

# Wetland Health Evaluation Program

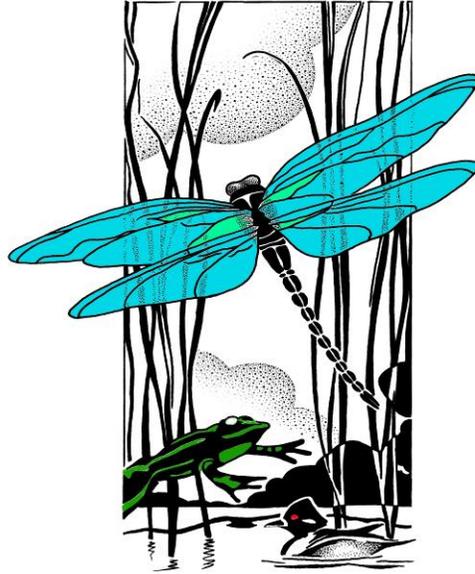


2016 Final Report

Dakota County, Minnesota



# 2016 Wetland Health Evaluation Program Report Dakota County, MN



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Dakota County  
City of Apple Valley  
City of Burnsville  
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City of Farmington  
City of Hastings  
City of Lakeville  
City of Mendota Heights  
City of Rosemount  
City of South St. Paul  
City of West St. Paul  
Vermillion River Watershed

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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](http://www.mnwhep.org).*

## Table of Contents

1.0	Background .....	1
1.1	The Wetland Health Evaluation Program (WHEP) .....	1
1.2	Why Monitor Wetlands? .....	2
1.3	Wetland Types .....	2
1.4	Dakota County Wetland Monitoring.....	4
2.0	Methods.....	5
2.1	Training .....	5
2.2	Data Collection.....	5
2.3	Cross-Checks and Quality Control .....	6
2.4	Wetland Scores and Quality Ratings.....	7
2.5	Using the Data .....	8
3.0	General Results and Recommendations .....	9
3.1	2016 Sampling Season Results .....	9
3.1.1	Natural versus Altered Wetlands .....	12
3.1.2	Effect of Invasive Species on Wetland Health .....	15
3.1.3	Impervious Area in the Watershed .....	15
3.1.4	Effect of Wetland Water Levels on Wetland Health .....	18
3.2	Is Volunteer Data Usable? .....	18
3.2.1	2016 Cross-checks.....	18
3.2.2	2016 Quality Control Checks .....	19
3.3	WHEP Historical Data.....	21
4.0	Wetland Evaluations.....	24
4.1	Apple Valley Wetlands .....	24
4.1.1	Belmont Park (AV-6).....	26
4.1.2	Long Lake North (AV-13) .....	27
4.1.3	Valleywood Golf Course (AV-20) .....	29
4.2	Burnsville Wetlands .....	30
4.2.1	Crystal Lake West (B-1) .....	32
4.2.2	Kraemer Preserve (B-3) .....	33
4.2.3	Alimagnet Dog Park (B-6) .....	35
4.2.4	Terrace Oaks North (B-7).....	36
4.3	Dakota County Parks Wetlands .....	37
4.3.1	Empire Lake (DC-1) .....	39
4.3.2	Buck Pond (DC-2).....	40
4.3.3	Tamarack Swamp (DC-3).....	42
4.3.4	Jensen Lake (DC-4) .....	43
4.4	Eagan Wetlands .....	44
4.4.1	Shanahan Lake (E-20) .....	46
4.4.2	Black Hawk Middle School Pond (E-39).....	47
4.4.3	Heine Pond (E-40) .....	48
4.5	Farmington Wetlands.....	49
4.5.1	Kral Pond (F-3).....	51
4.5.2	Autumn Glen (F-7) .....	52
4.5.3	Mystic Meadows (F-8) .....	53
4.6	Hastings Wetlands.....	54
4.6.1	Stonegate Treated Wetland (H-4) .....	56
4.6.2	Lake Rebecca Wetland (H-6) .....	57
4.6.3	180 <sup>th</sup> Street Marsh (H-56).....	59

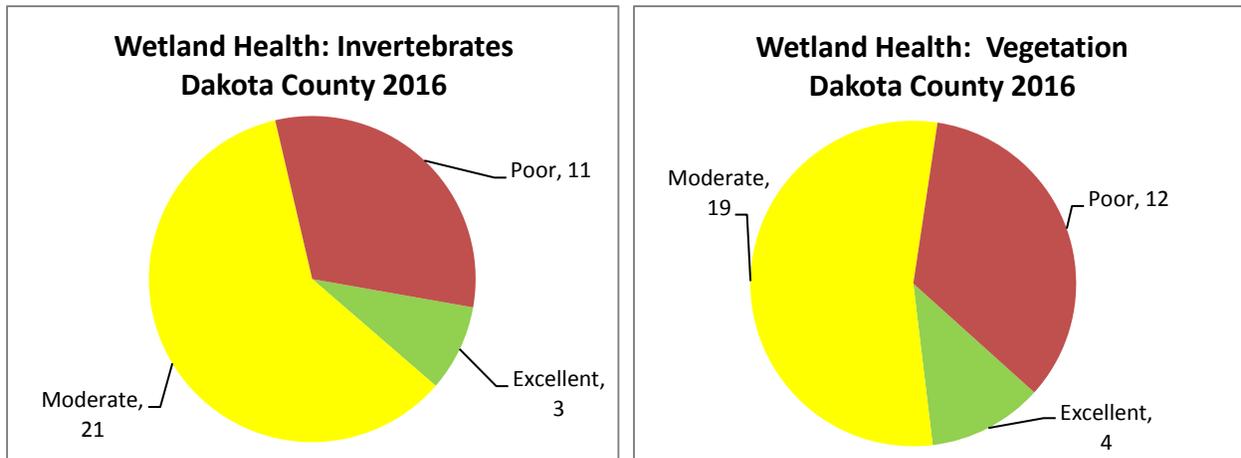
4.6.4 Cari Park Pond (H-57).....	60
4.7 Lakeville Wetlands.....	62
4.7.1 DNR Wetland #387 (L-7).....	63
4.7.2 DNR #393 (L-8).....	64
4.8 Mendota Heights Wetlands.....	66
4.8.1 Copperfield (MH-2).....	68
4.8.2 Victoria Pond (MH-8).....	69
4.9 Rosemount Wetlands .....	70
4.9.1 Kelly Marsh (R-1) .....	72
4.9.2 Keegan Lake (R-6).....	73
4.9.3 WMP #332 (R-20) .....	75
4.9.4 CR-38 Mitigation Site 1 (R-21) .....	76
4.10 South St. Paul Wetlands.....	78
4.10.1 LeVander Pond (SSP-3).....	79
4.10.2 Villaume Pond (SSP-4) .....	81
4.11 West St. Paul Wetlands .....	82
4.11.1 Mud Lake (WSP-1).....	84
4.11.2 Humboldt Pond (WSP-7).....	85
4.11.3 Emerson Pond South (WSP-10) .....	86
4.11.4 Wentworth Pond (WSP-12).....	88

# Executive Summary

## Dakota County Wetland Health Evaluation Program 2016

Dakota County began sponsoring the Wetland Health Evaluation Program (WHEP) in 1997. Since then, 181 wetlands have been monitored by many volunteers across the County. In 2016, ten cities and Dakota County Parks participated in WHEP, monitoring 35 different wetlands. Six of these wetlands were monitored for the first time in 2016, including sites from Dakota County Parks, Eagan, Farmington, and Mendota Heights. 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 provide an estimate of the health of each wetland.

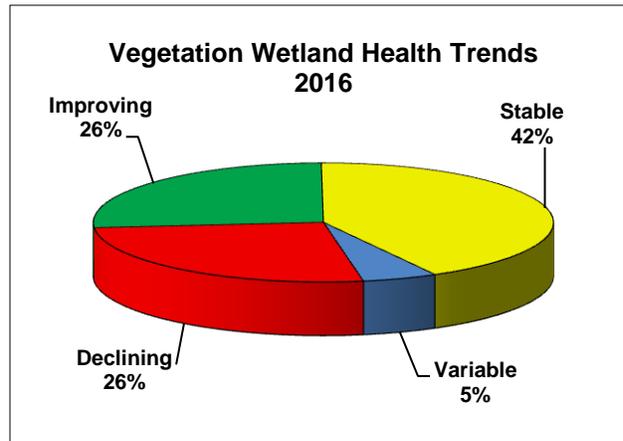
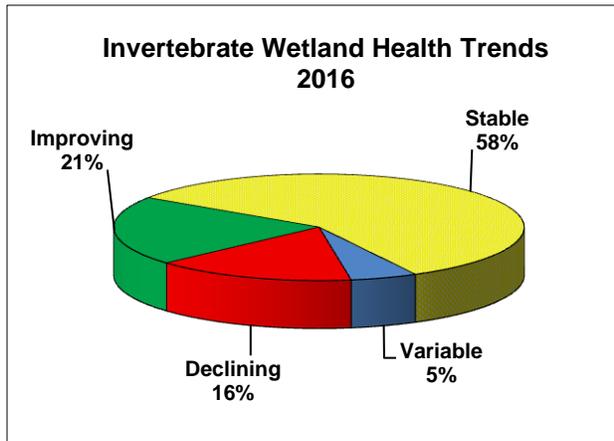
The results of the monitoring for 2016 showed a variety of wetland conditions. The Index of Biotic Integrity was used to determine wetland health ranging from poor to excellent. The majority of wetlands were in the moderate category for both macroinvertebrates (64%) and vegetation (58%). Three wetland sites rated excellent for macroinvertebrates and four wetland sites rated excellent for vegetation. Two of the sites rated excellent in both invertebrates and vegetation (H-56 and R-21). Thirty-three percent of the wetlands received poor invertebrate scores and thirty-six percent of the wetlands received poor vegetation scores.



