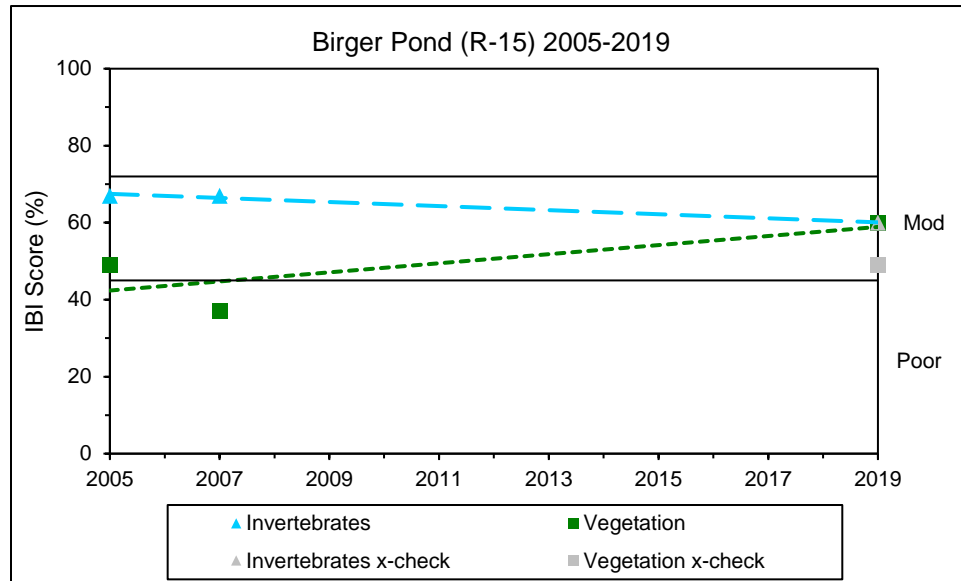
| | Invertebrates  | Vegetation  |
|--|---|--|
| 2019 Data (R-15) | | |
| Wetland Health Rating (IBI score) | Moderate (18) | Moderate (21) |
| Cross-check Rating (IBI score) | Moderate (18) | Moderate (17) |
| Trend 2005-2019 | Not enough data | Not enough data |

Figure 4.10.2 Invertebrate and vegetation trends for Birger Pond (R-15)



Site summary: This is the third year that R-15 has been monitored since 2005, but it was last monitored in 2007. The invertebrate and vegetation scores were very consistent, both indicating moderate wetland health. The few data points for invertebrates show a stable health trend. The vegetation data varies. This wetland was cross-checked by another team in 2019. The invertebrate and vegetation data for the cross-check team was inconsistent, differing by 11 percent. The invertebrate data from each team was consistent with each other. The vegetation data was not. The invertebrate species identified by each team was very similar. The vegetation species identified by each team were also very similar, the scoring difference was due to non-vascular plants found by the City team. More years of data will help determine more reliable health trends.

4.10.3 WMP #306 (R-25)

WMP #306 (R-25) is a 0.75-acre, type 4 wetland in the White Lake watershed. The watershed is approximately 6 acres of which 0.3 percent is impervious surface. There is one inlet and one outlet on the far northeast side of the wetland. This wetland is included in the City's stormwater management plan and is designated to preserve with a management goal to maintain the wetland and its existing functions, values, and wildlife habitat.



This wetland is within a drainage and utility easement. Invasive species exist in the area. The area was developed into a new subdivision in 2015. There is a 75 foot buffer around the wetland.

Wetland Health

Site Observations: The wetland slope is gentle, and the substrate is mucky. Duckweed (*Lemna* sp and *Spirodela* sp.) cover the wetland surface. Pondweed (*Potamogeton* sp.) and bladderwort (*Utricularia* sp.) dominate the submergent vegetation. Several sprigs of emergent grasses and forbs were present. Leeches, damselflies, snails, and crustaceans were collected.

Table 4.10.3 WMP 306 (R-25) Wetland Health based on Index of Biotic Integrity



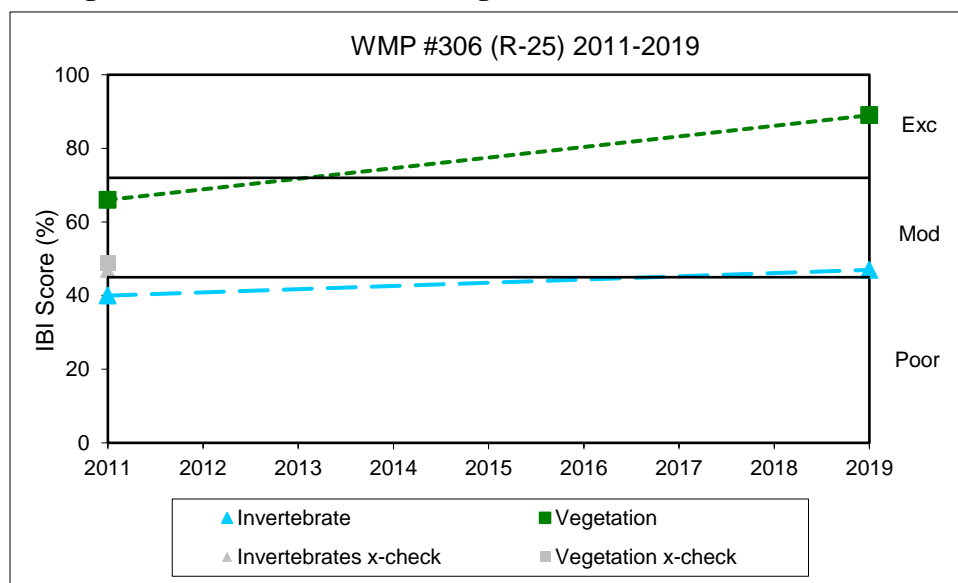
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (R-25) |  |  |
| Wetland Health Rating (IBI score) | Poor (14) | Excellent (31) |
| Trend 2011-2019 | Not enough data | Not enough data |

Figure 4.10.3 Invertebrate and vegetation trends for WMP 306 (R-25)



Site summary: This is the second time that R-25 has been monitored by the WHEP volunteers since 2011. The invertebrate and vegetation scores were very inconsistent, differing by 42 percent. Invertebrate data indicates moderate wetland health while vegetation data indicates excellent wetland health. The vegetation diversity was tallied high; however, the wetland was heavily dominated by a few plants. Many sparse populations of emergent forbs were represented in the plot which boosted the vegetation score. More years of data will help determine more reliable health trends.

4.10.4 Erickson Pond (R-26)

Erickson Pond (R-26), also known as WMP #620, is a 9.9-acre, type 3 wetland in the Erickson Pond Watershed. The watershed is 1,832 acres of which 25 percent is impervious surface. There is one inlet on the south side and no outlets. The wetland is included in the City’s stormwater management plan and is designated to preserve with a management goal to reduce the presence of invasive wetland plant species and enhance the vegetative diversity of the wetland basin.



Erickson Pond lies in a depression surrounded by hiking trails, parks, oak forest, woodlands, and restored native prairie. The basin area was included in the City’s Erickson Pond Water Quality and Habitat Enhancement Project. This project, constructed in 2008, provides improved stormwater treatment to treat runoff from the downtown area that drains to Erickson Pond. Prior to the project, large amounts of stormwater discharged directly into the wetland basin. The stormwater now enters treatment cells prior to discharge to the wetland. The wetland is also currently undergoing vegetation management to minimize invasive species and a five-acre native prairie has been planted in the adjacent upland. There is also a 75-foot buffer that helps pre-treat stormwater draining into the wetland.

Wetland Health

Site Observations: The wetland slope is gentle. The wetland substrate is very mucky, “like quick-sand.” A large diversity of vegetation including woody plants, grasslike plants, emergent forbs, submergent forbs, and floating plants were present. Coontail (*Ceratophyllum* sp.), pondweed (*Potamogeton* sp.), and duckweed (*Lemna* sp.) dominated the water column. Arrowhead (*Sagittaria* sp.), smartweed (*Polygonum* sp.), sedges (*Carex* sp.), spike-rush (*Eleocharis* sp.) and reed canary grass (*Phalaris arundinacea*) were also present. Leeches, dragonflies, damselflies, snails, true flies, and crustaceans were collected. Corixidae were collected in the bottle traps in high abundance.