The City of Rosemount’s CR-38 Mitigation Site 1 (R-21) had the highest invertebrates score (26) and the Cities of Hastings, Lakeville, Mendota Heights, and Rosemount had the highest vegetation score (27) in 2016. Wetland sites B-3 and H-56 also scored excellent for invertebrates. Wetland sites H-56, L-7, MH-2, and R-21 scored excellent for vegetation. The City of Hastings’ Cari Park Pond (H-57) had the lowest invertebrate scores (6). The Cities of Apple Valley (AV-13), Mendota Heights (MH-8), and South St. Paul (SSP-3) had the lowest vegetation score (9).

A trend analysis was conducted for all of the wetlands monitored in 2016 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, 21 percent of wetlands appear to be improving, 16 percent are declining, and 58 percent are stable. For vegetation, 26 percent of the wetlands appear to be improving, 26 percent are declining, and 42 percent are stable.

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.



**2016 Dakota County Wetland Health Trends\***

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

In 2016, 112 Dakota County WHEP volunteers donated more than 1,996 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

## 1.1 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, and others in Hennepin County. Up to eleven 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 Counties and communities.

Hennepin County joined the project in 2001, and began co-managing with Dakota County in 2002. Dakota County, the Vermillion River Watershed, and the participating cities 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.

## **1.2 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 ground water, 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.

## **1.3 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](http://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.

## 1.4 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.



Paula Liepold

Paula Liepold has coordinated the Dakota County's WHEP since 2006. Paula expressed, "I value the contribution that each volunteer citizen scientist makes to WHEP. Our program is stronger every year because of the dedication volunteers and team leaders bring to learning and evaluating wetlands. Special thanks to Mary Kay Lynch – she has shared her knowledge and insight regarding monitoring protocols, training logistics, plant and macroinvertebrate identification, and more. She will be missed. Have fun in your retirement, Mary Kay!"

Mary Kay Lynch has been involved in Dakota County WHEP since 1996. She began as a wetland volunteer and team leader, and recently fulfilled the roll of Field Monitoring Coordinator.



Mary Kay Lynch

She has a master's degree in biology and taught biology for 22 years, 20 of which were in Dakota County. She was a team leader in the WHEP pilot program as it was developed by Judy Helgen of the MPCA. She served as the Burnsville team leader for five years when the program began in Dakota County. Mary Kay retired from her WHEP position at the end of the 2016 season. She inscribed, "This is my parting message: My participation in the wetland program, from being involved at its inception as a pilot in 1996 through serving as the Field Monitoring Coordinator until 2016, has enriched my life. Interacting with the amazing people in the program has been enlightening and rewarding. I would like to thank all those with whom I have had contact over the years.

"Wetlands will always delight me with their sights, sounds, and smells. The flora and fauna living there are treasures. I know I'll continue to need to visit them. My butterfly/dragonfly net is ready for my senior citizen playtime with Odes that have matured to flight. As I always told my Biology students in Burnsville, experiencing nature is a gift we give ourselves.

"Enjoy your WHEP time and spread the word. The world needs us!"

## 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. 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](http://www.mnwhep.org).



### Vegetation and Invertebrate 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](http://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)***

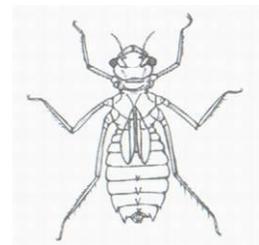
Vegetation is analyzed using a 100 square meter releve plot. All species within the sampling plot are identified to the genus level, and documented on the field data sheet. Vegetation is divided into categories based on their ecological function or relationship. The categories include nonvascular, woody, 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 or kinds 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](http://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 (Mary Kay Lynch) 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, Katie Farber, Roman Rowan, Lauren Tjaden

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 2016, Fortin Consulting cross-checked the vegetation plots of three wetlands, one in Dakota County Parks (DC-1), Hastings (H-6), and South St. Paul (SSP-3). Fortin Consulting also reviewed the invertebrate samples from sites AV-13, B-1, DC-1, E-20, F-7, H-6, L-8, MH-2, R-20, SSP-3, 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 2016 Sampling Season Results

During the 2016 sampling season, eleven citizen teams monitored 35 wetlands in ten cities in Dakota County (Apple Valley, Burnsville, Eagan, Farmington, Hastings, Lakeville, Mendota Heights, Rosemount, South St. Paul, West St. Paul, and Dakota County Parks). Eleven of these wetlands were sampled twice through citizen cross-checks. Three wetland vegetation samples and eleven invertebrate samples were checked for accuracy through the quality control check performed by Fortin Consulting.

**Figure 3.1.1 Dakota County Wetland Ratings**

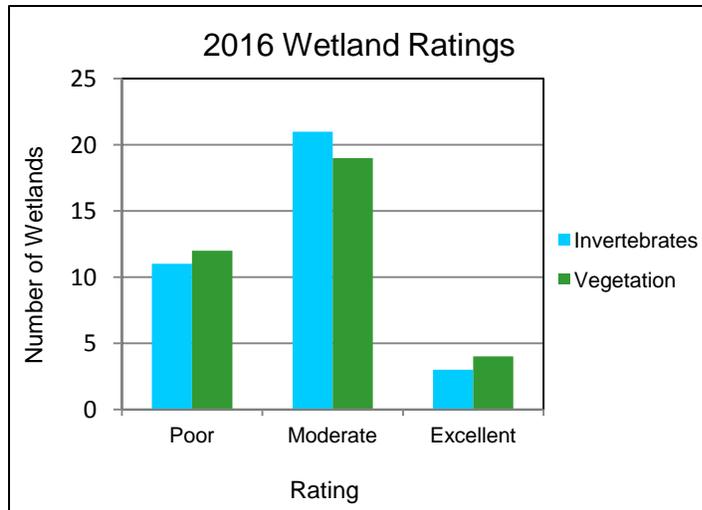


Figure 3.1.1 and Table 3.1.1 show the vegetation and invertebrate ratings for all of the wetlands assessed during the 2016 sampling season. Based on vegetation scores, four of the wetlands rated excellent, nineteen of the wetlands were rated moderate, and twelve rated poor. Vegetation scores ranged from 9 to 27 out of a maximum of 35 points.

The invertebrate analysis resulted in three wetlands rating excellent, twenty-one rating moderate and eleven poor. Invertebrate scores ranged from 6 to 26 out of a maximum of 30 points.

Several of the sites showed different ratings for vegetation versus invertebrates. More wetlands rated moderate for invertebrates than vegetation and more wetlands rated excellent for vegetation than invertebrates. There are different factors that may be influencing the plant and invertebrate communities in each wetland. Possible factors affecting wetland quality are described in the next section.

**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)	2/3	1/0	0/0
Burnsville (B)	0/1	3/3	1/0
Dakota County (DC)	1/0	3/4	0/0
Eagan (E)	1/2	2/1	0/0
Farmington (F)	1/0	2/3	0/0
Hastings (H)	2/0	1/3	1/1
Lakeville (L)	0/0	2/1	0/1
Mendota Heights (MH)	1/1	1/0	0/1
Rosemount (R)	1/0	2/3	1/1
South Saint Paul (SSP)	1/2	1/0	0/0
West Saint Paul (WSP)	1/3	3/1	0/0
<b>Totals</b>	<b>11/ 12</b>	<b>21/ 19</b>	<b>3/ 4</b>

Figures 3.1.2 and 3.1.3 show the distribution of wetland health ratings for each of the sites monitored in 2016.

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

Figure 3.1.2

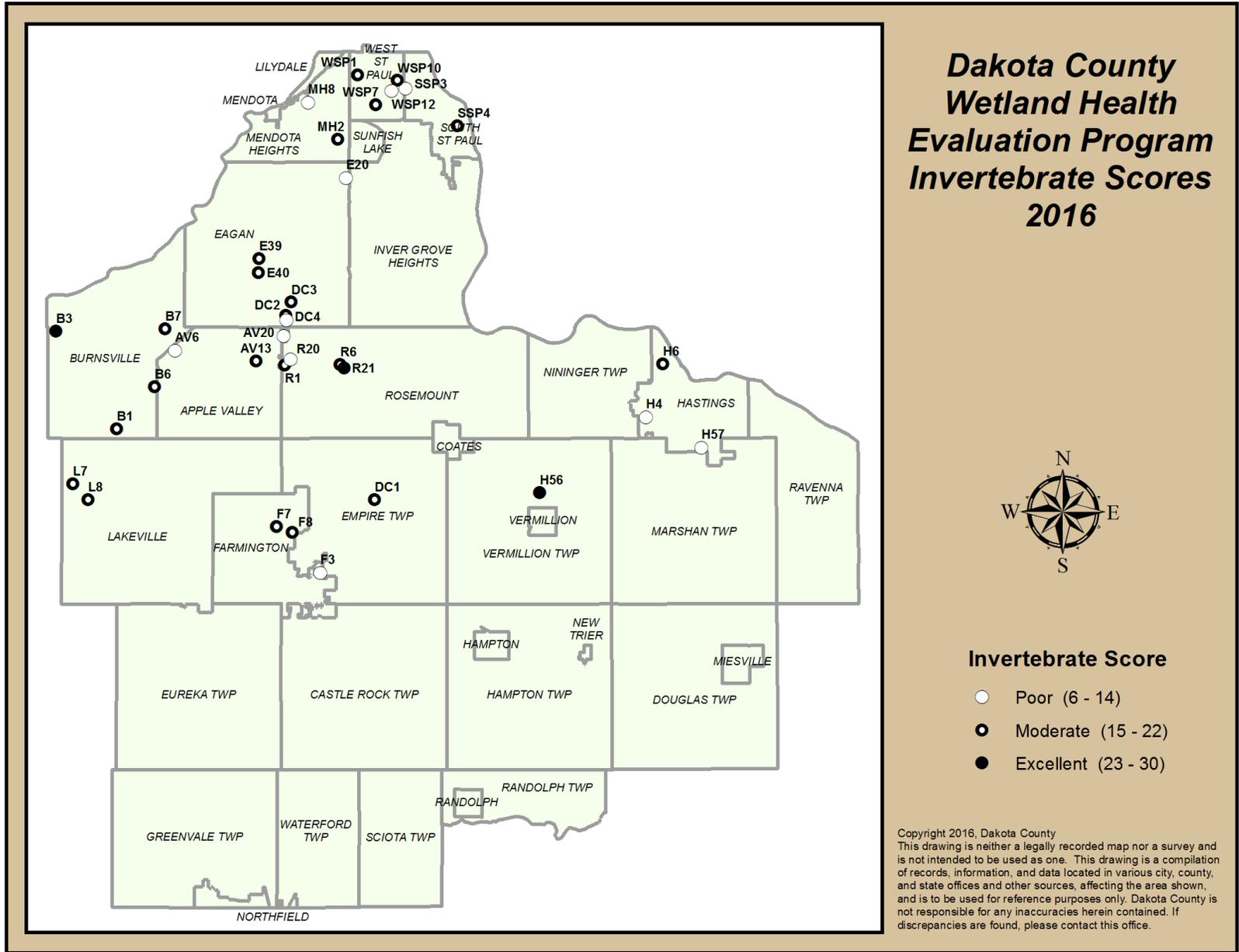
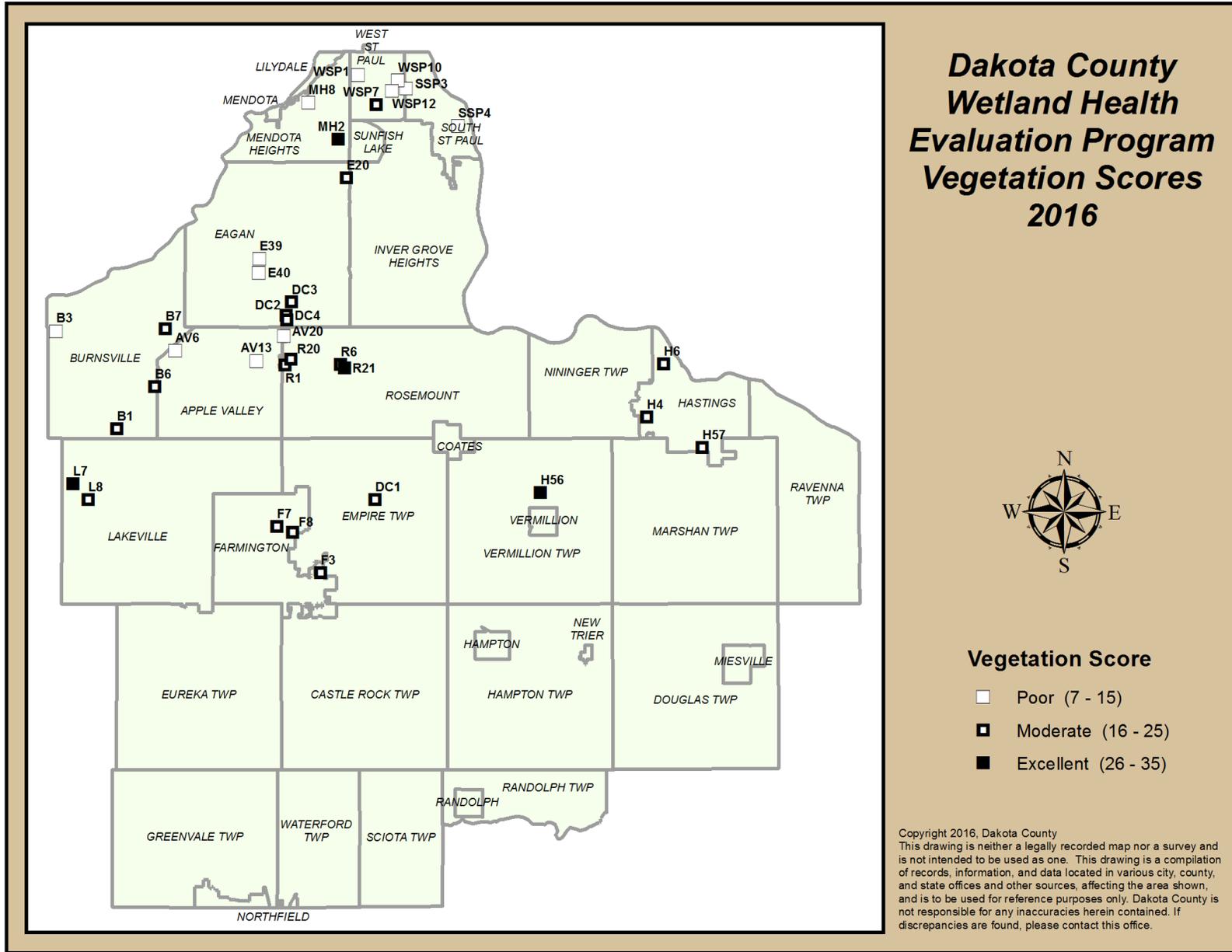


Figure 3.1.3



### 3.1.1 Natural versus Altered Wetlands

In an attempt to help identify why there are differences in wetland quality, different factors that impact the wetlands were evaluated. Wetlands were classified as natural, altered by stormwater input, or created based on information provided in the site identification form or 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 (Table 3.1.2). 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.

Wetland health scores vary from year to year. In 2016, stormwater and natural wetlands did not affect the wetland health. 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.

**Table 3.1.2 Site Score Averages of Created, Stormwater and Natural Wetlands**

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

Wetland	Invertebrates			Vegetation		
	Created Wetlands	Stormwater wetlands	Natural Wetlands	Created Wetlands	Stormwater wetlands	Natural Wetlands
B-8			22			17
B-9		13			13	
B-10		20			14	
B-11		18			21	
B-12			14			15
B-13		18			20	
B-17			20			23
DC-1			22			26
DC-2			14			17
DC-3			18			17
DC-4			14			21
E-1		20			19	
E-7		22			20	
E-10		11			13	
E-11		17			19	
E-18		16			21	
E-20		19			25	
E-21		20			16	
E-22		16			15	
E-25		16			19	
E-26		14			15	
E-27		18			21	
E-28		16			21	
E-29			12			27
E-31		20			13	
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	
F-1		14			13	
F-3		12			7	
F-4	11			11		
F-5		17			13	
F-6		16			10	
F-7		16			17	
F-8	22			17		
H-4	15			20		
H-6		20			21	
H-30	14			12		
H-56		20			13	

Wetland	Invertebrates			Vegetation		
	Created Wetlands	Stormwater Wetlands	Natural Wetlands	Created Wetlands	Stormwater Wetlands	Natural Wetlands
H-57	15			19		
L-4	16			19		
L-7		20			25	
L-8			22			20
L-9	17			18		
L-10			13			11
LD-1			14			17
MH-2		23			23	
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	
R-1		19			19	
R-2		21			17	
R-4		17			15	
R-6			18			18
R-14			23			25
R-18			26			19
R-20		17			16	
R-21	23			22		
R-22		22			22	
R-23	18			22		
R-25		12			23	
R-26			13			11
SSP-1		14			14	
SSP-3		19			14	
SSP-4		18			11	
WSP-1			18			18
WSP-2		17			16	
WSP-5			20			17
WSP-6			23			21
WSP-7		19			18	
WSP-9			12			11
WSP-10		18			19	
WSP-12		10			15	
<b>Average</b>	<b>16</b>	<b>17</b>	<b>17</b>	<b>18</b>	<b>18</b>	<b>18</b>

### 3.1.2 Effect of Invasive Species on Wetland Health

Many of the WHEP wetlands have been found to contain invasive species. Purple loosestrife (*Lythrum salicaria*) and reed canary grass (*Phalaris arundinacea*) are two common wetland invaders. Invasive species are a problem in that they tend to take over a wetland, shading out the diversity of wetland vegetation that belongs in the wetlands. Reductions in plant species diversity can result in lower diversity in the invertebrate community. Purple loosestrife was found in 14% of the wetlands and reed canary grass in 77% of the wetlands monitored in 2016. Purple loosestrife will grow in deeper water than reed canary grass, which can grow in both upland and wetland conditions. It is possible that purple loosestrife and reed canary grass exist in more wetlands, but just not made note of in the cases in which these plants were not located in the vegetation plots. An analysis of variance (ANOVA) was completed to determine if the differences were statistically significant. Differences in IBI scores for wetlands with invasive species present vs. not present were not statistically significant. Oriental mystery snails (*Bellamya* sp.) were found in seven wetlands in 2016.

### 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 city. 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%)<sup>1</sup>. A similar relationship may exist for wetlands too. Linear regressions completed in previous reports 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.

<sup>1</sup>Schueler, T. 2000. The Importance of Imperviousness, Article 1 in The Practice of Watershed Protection. Center for Watershed Protection. Ellicott City, MD.