Table 4.10.4 Erickson Pond (R-26) Wetland Health based on Index of Biotic Integrity



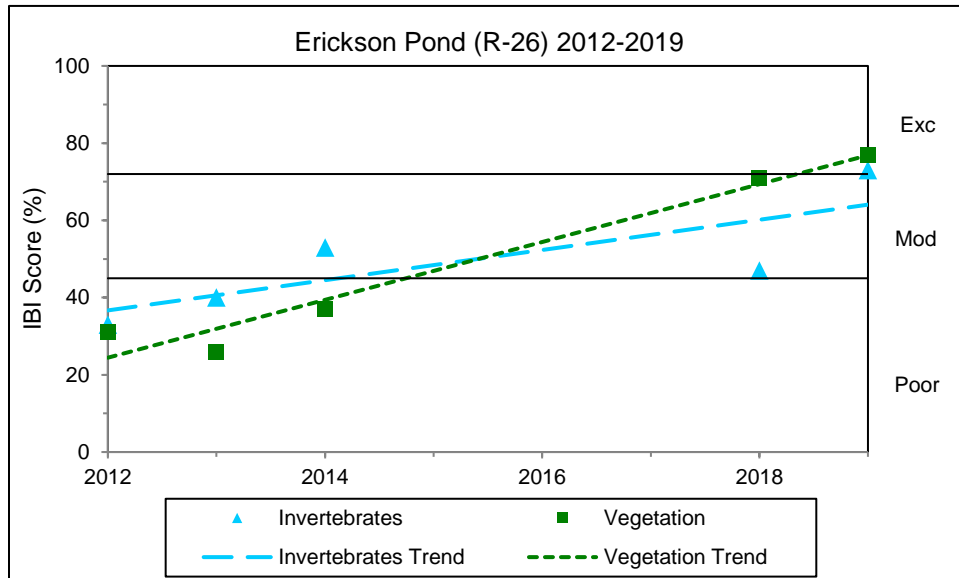
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (R-26) |  |  |
| Wetland Health Rating (IBI score) | Moderate (22) | Excellent (27) |
| Trend 2012-2019 | Not enough data | Not enough data |

Figure 4.10.4 Invertebrate and vegetation trends for Erickson Pond (R-26)



Site summary: This is the fifth time Erickson Pond has been monitored since 2012. The invertebrate and vegetation scores were consistent in 2019. The vegetation score indicates excellent wetland health. The invertebrate score indicates high-moderate wetland health. Both health trends appear to be improving; however, the two clusters of survey years (2012-2014 and 2018-2019) show very different scores. More years of surveys will help determine more reliable health trends.

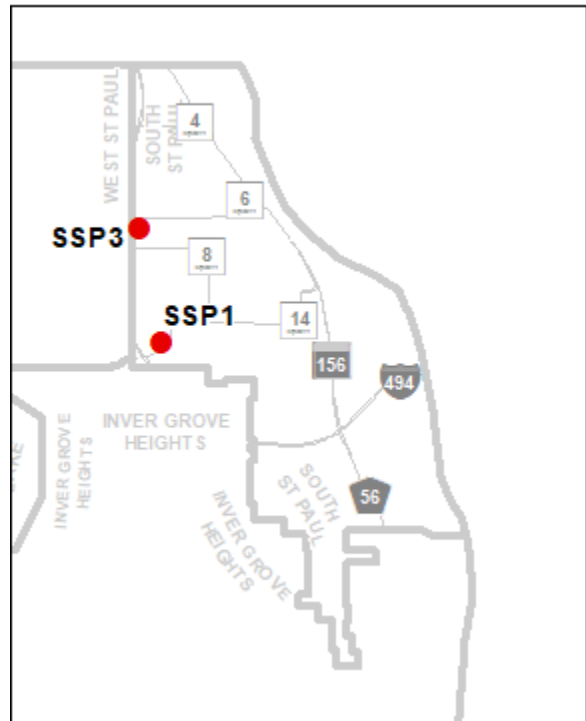
4.11 South St. Paul Wetlands

Two wetlands were monitored in South St. Paul in 2019 by the South St. Paul team. The City has 18 years of WHEP data! Four wetlands have been monitored in South St. Paul since the start of the WHEP program.

Team Leaders: Rachel Funke

Team Members: Cindy Funke, Luann Hoganson, Christopher McKelvey, and Cindy Swaim.

South St. Paul WHEP Sites Monitored in 2019





RACHEL FUNKE

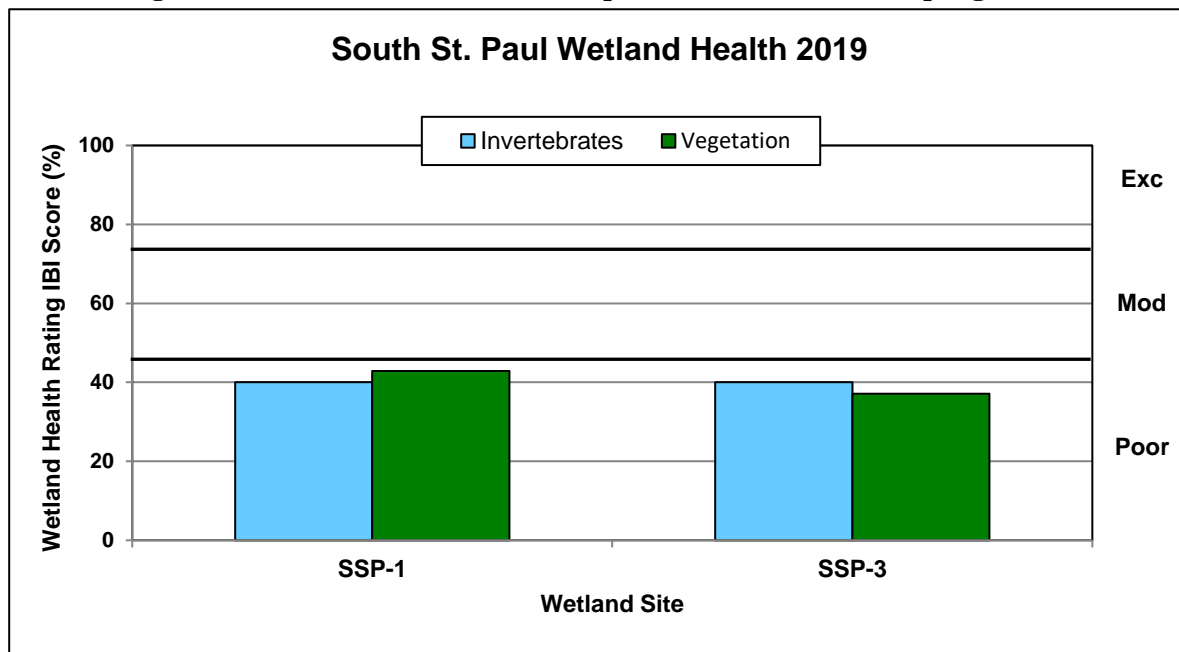
This was Rachel's first year as a WHEP team leader. She found out about the program while working for Dakota County Parks, and was excited to use her wetland experience to aid in citizen science. Rachel currently works for a watershed district in Saint Paul, where she assists with various water quality improvement projects. She said, "My favorite part of WHEP this year is that all of the team volunteers were new to WHEP!"

The City of South St. Paul has relatively few wetlands compared to most Cities which is why it is important for us to monitor the functionality and health of this limited natural resource in the community to ensure it is protected. We appreciate the WHEP program, and its volunteers help in monitoring our 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 2019 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 2019, the invertebrates and vegetation health rated poor in both wetlands surveyed. The invertebrates and vegetation scores for each wetland were consistent.