**Table 3.1.3 Wetland and Watershed Data for 2008-2016**

Site ID	Site Name	Wetland size (Acres)	Watershed Size (Acres)	% Imperv	Invert. Score	Veg. Score
AV-1	Hidden Valley	2	21	35	18	15
AV-5	Cedar Knolls Pond	0.5	8	20	14	19
AV-6	Belmont Park	1.3	202	20	8	13
AV-7	Podojil Pond	1.3	8	25	10	13
AV-8	Chaparral Pond	1.5	110	30	16	15
AV-10	Alimagnet Dog Park	0.5	25	20	12	9
AV-11	Farquar Lift Station	2.2	373	25	10	17
AV-12	EVR-P12 Public Water	5.7	571	25	16	11
AV-13	EVR-P14	3.6	26	25	18	9
AV-14	EVR-P43, Apple Valley East Park	0.8	2738	35	12	9
AV-15	Carrollwood	1.2	398	30	10	13
AV-16	Nordic Park	1	17	25		17
AV-17	AL-P9.1 Alimagnet Lift Station Chain of Ponds	0.25	7	20	18	19
AV-18	Sunset Park Pond	1	252	30	18	17

Site ID	Site Name	Wetland size (Acres)	Watershed Size (Acres)	% Imperv.	Invert. Score	Veg. Score
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	14	13
B-1	Crystal Lake West	0.9	444.5	5	18	21
B-1 Alt	Crystal Lake West Alternate	6	550	0	15	23
B-2	Cam Ram	0.41	1392	10	12	11
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	18	13
B-9	Crosstown West	7.2	388	50	14	15
B-10	AP-3 Cedar Pond	3.1	212	22	10	15
B-11	Valley View	1	80	10	16	13
B-12	Terrace Oaks	1.7	68	5	14	15
B-13	Sunset Lake	30	436	50	14	19
B-17	Terrace Oaks Buckthorn Pond	2.7	24	5	28	21
DC-1	Empire Lake	21	1152	NA	22	27
DC-2	Buck Pond	1.6	25	NA	10	13
DC-3	Tamarack Swamp	7.7	40	0	18	17
DC-4	Jensen Lake	50	330	7	14	21
E-1	Thomas Lake Park Pond	0.4	4	37	18	21
E-7	Discovery Pond	4.1	16.5	0	20	21
E-10	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	22	19
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	20	17
E-25	FP 4.5	1	35	55	16	19
E-26	DP-6.2, Northwoods Business Park	3.2	25	44	14	15
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	2.5	20	13
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	12	27
E-36	Mooney Pond	7.0	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

Site ID	Site Name	Wetland size (Acres)	Watershed Size (Acres)	% Imperv.	Invert. Score	Veg. Score
E-40	Heine Pond	7.4	17	15	18	15
F-1	Pine Knoll	35	107.5	10.4	NA	13
F-3	Kral Pond	10	41.8	6.6	12	19
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	NA	12	9
F-7	Autumn Glen	2.9	10	NA	18	19
F-8	Mystic Meadows	6.2	8.2	NA	22	17
H-4	Stonegate Treated	1	9.5	35	12	17
H-6	Lake Rebecca	19	56	1	18	21
H-30	Sand Coulee	1	107	25	8	13
H-56	180th Street Marsh	20	340	1	24	27
H-57	Cari Park Pond	0.78	29	14	6	19
L-4	Water Treatment Wetland Bank	22.85	99.8	20	14	15
L-7	DNR 387	10	2087	21	22	27
L-8	DNR 393	9.6	4987	17	22	23
L-9	NC 54	13.8	183	12	20	11
L-10	DNR#349W	40	213	NA	12	11
LD-1	Pickrel Lake	108	NA	NA	14	17
MH-2	Copperfield/Friendly Hills	9.4	865.3	20	20	27
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-18	King Pond	5.2	34	20	22	27
R-1	Kelly Marsh - Derryglen Ct in 2004	1.3	897	80	16	19
R-2	White Lake	333	998	10	18	23
R-4	Schwartz Pond	10.9	144.5	20	14	13
R-6	Keegan Lake	35	1530	30	22	19
R-14	WMP #379	4.8	81	30	20	23
R-18	WMP #279	4.5	33.7	30	26	19
R-20	Unnamed	1	897	30	14	19
R-21	CR-38 Mitigation Site 1	1.7	1530	30	26	27
R-22	Mare Pond, South	8	81	10	24	19
R-23	CR-38 Mitigation Site 2	0.3	81	30	18	23
R-25	WMP #306	1.7	81	30	12	23
R-26	Erickson Pond	1.9	1832	25	16	13
SSP-1	Anderson Pond	2.4	168	15	14	11
SSP-3	LeVander	3.4	37.9	20	12	9
SSP-4	Villaume Pond	1.7	25	30	18	11

Site ID	Site Name	Wetland size (Acres)	Watershed Size (Acres)	% Imperv.	Invert. Score	Veg. Score
WSP-1	Mud Lake	3.1	34.2	NA	20	13
WSP-2	Thompson Lake 48W	9	73,920	50	16	17
WSP-5	Lilly Lake	6.4	22	NA	20	19
WSP-6	Marthaler Park	4.5	23	NA	24	23
WSP-7	Humboldt Pond/Vivian Pond	1.2	23	NA	18	19
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	9	15

### 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 2016 within the vegetation plot sites. The lowest water level measured within the plots in 2016 was zero feet, the highest water level was 4.9 feet, and the average water level was 2.9 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 2016 Cross-checks

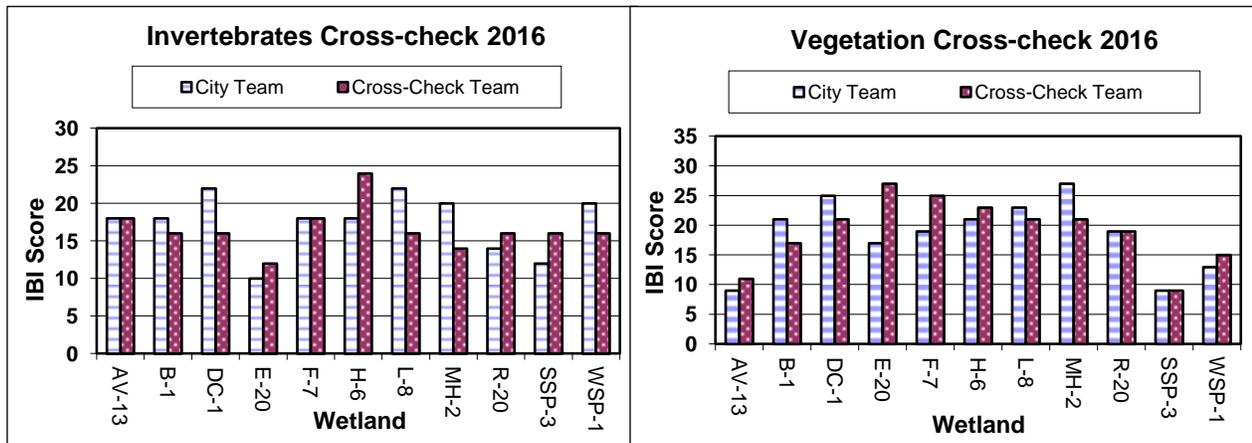
Each city team was responsible for evaluating one wetland in another city (Table 3.2.1). This citizen cross-check provides a second sample for the selected wetland. The purpose of this check is to determine if two different samples provide similar results for the vegetation and invertebrate IBI. Large 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). Vegetation scores for site E-20 were inconsistent. There was a ten point difference in scores. 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 sites AV-13 and F-7 were identical. Vegetation scores between the City team and the cross-check team for sites R-20 and SSP-3 were identical. Many scores were close in comparison.

- *E-20*: The cross-check team identified a more diverse vegetation plot than the City team. This affected the Nonvascular, *Utricularia*, and Aquatic Guild 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	Mendota Heights	AV-13	18	18	9	11
Burnsville	Farmington	B-1	18	16	21	17
Dakota County Parks	Eagan	DC-1	22	16	25	21
Eagan	Lakeville	E-20	10	12	<b>17</b>	<b>27</b>
Farmington	Burnsville	F-7	18	18	19	25
Hastings	Rosemount	H-6	18	24	21	23
Lakeville	Dakota County Parks	L-8	22	16	23	21
Mendota Heights	Apple Valley	MH-2	20	14	27	21
Rosemount	Hastings	R-20	14	16	19	19
South St. Paul	West St. Paul	SSP-3	12	16	9	9
West St. Paul	South St. Paul	WSP-1	20	16	13	15

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



### 3.2.2 2016 Quality Control Checks

Quality control checks were conducted at three sites for vegetation and eleven sites for invertebrates in 2016 (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-13, B-1, DC-1, DC-4, E-39, F-8, H-6, L-8, MH-2, R-6, SSP-3, and WSP-1.



Empire Lake

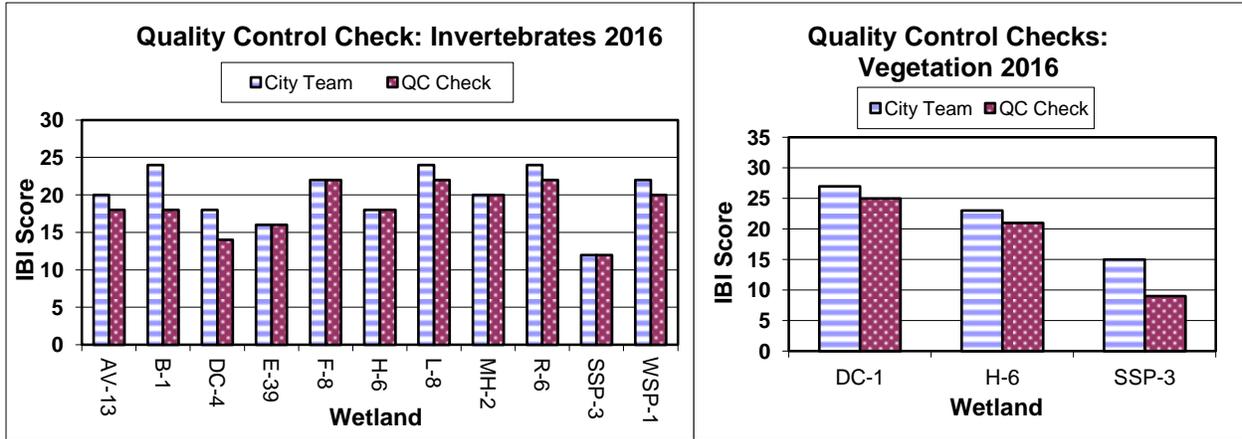


LeVander Pond



Lake Rebecca

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



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.

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 12 transfer errors. 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. Two errors were caused by miscalculating metric scores. There were 14 errors of which 10 affected the metric scores. Corrections affected the scores by two to eight 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**

Team Name	Site	Invertebrate IBI Scores			Vegetation IBI Scores		
		Team	Review	Errors	Team	Review	Errors
Apple Valley	AV-6	8	8	0	13	13	0
	AV-13	20	20	0	9	9	0
	AV-20	14	14	0	13	13	0
	MH-2 cc*	14	14	0	21	21	0
Burnsville	B-1	24	24	0	21	21	0
	B-3	24	24	0	13	13	0
	B-6	16	16	0	17	17	0
	B-7	20	20	0	19	19	0
	F-7 cc*	18	18	0	25	25	0
Dakota Co	DC-1	22	22	0	27	27	0
	DC-2	18	18	0	21	21	0
	DC-3	18	18	1	19	17	1
	DC-4	16	18	1	21	21	0
	L-8 cc*	16	16	0	21	21	0
Eagan	E-20	10	10	0	17	17	0
	E-39	16	16	0	11	11	0

Team Name	Site	Invertebrate IBI Scores			Vegetation IBI Scores		
		Team	Review	Errors	Team	Review	Errors
	E-40	15	18	2	15	15	0
	DC-1 cc*	8	16	2	21	21	0
Farmington	F-3	12	12	0	19	19	0
	F-7	18	18	0	19	19	0
	F-8	22	22	0	19	17	1
	B-1 cc*	16	16	0	17	17	0
Hastings	H-4	12	12	0	17	17	0
	H-6	18	18	0	23	23	2
	H-56	24	24	0	27	27	0
	H-57	6	6	0	19	19	0
	R-20 cc*	16	16	0	19	19	0
Lakeville	L-7	22	22	0	27	27	0
	L-8	24	24	0	23	23	0
	E-20 cc*	12	12	0	27	27	0
Mendota Heights	MH-2	20	20	0	27	27	0
	MH-8	10	10	0	9	9	0
	AV-13 cc*	18	18	0	11	11	0
Rosemount	R-1	16	16	0	19	19	0
	R-6	24	24	0	21	19	1
	R-20	14	14	0	19	19	0
	R-21	26	26	0	27	27	0
	H-6 cc*	24	24	0	23	23	0
South St. Paul	SSP-3	15	12	1	15	15	0
	SSP-4	18	18	0	11	11	0
	WSP-1 cc*	16	16	0	15	15	0
West St. Paul	WSP-1	20	22	1	13	13	0
	WSP-7	18	18	0	19	19	0
	WSP-10	22	22	1	15	15	0
	WSP-12	8	8	0	15	15	0
	SSP-3 cc*	16	16	0	9	9	0

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

### 3.3 WHEP Historical Data

Since WHEP began in 1997, 181 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](http://www.mnwhep.org). Section 4.0 includes the sites sampled in 2016 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

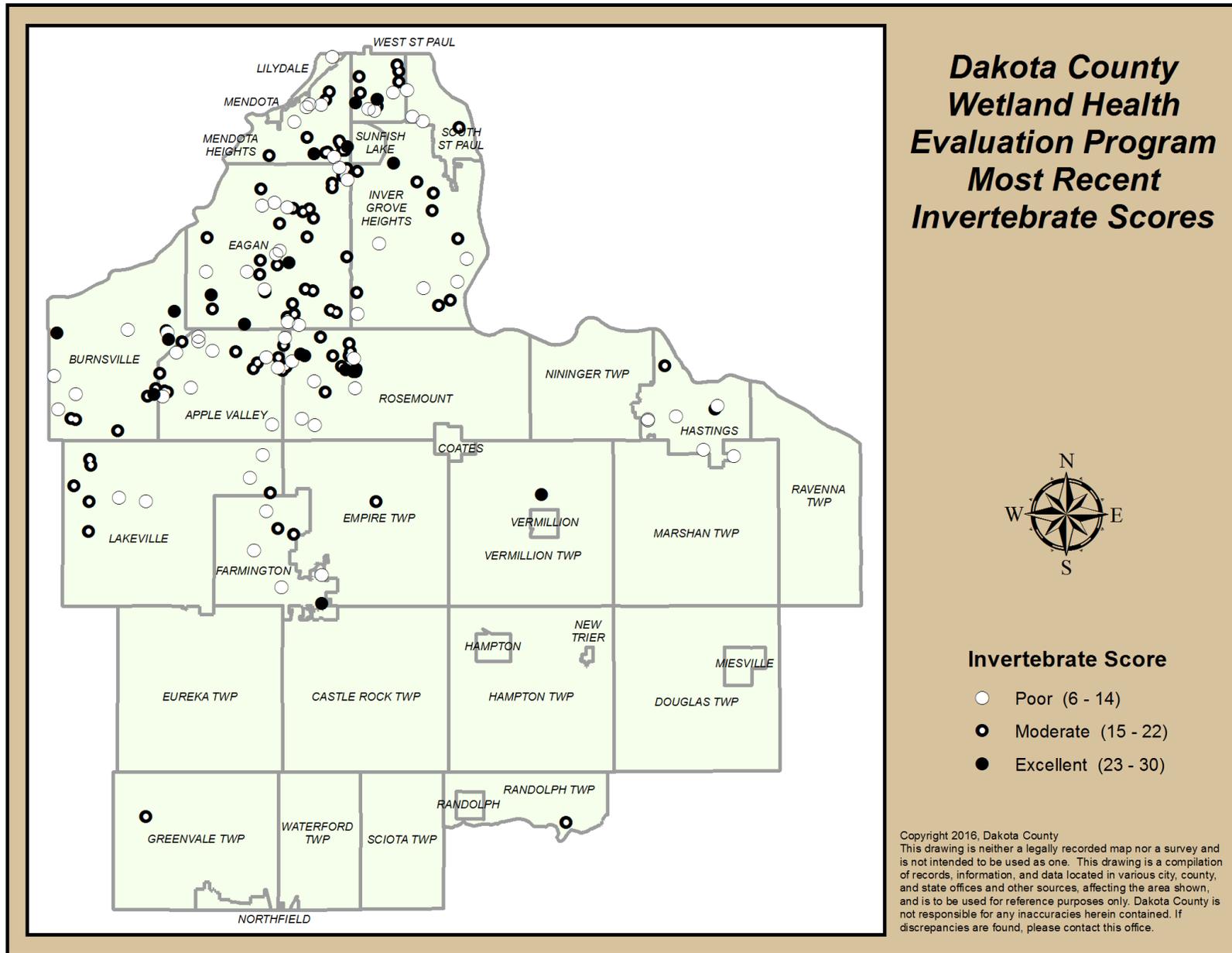
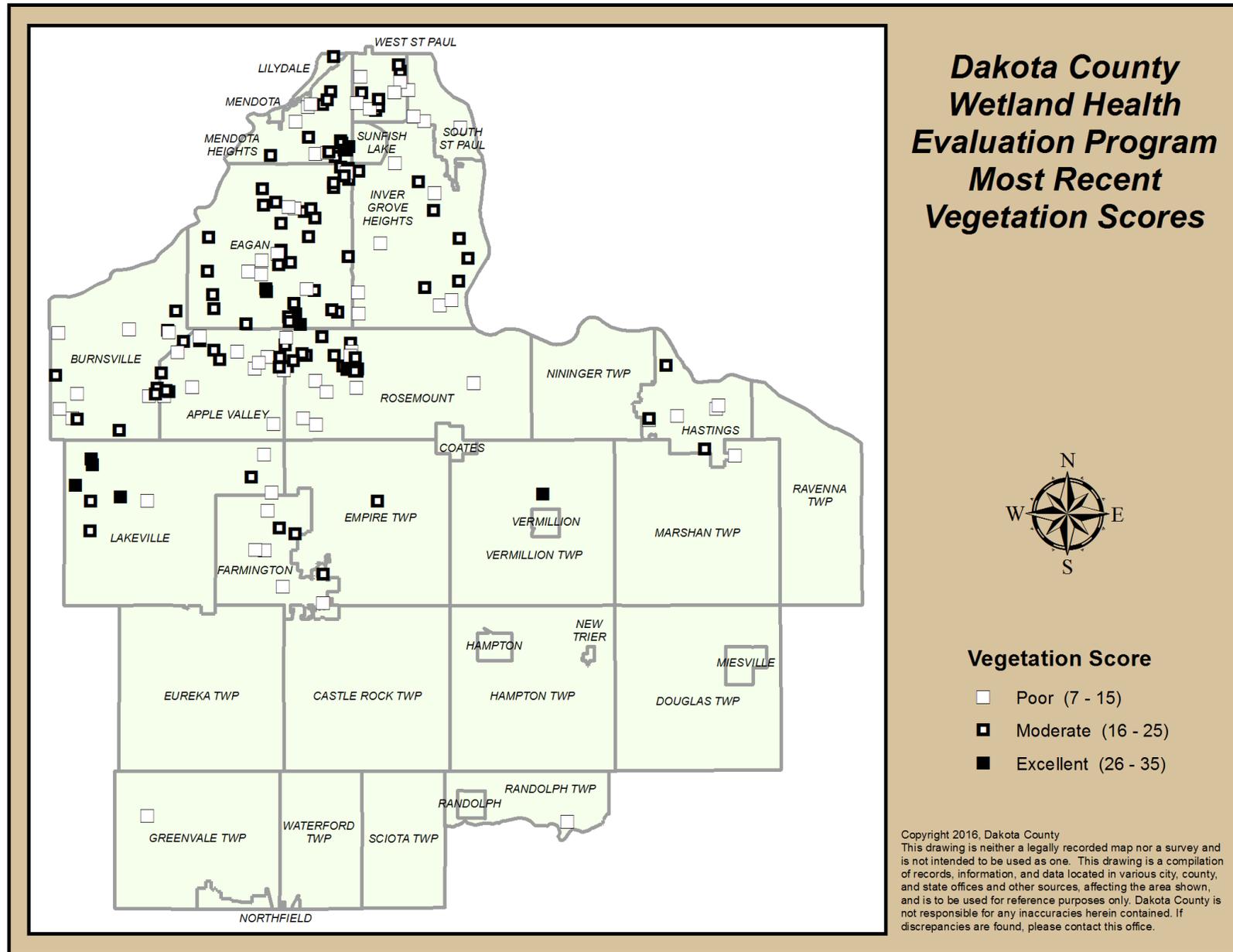