Figure 4.11 South St. Paul site scores (percent) for the 2019 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. The City does not have a wetland 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 in order to facilitate future dredging and other maintenance activities. Additional dredging was done in late 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. 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.) is abundant and represented the only submergent plant in the vegetation plot. Duckweed (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) covered much of the wetland surface. Very few grasses and emergent forbs were documented, with the exception of cattail. Slender Riccia (*Riccia fluitans*) was found. A poor diversity of invertebrates was collected, including: one family of leech, one family of dragonfly, damselfly, snails, scuds, and crayfish. Chinese mystery snails were abundantly present.



LUANN HOGANSON AND CINDY FUNKE
WITH INVERTEBRATES



CINDY SWAIM EXAMINING A
DRAGONFLY NYMPH EXOSKELETON

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



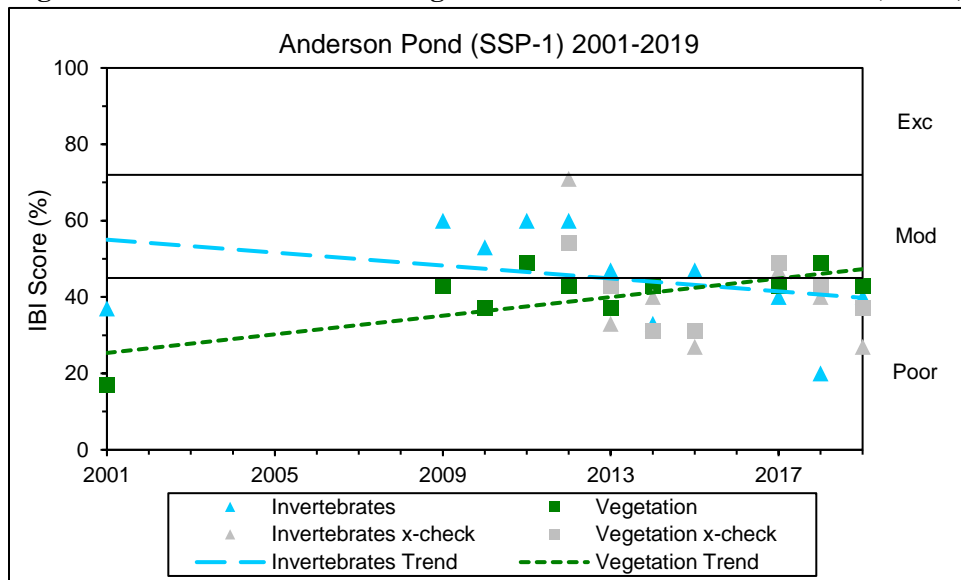
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (SSP-1) |  |  |
| Wetland Health Rating (IBI score) | Poor (12) | Poor (15) |
| Cross-check Rating (IBI score) | Poor (8) | Poor (13) |
| Trend 2001-2019 | Stable | Stable |

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



Site Summary: This is the eleventh time that SSP-1 has been monitored since 2001. The invertebrate and vegetation scores are very consistent, in 2019. The vegetation description and invertebrate collection were very similar to 2018. The invertebrate score has rebounded to what appears to be stable score bordering the poor to moderate health division. The vegetation scores appear to be stable, with an exception for the first year of surveys. This wetland is described as a poor site, and the scores are reflecting its physical image. Highway 52 contributes stormwater input to the wetland. This wetland was cross-checked by another WHEP team in 2019. The invertebrate scores between teams were inconsistent, differing by 13 percent. Though neither team found many bugs and beetles, the difference in the Corixidae Proportion affected the metric score improving the overall invertebrate score calculated by the City team. Otherwise, the invertebrate findings were similar for each team. The vegetation species identified by each team were similar in representation.

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. Mn/DOT recently completed an upgrade of Wentworth/Thompson interchanges and in doing so enhanced some of the drainage in LeVander Pond by installing a pretreatment basin south of the pond. 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 *Spirodela* sp.) and water-meal (*Wolffia* sp.). No submergent vegetation was found within the vegetation plot in 2019. Cattails (*Typha* sp.) surround the wetland. Reed canary grass (*Phalaris arundinacea*) is the only other emergent grass or forb found in the vegetation plot. Leeches, dragonflies, damselflies, snails, and scuds were observed.

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



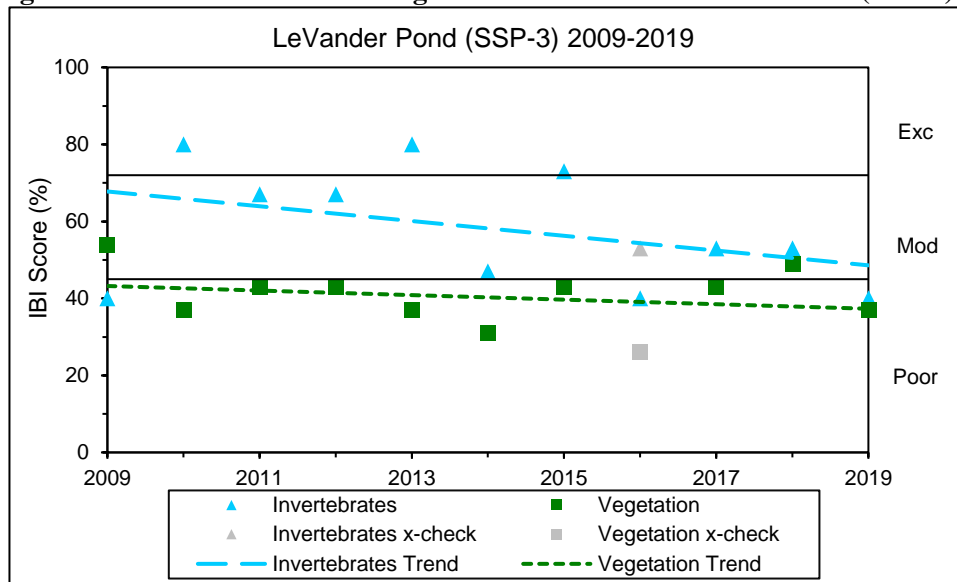
| 2019 Data (SSP-3) | Invertebrates  | Vegetation  |
|--|--|---|
| Wetland Health Rating (IBI score) | Poor (12) | Poor (13) |
| Trend 2009-2019 | Declining | Stable |

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



Site summary: This is the eleventh consecutive year of monitoring LeVander Pond. The vegetation and invertebrates scores were consistent with each other in 2019, and both indicate poor wetland health. The invertebrate scores have fluctuated between poor and excellent over the years; however, the trend appears to be declining as the invertebrate scoring has been lower since 2016. The vegetation trend appears stable. The only emergent vegetation represented included reed canary grass and cattail, which dominate the shoreline.

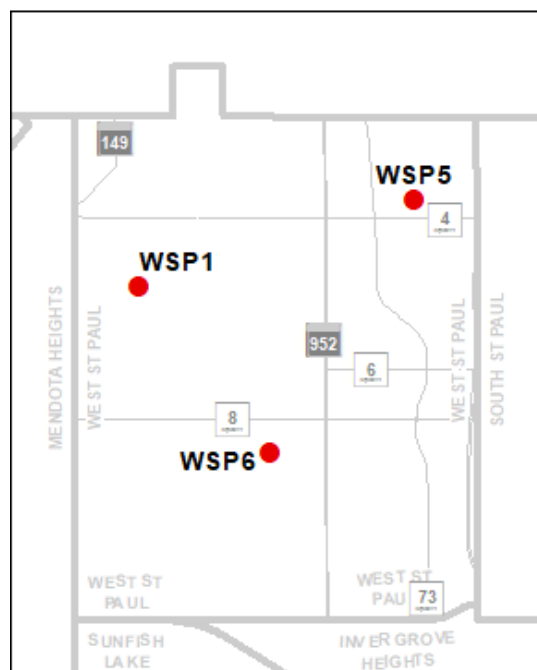
4.12 West St. Paul Wetlands

Three wetlands were monitored in West St. Paul in 2018 by the West St. Paul team. The City of West St. Paul has 20 years of WHEP data! Eleven wetlands have been monitored in West St. Paul since the City became involved with WHEP in 1999.

Team Leaders: Kelsey White

Team Members: Kelly Gibson, Amanda Henderson, Katie Scheurer, Len Solarz, and Heidi Sundet.

West St. Paul WHEP Sites Monitored in 2019





KELSEY WHITE

Kelsey White is a Dakota County resident and self-proclaimed wetland enthusiast. She has an educational and professional background in aquatic ecology and has participated in WHEP since 2016. Kelsey said, “I appreciate the opportunity to act as the West St. Paul team lead for the 2019 field sampling season. I not only value the importance of long-term biological monitoring to track wetland health and water quality, but also enjoy meeting and working with individuals who share an interest in plant and macroinvertebrate biology.”

year. The data helps us plan and prioritize future areas of need as well as give us a snapshot into the health of our water bodies. Thank you to all those who work hard and keep this program running so smoothly!”



ROSS BECKWITH

Dave Schletty is the Assistant Parks & Recreation Director at the City of West St Paul. He has been assisting with coordination of the program for more than 6 years. 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.



DAVE SCHLETTY

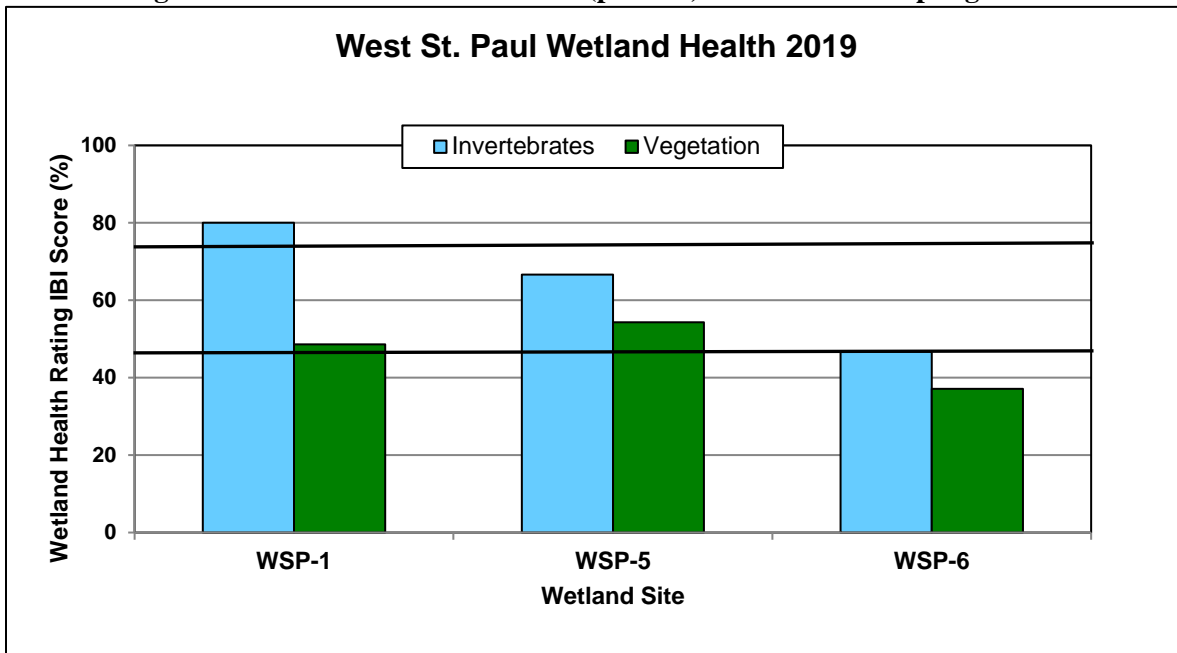
West St. Paul General Wetland Health



WEST ST. PAUL TEAM AT
INVERTEBRATE TRAINING

Figure 4.12 presents an overall view of wetland health for all of the 2019 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 2019. The invertebrate and vegetation scores for WSP-1 and WSP-5 were inconsistent, differing by 31 percent and 13 percent, respectively.

Figure 4.12 West St. Paul site scores (percent) for the 2019 sampling season



4.12.1 Mud Lake (WSP-1)

Mud Lake (WSP-3), 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 gentle. The wetland substrate is mucky. White and Yellow water lilies (*Nymphaea* sp. and *Nuphar* sp.), duckweed (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) cover much of the surface of the pond. Coontail (*Ceratophyllum* sp.), pondweed (*Potamogeton* sp.), and water-nymph (*Najas* sp.) represented the submergent vegetation. Cattail dominates the wetland. Slender Riccia (*Riccia fluitans*) and sedge (*Carex* sp.) were also found. No other emergent grasses, forbs, or woody plants were observed near the vegetation plot. However, aerial photos show the wetland to be surrounded by trees. Leeches, dragonflies, caddisflies, snails, true flies, and scuds were collected.

Table 4.12.1 Mud Lake (WSP-1) Wetland Health based on Index of Biotic Integrity



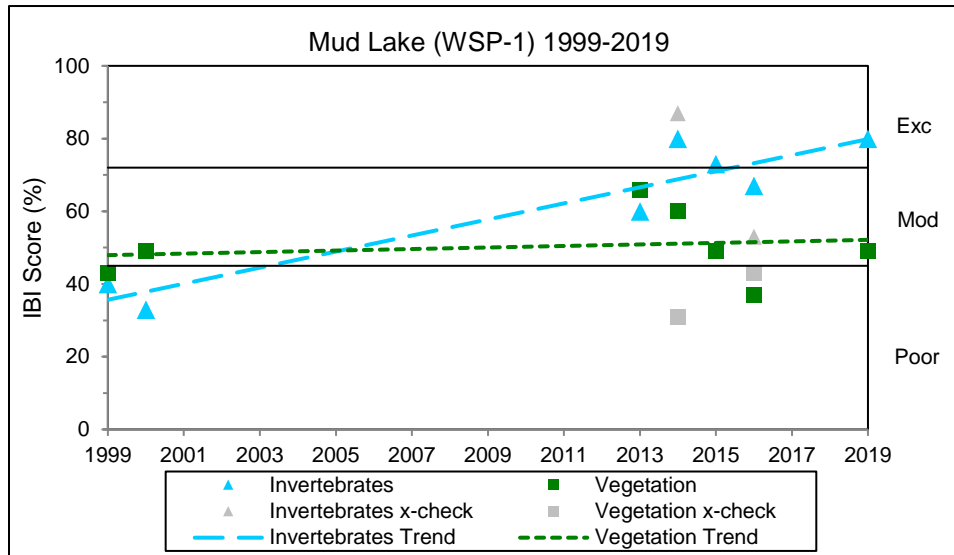
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (WSP-1) |  |  |
| Wetland Health Rating (IBI score) | Excellent (24) | Moderate (17) |
| Trend 1999-2019 | Not enough data | Not enough data |

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



Site Summary: This is the seventh time that Mud Lake has been surveyed since 1999. The invertebrates and vegetation scores were inconsistent, differing by 31 percent. The invertebrate score indicating excellent wetland health, while the vegetation score indicates low-moderate 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 excellent (or nearly 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 scores are variable. The invertebrate scores appear to adjust with the vegetation scores in most recent years. More years of data will help determine a more reliable health trend.

4.12.2 Lily Lake (WSP-5)

Lilly Lake (WSP-5), also known as RW24P, is a 6.4-acre, type 3 wetland within the Riverview Tunnel Drainage District. Its watershed is 22 acres. It is publically owned. There is one inlet from Carrie Street east of the Carrie Stanley intersection. There is an outlet on the north end to Bernard Street. It is part of the City's stormwater management plan.



Wetland Health

Site Observations: The wetland slope is fairly steep, and the substrate is mostly firm with mucky spots. The surrounding area is densely residential. Patches of trees and shrubs provide buffer between the homes and the lake. Very little diversity of emergent vegetation is present. Cattail (*Typha* sp.) and reed canary grass (*Phalaris arundinacea*) were observed. A dense population of coontail (*Ceratophyllum* sp.) dominates the water column. Pondweed (*Potamogeton* sp.) was also present. White water lily (*Nymphaea* sp.), duckweed (*Lemna* sp. and *Spirodela* sp.), and water-meal (*Wolffia* sp.) covered the wetland surface. Leeches, dragonflies, damselflies, mayflies, caddisflies, snails, true flies, and scuds were observed. Chinese mystery snails are present.