Figure 3.3.2



## 4.0 Wetland Evaluations

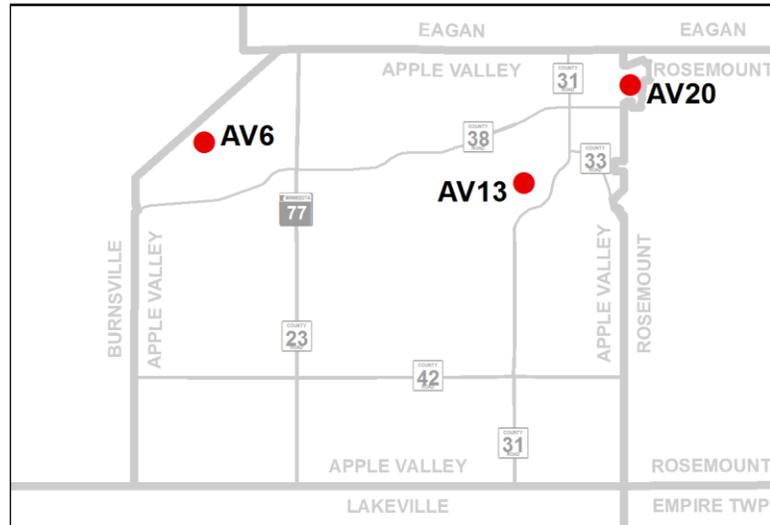
### 4.1 Apple Valley Wetlands

Three wetlands were monitored within the City of Apple Valley in 2016. This is the nineteenth year the City has participated in WHEP, and 20 wetlands have been monitored in that time period.

**Team Leader:** Jeff Korpik

**Team Members:** John Carnahan, Keith Endreson, Evan Gedlinske, Michael Krummel, Edward Marek, Brad Ohmann, Kristine Reiners, Larry Reiners, Rachel Ricard, Maya Ricard, and Cindy Taintor

**Apple Valley WHEP Sites Monitored in 2016**



Jeff Korpik

Jeff Korpik has been involved with WHEP since 2006 and team leader for Apple Valley since 2007. Jeff remarked, “Apple Valley had another good year sampling, some good and others not so good, sites that we haven’t been to in several years. With the exception of our site in Valleywood Golf Course, the sites are in neighborhoods with well spaced homes. They still seem to have a lot of impact on the wetlands though. Our volunteers were hard working as always, with a mix of a few solid veterans and one very dedicated new volunteer. I will miss being the team leader next year, but I am interested in my new role, as Dakota County’s WHEP Monitoring Coordinator, to see how other teams work and explore around the county.”



Jessica Schaum

Jessica Schaum started with Apple Valley as their Natural Resources Coordinator two years ago, and serves as a City contact for WHEP. She remarked, “I was immediately impressed with the ongoing water quality programs and volunteer base Apple Valley is fortunate enough to have. WHEP is truly an instrumental program that allows us to track local trends and impacts over time. We utilize this data when evaluating conditions for a new road project, when a nearby site might be redeveloped, or in determining the best stormwater feature we could use upstream. Sometimes unexpected projects come up – like the future North Creek Greenway trail near our reference wetland. It will be interesting to see potential benefits of the overall project somewhere we already have compiled data. We have come to rely and depend on our volunteers for this service, and without them I’m not sure we could accomplish even half

of the work on our own! I look forward to another successful year in establishing and tracking our wetland trends.”



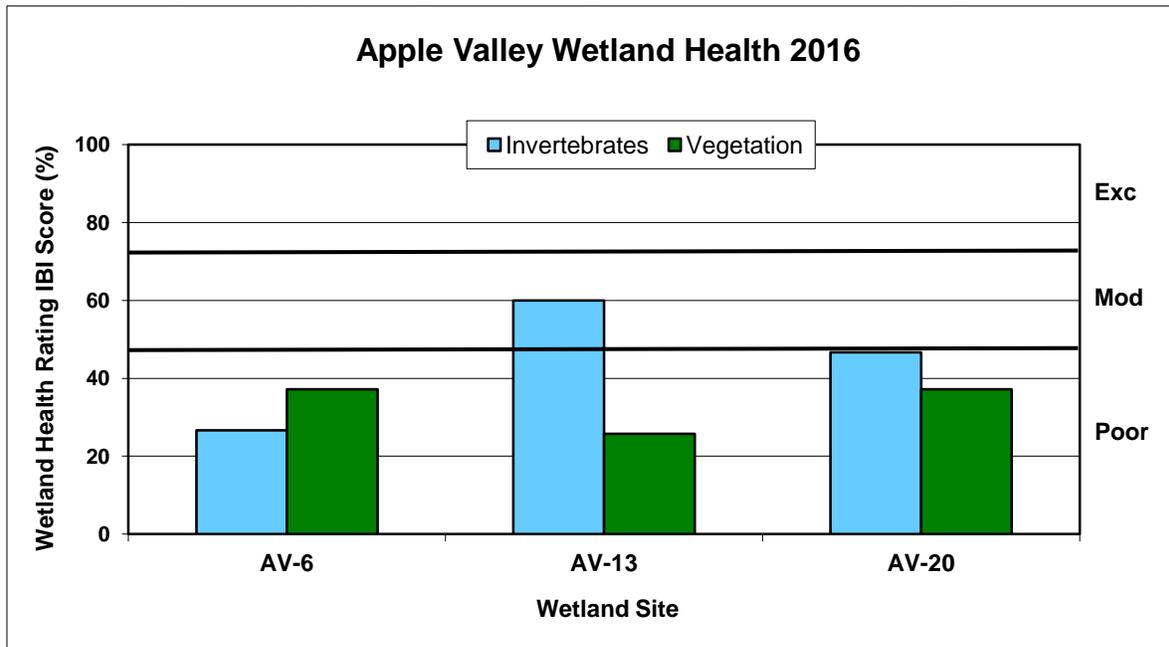
Jane Byron

Jane Byron is the Water Quality Technician for the City of Apple Valley. Her primary role in WHEP is to assist in wetland selections and provide some of the administrative assistance needed from the City of Apple Valley. She says, "The City finds the information gathered by WHEP volunteers invaluable. In recent years, the data gathered has allowed us to supplement information from other studies on some of our most impacted wetlands to give a much more detailed picture of the quality of selected wetlands. The baseline picture painted by the information gathered will help us gauge the success of future projects to improve water quality. We cannot thank our volunteers enough for the important service they provide."

## Apple Valley General Wetland Health

Figure 4.1 presents an overall view of wetland health for all of the 2016 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 mostly poor wetland health based on both invertebrate and vegetation data with the exception of AV-13 which scored moderate health based on invertebrate data. Invertebrate and vegetation scores for AV-6 and AV-20 each measured a ten percent scoring difference. The invertebrates and vegetation scores for AV-13 were inconsistent and differed by 29 percent.

Figure 4.1 Apple Valley site scores (percent) for the 2016 sampling season



### 4.1.1 Belmont Park (AV-6)



Belmont Park (AV-6), also known as BD-P10, is a 1.3 acre, type 3 wetland within the Black Dog Lake Watershed. The BD-10 subwatershed has approximately 202 acres of total drainage with 32 acres of direct drainage, and is 20 percent impervious. The wetland has one inlet at the eastern border, one inlet along the northern border, and one inlet along the southern border. A lift station is the one outlet located at the northwest corner of the wetland. Belmont Park wetland is included in the City's stormwater management plan and is managed as a Manage 1 Restore wetland with a goal to continue monitoring periodically. Wetlands in this classification have medium floral diversity/integrity, but also have direct stormwater input. The wetland must have high or exceptional restoration potential and be located in public or open

space in order to meet the restoration classification.

Belmont Park wetland is located within a City park. It is surrounded by residential and parkland. This wetland was altered in the 1970's for stormwater management. It is expected to be disturbed by road reconstruction within the next five years. The City has placed barley straw pellets within the pond in an effort to control algae for the past several years. Residents have been reported to be feeding animals corn. In addition, a resident alleges that their pet became sick with Gardia from the wetland in the recent past. The Palamino neighborhood around Belmont Pond will see a street and utility reconstruction project in 2017.



Cindy Taintor and Chris Reiners

City engineers are currently assessing what can be done to enhance the water quality in Belmont Pond in conjunction with this construction. Some accumulated sediment will likely be removed and the City hopes to enhance the buffer with additional native vegetation.

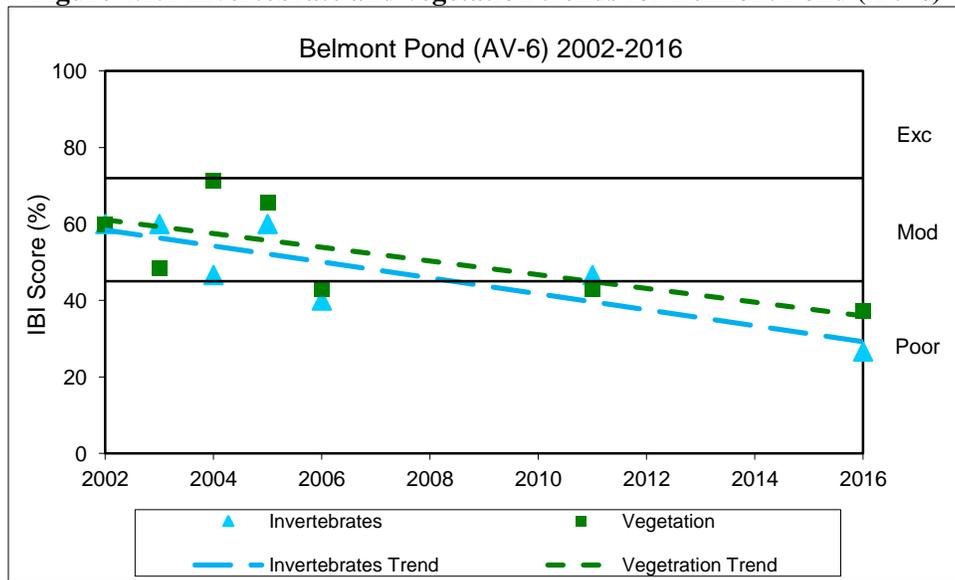
### Wetland Health

**Site Observations:** The wetland has a gentle slope and very mucky substrate. A vegetated buffer exists along the shoreline with many trees growing at the edges and hanging over the water. Private residences near the southeast corner of the wetland maintain manicured lawns up to the edge of the riparian vegetation. A walking bridge crosses the center of the wetland. Ducks and dragonflies were observed.

**Table 4.1.1 Belmont Pond (AV-6) Wetland Health based on Index of Biotic Integrity (IBI)**

	Invertebrates 	Vegetation 
<b>2016 Data (AV-6)</b>		
<b>Wetland Health Rating (IBI score)</b>	Poor (8)	Poor (13)
<b>Trend 2002-2016</b>	Declining	Declining

**Figure 4.1.1 Invertebrate and vegetation trends for Belmont Pond (AV-6)**



**Site Summary:** Belmont Pond has been surveyed seven times since 2002; however, it has only been surveyed three times in the last ten years. Health scores have remained poor or nearly poor in the last three surveys. The health scores have declined since the initial surveys in the early 2000’s, and the health trends agree. In 2016, very little submergent and emergent vegetation was observed; however, floating vegetation like duckweed and water-meal covered the surface of the water. Dense floating vegetation can shade out submergent vegetation. Sparse submergent vegetation will limit invertebrate habitat.

#### 4.1.2 Long Lake North (AV-13)



Long Lake North (AV-13), also known as EVR-P14 and 132<sup>nd</sup> Street West Pond, is a 3.6 acre, type 5 wetland within the EVR-P14 subwatershed. Its Jurisdictional Watershed is the Vermillion River. The subwatershed has approximately 26 acres of total drainage in which all 26 acres drain directly. There are two inlets located along the eastern border of the wetland and two inlets along the northern border. An equalizer pipe along the southern border serves as an outlet. Long Lake North is part of the City’s stormwater management plan and is designated as a Manage 3 wetland. Wetlands assigned to this category have medium floral diversity/integrity, direct stormwater input, medium restoration potential, and are not located in public or local space. Wetlands are also assigned to this category if they have low floral diversity/integrity and restoration potential is not exceptional.

Long Lake North wetland is within the Long and Farquar Lakes TMDL area. Approximately 0.13 percent of the external phosphorus load entering Long Lake comes from this wetland. The area surrounding this wetland is primarily residential. Long Lake North wetland has a shallow, mucky

bottom. It contains less algae and more submergent and emergent plants in comparison to other ponds directly draining to Long Lake.

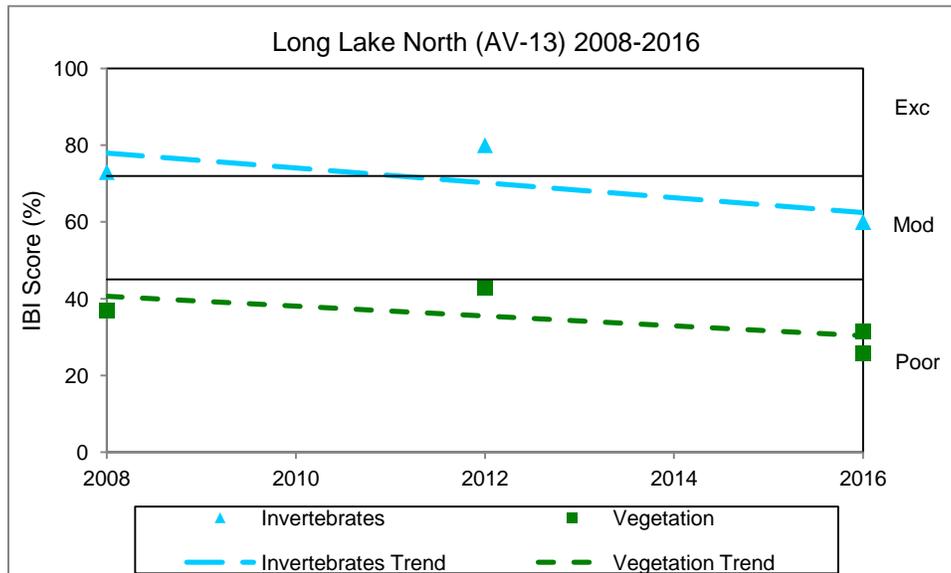
## Wetland Health

**Site Observations:** The substrate is sandy, but firm. The slope into the wetland is initially steep and then levels off. The entire wetland is surrounded by cattail. Tall, woody and non-woody vegetation surrounds the perimeter of cattails. Heron, golf-ball sized mystery snails, and dead planar snails were observed.

**Table 4.1.2 Long Lake North (AV-13) Wetland Health based on IBI**

	Invertebrates 	Vegetation 
<b>2016 Data (AV-13)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (18)	Poor (9)
<b>Cross-check Rating (IBI score)</b>	Moderate (18)	Poor (11)
<b>Trend 2008-2016</b>	Not enough data	Not enough data

**Figure 4.1.2 Invertebrate and vegetation trends for Long Lake North (AV-13)**



**Site summary:** This is the third time that AV-13 has been monitored since the initial survey in 2008. The invertebrate score is lower (moderate) than the two previous surveys (both excellent). The vegetation scores have remained poor all three surveys. The invertebrate and vegetation scores have been inconsistent all three surveys. The dense cattail population may be affecting the vegetation diversity. Scores between the City team and cross-check team were consistent. More data is needed to analyze a reliable health trend.

### 4.1.3 Valleywood Golf Course (AV-20)

Valleywood Golf Course (AV-20), also known as Hole 16 Wetland, 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 but are not located in public or open space.



Valleywood Golf Course wetland is located within the boundaries of the golf course. Management of the wetland is consistent with the golf course’s practices. The golf course is also interested in pursuing Audubon Certification; as such, they are interested in programs like WHEP that can add to their education components.

### Wetland Health

**Site Observations:** The wetland substrate is very mucky with many logs, and the slope is fairly steep. Trees overhang the water and vegetation grows along the shoreline.

**Table 4.1.3 Valleywood Golf Course (AV-20) Wetland Health based on Index of Biotic Integrity**

	Invertebrates 	Vegetation 
<b>2016 Data (AV-20)</b>		
<b>Wetland Health Rating (IBI score)</b>	Poor (14)	Poor (13)
<b>Trend 2013-2016</b>	Declining	Stable



Jeff Korpik, Keith Endreson, Michael Krummel, Larry Reiners

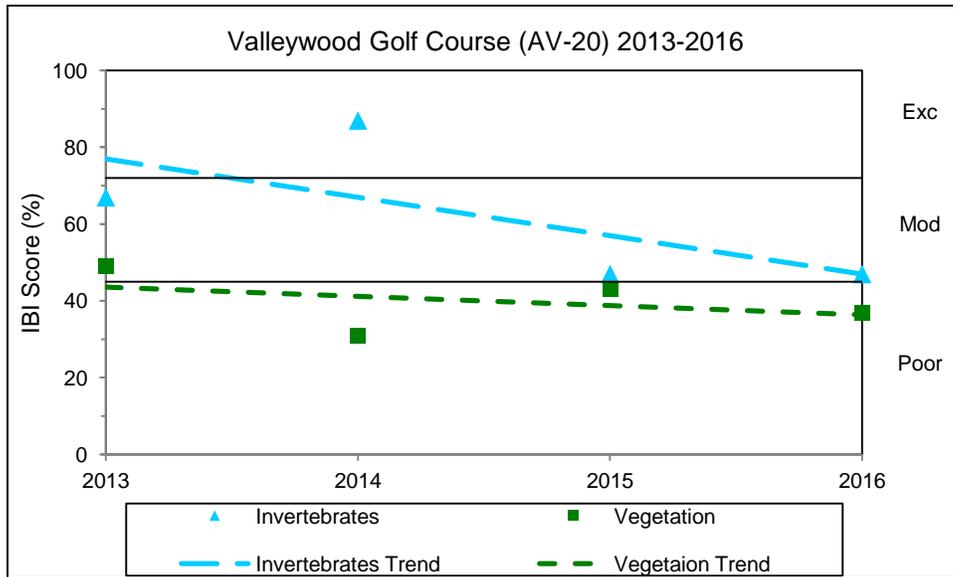


Keith Endreson, Cindy Taintor, Kristine Reiners, Larry Reiners, Jeff Korpik



Apple Valley team at invertebrate training

**Figure 4.1.3 Invertebrate and vegetation trends for Valleywood Golf Course (AV-20)**



**Site summary:** This is the fourth consecutive year that AV-20 has been monitored through WHEP. Invertebrate and vegetation scores are similar to 2015 scores. The invertebrate scores have declined from excellent in 2014 to poor in 2015 and 2016. Vegetation scores remain stable. Invertebrate and vegetation scores were consistent in 2016. Invertebrates and vegetation scores were poor. Continued monitoring will provide data for a more reliable health trend.

## 4.2 Burnsville Wetlands

Four wetlands were monitored within the City of Burnsville in 2016. Burnsville has monitored 16 wetlands through WHEP since 1997.