Table 4.12.2 Lily Lake (WSP-5) Wetland Health based on Index of Biotic Integrity



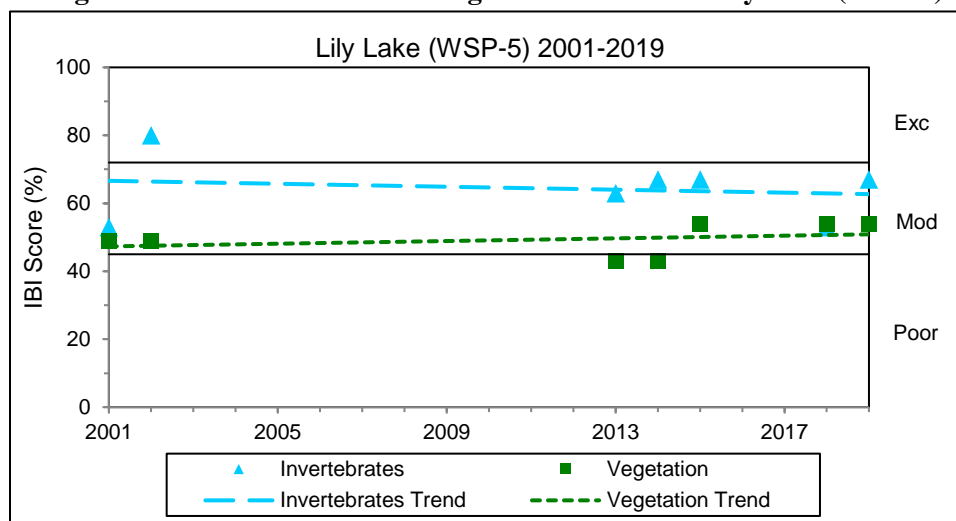
| | Invertebrates | Vegetation |
|--|---|---|
| 2019 Data (WSP-5) |  |  |
| Wetland Health Rating (IBI score) | Moderate (20) | Moderate (19) |
| Trend 2001-2019 | Stable | Stable |

Figure 4.12.2 Invertebrate and vegetation trends for Lily Lake (WSP-5)



Site Summary: This is the seventh time that Lily Lake has been surveyed since 2001. The invertebrates and vegetation scores were inconsistent with each other, differing by 13 percent; however, both indicate moderate wetland health. Both invertebrate and vegetation trends appear stable.

4.12.3 Marthaler Park (WSP-6)

Marthaler Park (WSP-6) is a 4.5-acre, type 5 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 SR4P Marthaler Pond. There is one inlet on the east side, but no outlets.

The wetland is located within Marthaler Park. Most of the surrounding area is undisturbed with trees and other vegetation. Humboldt Avenue runs along the eastern side of the wetland. Residential neighborhoods exist to the south and east of the wetland. The West St. Paul Sports Center is northeast of the wetland.



Wetland Health

Site Observations: The wetland slope is steep. The wetland substrate is firm with sand, but mucky on top. The vegetation diversity is low. Coontail (*Ceratophyllum* sp.), waterweed (*Elodea* sp.), and pondweed (*Potamogeton* sp.) was present. Duckweeds (*Lemna* sp. and *Spirodela* sp.) and water-meal (*Wolffia* sp.) were scattered over the surface of the water. No emergent grasses or forbs were noted. Willows (*Salix* sp.), cottonwoods (*Populus* sp.), maple (*Acer* sp.), and ash (*Fraxinus* sp.) surround the wetland. Leeches, dragonflies, damselflies, mayflies, caddisflies, snails, true flies, and crustaceans were collected.

Table 4.12.3 Marthaler Park (WSP-6) Wetland Health based on Index of Biotic Integrity



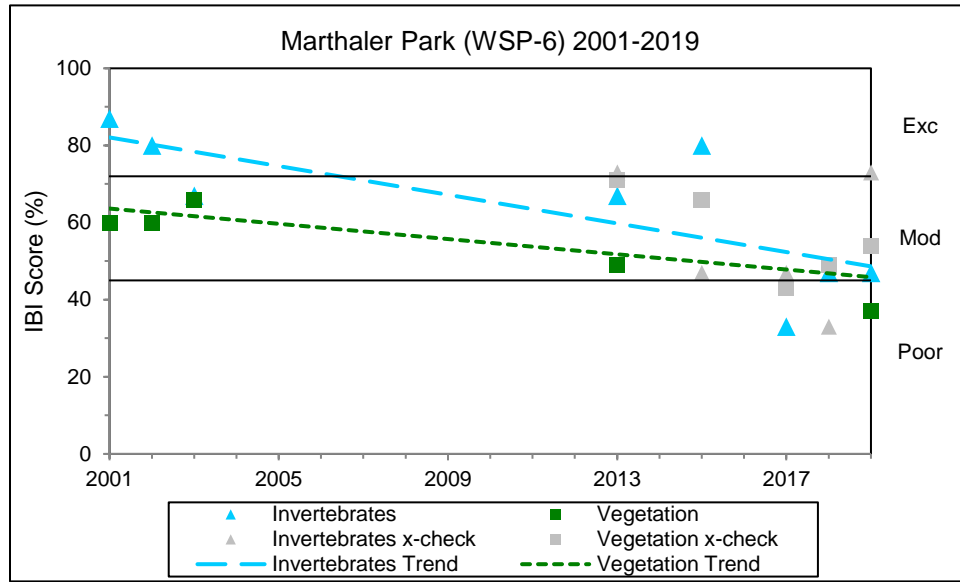
| | Invertebrates | Vegetation |
|-----------------------------------|---|---|
| 2019 Data (WSP-6) |  |  |
| Wetland Health Rating (IBI score) | Poor (14) | Poor (13) |
| Cross-check Rating (IBI score) | Moderate (22) | Moderate (19) |
| Trend 2001-2019 | Declining | Declining |

Figure 4.12.3 Invertebrate and vegetation trends for Marthaler Park (WSP-6)



Site summary: This is the eighth time that Marthaler Park has been monitored since 2001. The invertebrates and vegetation scores were consistent, in 2019, and both indicate poor wetland health. Overall, the trends for both invertebrates and vegetation are declining. This wetland was cross-checked by another WHEP team in 2019. The invertebrates scores of the teams were inconsistent, differing by 26 percent. The vegetation scores of each team were also inconsistent, differing by 19 percent. The cross-check team identified an extra damselfly, and several mayflies, caddisflies, snails, and true flies. This larger diversity enhanced several of the metric scores, which earned a higher wetland health score. The City team collected invertebrates among woody material, as there was no wetland fringe near the collection area. The cross-check team found a few species of submergent and floating vegetation, as well as a non-vascular species, in which the City team did not observe. This enhanced several of the invertebrate scoring metrics. The wetland scores for this wetland may be affected by plot placement.

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 | 1 | 5 | 1 | 1 | 1 | 3 | 12 |
| AV-20 | 5 | 5 | 1 | 1 | 1 | 3 | 16 |
| AV-6 | 3 | 3 | 1 | 1 | 3 | 3 | 14 |
| AV-8 | 5 | 5 | 1 | 1 | 1 | 3 | 16 |
| B-1 | 5 | 5 | 1 | 5 | 5 | 5 | 26 |
| B-12 | 5 | 1 | 1 | 3 | 5 | 5 | 20 |
| B-18 | 5 | 1 | 1 | 1 | 5 | 5 | 18 |
| B-1A | 1 | 5 | 5 | 3 | 5 | 5 | 24 |
| DC-2 | 5 | 5 | 1 | 1 | 1 | 3 | 16 |
| DC-3 | 3 | 1 | 1 | 1 | 3 | 3 | 14 |
| DC-4 | 5 | 1 | 1 | 5 | 1 | 5 | 18 |
| DC-5 | 1 | 1 | 1 | 3 | 3 | 3 | 12 |
| DC-6 | 3 | 3 | 5 | 5 | 3 | 5 | 24 |
| DC-7 | 5 | 5 | 3 | 5 | 3 | 5 | 26 |
| DC-8 | 3 | 3 | 1 | 3 | 5 | 5 | 20 |
| DC-9 | 1 | 5 | 1 | 3 | 1 | 3 | 14 |
| E-22 | 3 | 5 | 5 | 5 | 5 | 5 | 28 |
| E-44 | 1 | 5 | 1 | 3 | 1 | 3 | 14 |
| E-45 | 1 | 5 | 1 | 1 | 1 | 1 | 10 |
| F-3 | 1 | 5 | 1 | 1 | 1 | 1 | 10 |
| F-7 | 1 | 5 | 3 | 3 | 3 | 5 | 20 |
| F-9 | 1 | 5 | 1 | 3 | 1 | 3 | 14 |
| H-4 | 1 | 1 | 3 | 5 | 1 | 5 | 16 |
| H-56 | 3 | 5 | 3 | 3 | 3 | 5 | 22 |
| H-57 | 3 | 1 | 1 | 3 | 1 | 5 | 14 |
| H-6 | 3 | 5 | 1 | 3 | 3 | 5 | 20 |

| Site Number | Leech Metric | Corixid Metric | Odonata Metric | ETSD Metric | Snail Metric | Total Taxa Metric | Total IBI Score |
|-------------|--------------|----------------|----------------|-------------|--------------|-------------------|-----------------|
| L-7 | 5 | 1 | 1 | 3 | 5 | 5 | 20 |
| L-8 | 3 | 1 | 3 | 5 | 5 | 5 | 22 |
| MH-2 | 3 | 5 | 1 | 3 | 1 | 3 | 16 |
| MH-20 | 5 | 5 | 1 | 5 | 3 | 5 | 24 |
| NC-1 | 5 | 5 | 3 | 3 | 5 | 5 | 26 |
| NC-2 | 3 | 5 | 3 | 1 | 5 | 5 | 22 |
| R-15 | 1 | 1 | 1 | 5 | 5 | 5 | 18 |
| R-25 | 3 | 5 | 1 | 1 | 1 | 3 | 14 |
| R-26 | 5 | 1 | 5 | 3 | 3 | 5 | 22 |
| R-4 | 5 | 3 | 3 | 5 | 3 | 5 | 24 |
| SSP-1 | 1 | 5 | 1 | 1 | 1 | 3 | 12 |
| SSP-3 | 3 | 1 | 1 | 3 | 1 | 3 | 12 |
| WSP-1 | 5 | 5 | 1 | 5 | 3 | 5 | 24 |
| WSP-5 | 5 | 3 | 1 | 5 | 1 | 5 | 20 |
| WSP-6 | 3 | 3 | 1 | 3 | 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 | 3 | 1 | 1 | 1 | 5 | 5 | 19 |
| AV-20 | 3 | 1 | 3 | 1 | 1 | 3 | 5 | 17 |
| AV-6 | 3 | 1 | 3 | 1 | 1 | 3 | 5 | 17 |
| AV-8 | 3 | 1 | 3 | 1 | 1 | 3 | 5 | 17 |
| B-1 | 3 | 5 | 3 | 3 | 1 | 5 | 5 | 25 |
| B-12 | 1 | 5 | 1 | 1 | 1 | 1 | 5 | 15 |
| B-18 | 3 | 3 | 3 | 1 | 5 | 3 | 5 | 23 |
| B1A | 3 | 5 | 3 | 1 | 1 | 5 | 1 | 19 |
| DC-2 | 1 | 1 | 1 | 1 | 1 | 3 | 5 | 13 |
| DC-3 | 3 | 3 | 1 | 1 | 5 | 3 | 5 | 21 |
| DC-4 | 5 | 3 | 3 | 3 | 1 | 5 | 5 | 25 |
| DC-5 | 5 | 3 | 3 | 1 | 5 | 5 | 3 | 25 |
| DC-6 | 3 | 1 | 5 | 3 | 5 | 5 | 3 | 25 |
| DC-7 | 3 | 5 | 1 | 3 | 1 | 5 | 5 | 23 |
| DC-8 | 3 | 3 | 3 | 1 | 5 | 3 | 5 | 23 |
| DC-9 | 5 | 5 | 3 | 1 | 5 | 5 | 1 | 25 |
| E-22 | 3 | 3 | 3 | 1 | 5 | 5 | 5 | 25 |
| E-44 | 3 | 5 | 3 | 1 | 1 | 5 | 5 | 23 |
| E-45 | 3 | 5 | 5 | 1 | 1 | 3 | 5 | 23 |
| F-3 | 3 | 1 | 3 | 1 | 5 | 5 | 3 | 21 |
| F-7 | 3 | 1 | 3 | 1 | 1 | 5 | 5 | 19 |
| F-9 | 3 | 1 | 3 | 1 | 1 | 3 | 1 | 13 |
| H-4 | 5 | 3 | 1 | 1 | 1 | 1 | 1 | 13 |
| H-56 | 3 | 1 | 3 | 5 | 1 | 3 | 5 | 21 |
| H-57 | 3 | 3 | 3 | 1 | 1 | 1 | 3 | 15 |
| H-6 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 15 |
| L-7 | 5 | 3 | 5 | 1 | 1 | 3 | 3 | 21 |

| Site # | Vascular Genera | Nonvascular Taxa | Grasslike Genera | Carex Cover | <i>Utricularia</i> Presence | Aquatic Guild | Persistent Litter | Total IBI Score |
|--------|--------------------|---------------------|---------------------|----------------|--------------------------------|------------------|----------------------|--------------------|
| L-8 | 3 | 1 | 3 | 1 | 1 | 5 | 3 | 17 |
| MH-2 | 5 | 1 | 5 | 3 | 5 | 5 | 5 | 29 |
| MH-20 | 5 | 1 | 5 | 3 | 1 | 3 | 3 | 21 |
| NC-1 | 3 | 3 | 3 | 1 | 1 | 5 | 3 | 19 |
| NC-2 | 1 | 3 | 1 | 1 | 1 | 3 | 5 | 15 |
| R-15 | 3 | 5 | 1 | 1 | 1 | 5 | 5 | 21 |
| R-25 | 5 | 5 | 3 | 3 | 5 | 5 | 5 | 31 |
| R-26 | 5 | 3 | 3 | 5 | 1 | 5 | 5 | 27 |
| R-4 | 3 | 1 | 3 | 1 | 1 | 1 | 5 | 15 |
| SSP-1 | 3 | 3 | 1 | 1 | 1 | 5 | 1 | 15 |
| SSP-3 | 3 | 1 | 1 | 1 | 1 | 3 | 3 | 13 |
| WSP-1 | 3 | 3 | 1 | 1 | 1 | 5 | 3 | 17 |
| WSP-5 | 3 | 5 | 1 | 1 | 1 | 5 | 3 | 19 |
| WSP-6 | 1 | 1 | 1 | 1 | 1 | 3 | 5 | 13 |

Appendix B. Invasive Species Presence 2012-2019

| Site | Purple loose-strife | Reed canary grass | Curly-leaf pond-weed | Eurasian Water-milfoil | Honey-suckle | Buckthorn | Chinese mystery snail | Banded mystery snail |
|-------|---------------------|-------------------|----------------------|------------------------|--------------|-----------|-----------------------|----------------------|
| AV-1 | | 1 | | | | | 1 | |
| AV-6 | | 1 | | | | | 1 | |
| AV-7 | | 1 | | | | | | |
| AV-8 | | 1 | | | | | | |
| AV-10 | | 1 | | | | 1 | 1 | |
| AV-11 | | 1 | | | | | 1 | |
| AV-12 | | 1 | | | | 1 | 1 | |
| AV-13 | | 1 | | | | | 1 | |
| AV-18 | | 1 | | | | | 1 | |
| AV-19 | | 1 | | | | | | |
| AV-20 | | 1 | | | | 1 | | |
| B-1 | 1 | 1 | | | | | 1 | |
| B-1A | 1 | 1 | | | | | | |
| B-2 | | 1 | | | | 1 | 1 | |
| B-3 | | | | | | | 1 | 1 |
| B-4 | | 1 | | | | | | |
| B-6 | | 1 | | | | | 1 | |
| B-7 | | 1 | | | | | | |
| B-8 | 1 | 1 | | | | | | |
| B-9 | 1 | 1 | | | | | | |
| B-10 | | 1 | | | | | | |
| B-12 | | 1 | | | | 1 | | |
| B-13 | 1 | 1 | | 1 | | | 1 | 1 |
| B-17 | 1 | 1 | | | | | | |
| B-18 | | 1 | | | | | | |
| DC-1 | | 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 |
|-------|---------------------|-------------------|----------------------|------------------------|--------------|-----------|-----------------------|----------------------|
| DC-2 | | 1 | | | | | | |
| DC-3 | | 1 | | | | | | |
| DC-4 | | 1 | | | | 1 | | |
| DC-5 | | 1 | | | | | | |
| DC-6 | | 1 | | | | | | |
| DC-7 | | 1 | | | | | | |
| DC-8 | | 1 | | | | | | |
| DC-9 | | 1 | | | | | | |
| DC-10 | | 1 | | | | | | |
| E-7 | | 1 | | | | | 1 | |
| E-9 | 1 | 1 | | | | | | |
| E-10 | | 1 | | | | | | |
| E-11 | | 1 | | | | | 1 | |
| E-18 | | 1 | | | | 1 | | |
| E-20 | | 1 | | | | | | |
| E-22 | | 1 | | | | | | |
| E-31 | | 1 | | | | | | |
| E-32 | | 1 | | | | | 1 | |
| E-33 | | 1 | | | | | 1 | |
| E-34 | 1 | 1 | | | | | 1 | |
| E-35 | | 1 | | | | | | |
| E-36 | | 1 | | | | | | |
| E-37 | | 1 | | | | | | |
| E-38 | | 1 | | | | | | |
| E-40 | | 1 | | | | | 1 | |
| E-41 | | 1 | | | | 1 | | |
| E-42 | | 1 | | | | | | |

| Site | Purple loose-strife | Reed canary grass | Curly-leaf pond-weed | Eurasian Water-milfoil | Honey-suckle | Buckthorn | Chinese mystery snail | Banded mystery snail |
|-------|---------------------|-------------------|----------------------|------------------------|--------------|-----------|-----------------------|----------------------|
| E-43 | | | | | | 1 | | |
| E-44 | | | | | | | | |
| E-45 | | 1 | | | | | | |
| F-3 | 1 | 1 | | 1 | | | 1 | |
| F-6 | | 1 | | | | | 1 | |
| F-7 | | 1 | | | | | 1 | |
| F-9 | | 1 | | | | | | |
| H-4 | | 1 | 1 | | | | 1 | |
| H-6 | 1 | 1 | 1 | | | 1 | 1 | |
| H-56 | 1 | 1 | | | | | 1 | |
| H-57 | 1 | 1 | | | | | 1 | |
| L-7 | 1 | 1 | | | | | 1 | |
| L-8 | | 1 | | | | | 1 | |
| L-9 | | 1 | | | | | 1 | |
| L-10 | | 1 | | | | | 1 | |
| LD-1 | 1 | 1 | | | | | 1 | |
| MH-2 | 1 | 1 | | | | 1 | 1 | |
| MH-4 | | 1 | | | | | | |
| MH-16 | | 1 | | | | | 1 | |
| MH-17 | | 1 | | | | | | |
| MH-19 | | | | | | 1 | | |
| MH-20 | 1 | | | | | | | |
| NCR-1 | | 1 | | | | | | |
| NCR-2 | | 1 | | | | | | |
| R-1 | | 1 | | | | | 1 | |
| R-2 | | 1 | | | | | | |
| R-4 | | 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 |
|---------|---------------------|-------------------|----------------------|------------------------|--------------|-----------|-----------------------|----------------------|
| R-6 | | 1 | | | | | | |
| R-14 | | 1 | | | | | | |
| R-15 | | 1 | | | | | | |
| R-20 | | 1 | | | | | | |
| R-21 | 1 | 1 | | | | | 1 | |
| R-23 | 1 | 1 | | | | | 1 | |
| R-25 | | 1 | | | | | | |
| R-26 | | 1 | | | | | 1 | |
| SSP-1 | 1 | 1 | 1 | | | 1 | 1 | |
| SSP-3 | | 1 | | | | 1 | 1 | |
| SSP-4 | 1 | | | | | | | |
| WSP-1 | 1 | 1 | | | | | 1 | |
| WSP-2 | | 1 | | | | | 1 | |
| WSP-3 | | 1 | | | | 1 | | |
| WSP-4 | 1 | 1 | | | | 1 | | |
| WSP-5 | | 1 | | | | | 1 | |
| WSP-6 | 1 | 1 | | | 1 | 1 | 1 | |
| WSP-7 | | 1 | | | | | | |
| WSP-8 | | 1 | | | | | | |
| WSP-9 | | 1 | | | | | | |
| WSP-10 | | 1 | | | | | 1 | |
| WSP-12 | 1 | | | | | | | |
| WSP-18 | 1 | | | | | | | |
| Totals: | 23 | 88 | 3 | 2 | 1 | 15 | 43 | 2 |
| | | | | | | | | |
| | | | | | | | | |

Appendix C. Site Score Averages of Created, Stormwater, and Natural Wetland 2008-2019

| | Invertebrates | | | Vegetation | | |
|----------|------------------|---------------------|------------------|------------------|---------------------|------------------|
| Wetland | Created Wetlands | Stormwater Wetlands | Natural Wetlands | Created Wetlands | Stormwater Wetlands | Natural Wetlands |
| AV-1 | | 18 | | | 20 | |
| AV-5 | | | 15 | | | 18 |
| AV-6 | | 15 | | | 18 | |
| AV-7 | | 11 | | | 14 | |
| AV-8 | | 15 | | | 20 | |
| AV-10 | | | 11 | | | 12 |
| AV-11 | | | 17 | | | 13 |
| AV-12 | | 14 | | | 18 | |
| AV-13 | | 21 | | | 12 | |
| AV-14 | | 12 | | | 9 | |
| AV-15 | | 11 | | | 13 | |
| AV-16 | | | | | 17 | |
| AV-17 | | | 18 | | | 19 |
| AV-18 | | 20 | | | 17 | |
| AV-19 | | | 20 | | | 16 |
| AV-20 | | | 17 | | | 15 |
| B-1 | | | 21 | | | 26 |
| B-1 Alt. | | | 20 | | | 23 |
| B-2 | | | 16 | | | 17 |
| B-3 | | 20 | | | 19 | |
| B-4 | | | 18 | | | 15 |
| B-6 | | 19 | | | 18 | |
| B-7 | | 17 | | | 18 | |
| B-8 | | | 22 | | | 14 |
| B-9 | | 13 | | | 12 | |
| B-10 | | 20 | | | 14 | |

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

| | Invertebrates | | | Vegetation | | |
|---------|------------------|---------------------|---------|------------------|---------------------|---------|
| Wetland | Created Wetlands | Stormwater Wetlands | Wetland | Created Wetlands | Stormwater Wetlands | Wetland |
| E-28 | | 16 | | | 21 | |
| E-29 | | | 14 | | | 27 |
| E-31 | | 21 | | | 15 | |
| E-32 | | 16 | | | 17 | |
| 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 |
| F-1 | | 14 | | | 16 | |
| F-3 | | 12 | | | 17 | |
| F-4 | 11 | | | 15 | | |
| F-5 | | 17 | | | 16 | |
| F-6 | | 16 | | | 10 | |
| F-7 | | 16 | | | 20 | |
| F-8 | 17 | | | 16 | | |
| F-9 | | 11 | | | 16 | |
| H-4 | 15 | | | 17 | | |
| H-6 | | 19 | | | 21 | |

| | Invertebrates | | | Vegetation | | |
|---------|------------------|---------------------|---------|------------------|---------------------|---------|
| Wetland | Created Wetlands | Stormwater Wetlands | Wetland | Created Wetlands | Stormwater Wetlands | Wetland |
| H-30 | 14 | | | 14 | | |
| H-56 | | 21 | | | 17 | |
| H-57 | 14 | | | 17 | | |
| L-4 | 16 | | | 20 | | |
| L-7 | | 20 | | | 25 | |
| L-8 | | | 21 | | | 20 |
| L-9 | 17 | | | 17 | | |
| L-10 | | | 13 | | | 11 |
| LD-1 | | | 14 | | | 17 |
| MH-2 | | 22 | | | 23 | |
| 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 | | 24 | | | 21 | |
| NCR-1 | | | 19 | | | 16 |
| NCR-2 | | | 19 | | | 16 |
| R-1 | | 18 | | | 19 | |
| R-2 | | 22 | | | 17 | |
| R-4 | | 18 | | | 14 | |
| R-6 | | | 18 | | | 18 |

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

Appendix D. Wetland and Watershed Data for 2008-2019

| Site ID | Site Name | Wetland size (Acres) | Watershed Size (Acres) | % Imperv | Invert. Score | Veg. Score |
|---------|---|----------------------|------------------------|----------|---------------|------------|
| AV-1 | Hidden Valley | 2 | 21 | 35 | 12 | 19 |
| 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 | Chaparral 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 | NA | 17 |
| AV-17 | AL-P9.1 Alimagnet Lift Station Chain of Ponds | 0.25 | 7 | 20 | 18 | 19 |
| AV-18 | Sunset Park Pond | 1 | 252 | 30 | 20 | 17 |
| AV-19 | AL-P9.3 Alimagnet Lift Station Chain of Ponds | 0.25 | 28.5 | 25 | 18 | 17 |
| AV-20 | Valleywood Golf Course | 1.5 | 12 | 0 | 16 | 17 |
| B-1 | Crystal Lake West | 0.9 | 444.5 | 5 | 26 | 25 |
| B-1 Alt | Crystal Lake West Alternate | 6 | 550 | 0 | 24 | 19 |
| B-2 | Cam Ram | 0.41 | | 0 | 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 |

| Site ID | Site Name | Wetland size (Acres) | Watershed Size (Acres) | % Imperv | Invert. Score | Veg. Score |
|---------|----------------------------------|----------------------|------------------------|----------|---------------|------------|
| B-10 | AP-3 Cedar Pond | 3.1 | 212 | 22 | 10 | 15 |
| B-11 | Valley View | 1 | 80 | 10 | 16 | 13 |
| B-12 | Terrace Oaks | 1.7 | 68 | 5 | 20 | 15 |
| B-13 | Sunset Lake | 30 | 436 | 50 | 18 | 17 |
| B-17 | Terrace Oaks Buckthorn Pond | 2.7 | 24 | 5 | 22 | 17 |
| B-18 | Terrace Oaks Central | 0.34 | 2.89 | 0 | 18 | 23 |
| DC-1 | Empire Lake | 21 | 1152 | NA | 18 | 21 |
| DC-2 | Buck Pond | 1.6 | 25 | 0 | 16 | 13 |
| DC-3 | Tamarack Swamp | 7.7 | 40 | 0 | 14 | 21 |
| DC-4 | Jenson Lake | 50 | 330 | 7 | 18 | 25 |
| DC-5 | Wood Pond | 0.8 | 22 | 0 | 12 | 25 |
| DC-6 | BB's Wetland | NA | NA | NA | 24 | 25 |
| DC-7 | Lilypad Pond | NA | NA | NA | 26 | 23 |
| DC-8 | Star East | NA | NA | NA | 20 | 23 |
| 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 | 1.8 | 130 | 20 | 14 | 21 |
| 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-25 | FP 4.5 | 1 | 35 | 55 | 16 | 19 |
| E-26 | DP-6.2, Northwoods Business Park | 3.2 | 25 | 44 | 14 | 15 |

| 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 | 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 |
| F-1 | Pine Knoll | 35 | 107.5 | 10.4 | NA | 13 |
| F-3 | Kral Pond | 10 | 41.8 | 6.6 | 10 | 21 |
| 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 | 20 | 19 |
| F-8 | Mystic Meadows | 6.19 | 8.23 | NA | 12 | 15 |
| F-9 | Cambodia | 5 | 24 | 9 | 14 | 13 |
| H-4 | Stonegate Treated | 1 | 9.5 | 35 | 16 | 13 |

| Site ID | Site Name | Wetland size (Acres) | Watershed Size (Acres) | % Imperv | Invert. Score | Veg. Score |
|---------|------------------------------------|----------------------|------------------------|----------|---------------|------------|
| H-6 | Lake Rebecca | 19 | 56 | 1 | 20 | 15 |
| H-30 | Sand Coulee | 1 | 107 | 25 | 8 | 13 |
| H-56 | 180th Street Marsh | 20 | 340 | 1 | 22 | 21 |
| H-57 | Cari Park Pond | 0.78 | 29 | 14 | 14 | 15 |
| L-4 | Water Treatment Wetland Bank | 22.85 | 99.8 | 20 | 14 | 15 |
| L-7 | DNR 387 | 10 | 2087 | 29 | 20 | 21 |
| L-8 | DNR 393 | 9.6 | 4987 | 17 | 22 | 17 |
| L-9 | NC 54 | 13.8 | 183 | 12 | 20 | 11 |
| L-10 | DNR#349W | 40 | 213 | NA | 12 | 11 |
| LD-1 | Pickereel Lake | | | | 14 | 17 |
| MH-2 | Copperfield/Friendly Hills | 9.4 | 865.3 | 20 | 16 | 29 |
| 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 | 30.1 | 14 | 15 |
| MH-20 | City Hall Orchard Heights | 10.6 | 965.4 | 30.1 | 24 | 21 |
| NCR-1 | Loretto Wetland | 0.5 | 160 | 4 | 26 | 19 |
| NCR-2 | Peterson | 2 | 55 | 0 | 22 | 15 |
| R-1 | Kelly Marsh - Derryglen Ct in 2004 | 1 | 12.5 | 80 | 14 | 21 |
| R-2 | White Lake | 333 | 998 | 30 | 26 | 17 |
| R-4 | Schwarz Pond | 10.9 | 144.5 | 20 | 24 | 15 |
| R-6 | Keegan Lake/WMP 310 | 35 | 1530 | 30 | 22 | 19 |

| Site ID | Site Name | Wetland size (Acres) | Watershed Size (Acres) | % Imperv | Invert. Score | Veg. Score |
|---------|---------------------------|----------------------|------------------------|----------|---------------|------------|
| R-14 | WMP #379 | 4.8 | 81 | 30 | 22 | 21 |
| R-15 | Birger Pond | 27.1 | 60.6 | 13.8 | 18 | 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 | 1.9 | 1832 | 25 | 22 | 27 |
| SSP-1 | Anderson Pond | 2.4 | 168 | 15 | 12 | 15 |
| SSP-3 | LeVander | 3.4 | 37.9 | 20 | 12 | 13 |
| SSP-4 | Villaume Pond | 1.66 | 25 | 30 | 18 | 11 |
| WSP-1 | Mud Lake | 3.1 | 34.2 | NA | 24 | 17 |
| WSP-2 | Thompson Lake 48W | 9 | 73920 | 50 | 16 | 17 |
| WSP-3 | Duck Pond | 2.5 | 65 | NA | 12 | 15 |
| WSP-4 | Weschcke 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 | 18 | 19 |
| WSP-8 | DNC Prairie Pond | 2.9 | 113 | 0 | 16 | 17 |
| WSP-9 | Marie Avenue | 4 | 15 | NA | 12 | 11 |
| WSP-10 | Emerson Pond South | 2.3 | 23 | NA | 22 | 15 |
| WSP-12 | Wentworth Pond | 6 | 71.2 | NA | 8 | 15 |

*Scores reflect most recent data