**Team Leader:** Bernie DeMaster

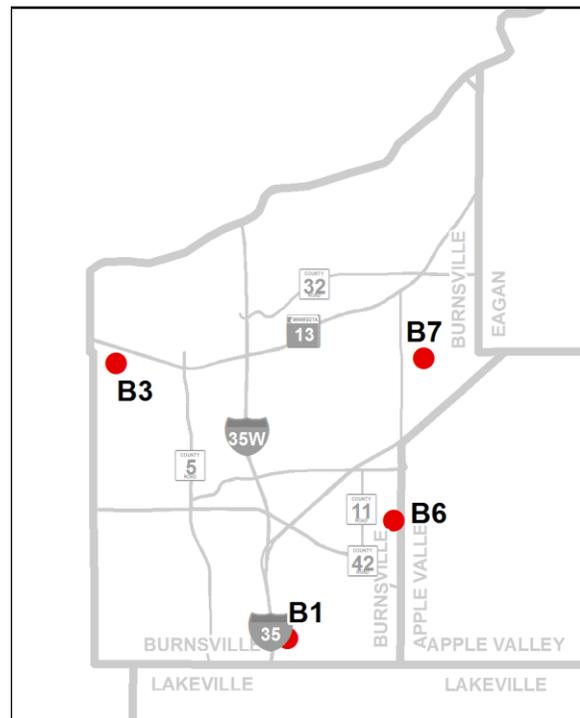
**Team Members:** Frank Beery, Ryan Blegen, Ben Dattres, Rachel Foss, Syndey Gram, Emily Haberlack, Jessica Jaycox, Abby Johnson, Harvey Keynes, Greg Lund, Dianne Rowse, and Nick Rowse



Bernie DeMaster

This is Bernie’s third year as a Burnsville team leader; though he has been an active volunteer with the program since 2010. He has a college degree in Physics and Computer Science, but he says, “I have always had an interest in the outdoors and conservation. I believe I saw the initial notice for WHEP in the local paper,” and everything else is history. He described his team as a “very dedicated group of volunteers.”

**Burnsville WHEP Sites Monitored in 2016**





Liz Forbes with Nova

Liz Forbes 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.

She wrote, “WHEP provides good information on wetlands that City staff doesn’t have time to study. Since Burnsville has participated in WHEP since it began, we have nearly 20 years of data to reference when looking at health trends of our water bodies and to guide our surface water management decisions.

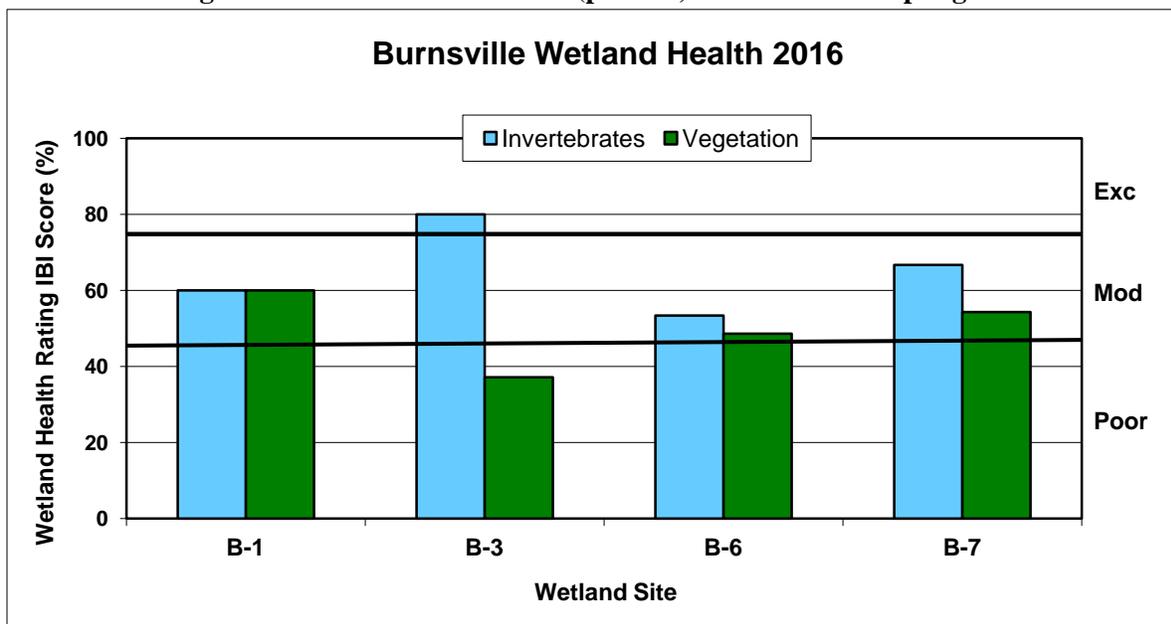
“Burnsville has two reference wetlands (Kraemer and Crystal West) that are included in WHEP every year. Two other wetlands are selected based on a number of factors, including how long since it was last studied and proximity to projects that disturb the landscape. For example, this year I included the pond within the Alimagnet Dog Park because it’s a high-use area that we like to monitor frequently.

“I greatly appreciate the Burnsville WHEP volunteers, who have dedicated many years to the program. WHEP is such a great way to gain valuable information, but I really like that it provides an opportunity for residents to get out and experience natural resources within the City.”

## Burnsville General Wetland Health

Figure 4.2 presents an overall view of wetland health for all of the 2016 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. For 2016, the Burnsville wetlands showed poor to excellent wetland health. Invertebrate and vegetation scores for B-3 and B-7 were inconsistent. B-3 scored excellent for invertebrate health and poor for vegetation health. B-1, B-6, and B-7 scored moderate for both invertebrate and vegetation.

**Figure 4.2 Burnsville site scores (percent) for the 2016 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 Blackdog watershed. 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 wetland with the purposes of aesthetic, recreation, education, and science. 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 substrate is very silty, and the wetland has a gentle slope. Hardwood trees surround the wetland. A high population of reed canary grass is present. Submergent vegetation and water lilies are plentiful. Tadpoles and algae were observed.

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

2016 Data (B-1)	<b>Invertebrates</b> 	<b>Vegetation</b> 
<b>Wetland Health Rating (IBI score)</b>	Moderate (18)	Moderate (21)
<b>Cross-check Rating (IBI score)</b>	Moderate (16)	Moderate (17)
<b>Trend 1999-2016</b>	Variable but stable	Variable but declining



Ben Datres



Frank Beery

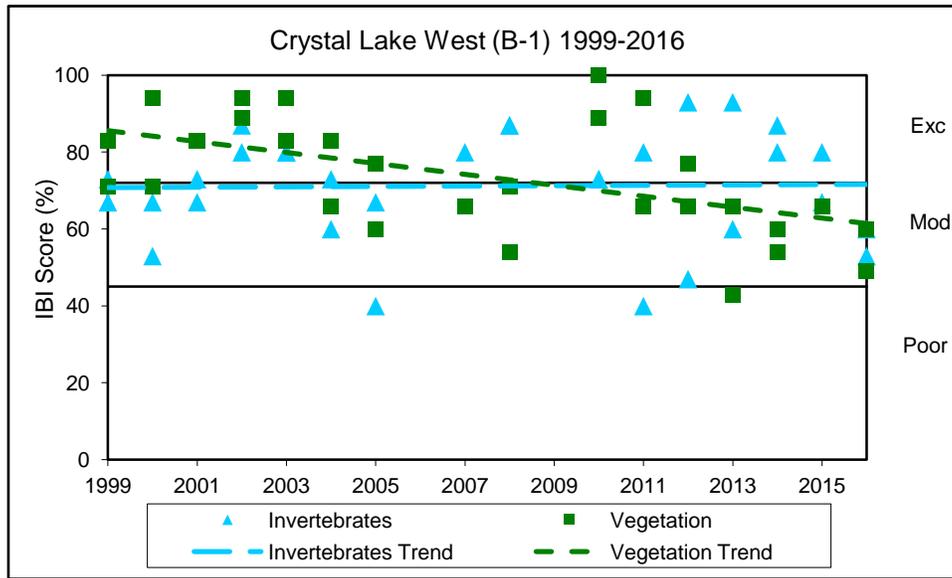


Ryan Blegen



Greg Lund, Rachel Foss,  
Bernie DeMaster

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



**Site summary:** This is the sixteenth year that B-1 has been surveyed since 1999, and seventh consecutive survey since 2010. The invertebrate and vegetation scores both indicate that the wetland has moderate health. Both scores have declined since 2015. However, throughout the years of monitoring, the scores have varied and ranged from poor to excellent. Scores between the City team and the cross-check team were consistent. The invertebrate trend line indicates variable but overall stable wetland health. The vegetation trend line indicates variable but overall declining health.

#### 4.2.2 Kraemer Preserve (B-3)



Sons, Inc.

B-3, also known as Kraemer Preserve, is a restored public water wetland in the City of Burnsville. It is a 29.7 acre, type 3 wetland located within the NW21 drainage area of Northwest Subwatershed (1,404 acres) of the Lower Minnesota Watershed (40,960 acres). The NW21 drainage area is 93 acres and approximately 30 percent impervious. The wetland is part of the City’s stormwater management plan. It has one inlet on the south side and one inlet on the east side. It also has one outlet in the northwest corner and one outlet on the north side. The large wetland was installed in 1997 to mitigate for wetland disturbances by Kraemer &

Land use in the watershed is mainly residential and industrial. The upland buffer has been restored to prairie and some stormwater ponds are in place to protect the wetland. It is a protected wetland and provides migratory bird habitat. The wetland management goal is to protect the wetland, maintain flood protection, control sediment, and remove nutrients. Upland vegetation is managed through burning, spraying, and interseeding. A gravel path encircles the wetland. Invasive species are cause for concern.

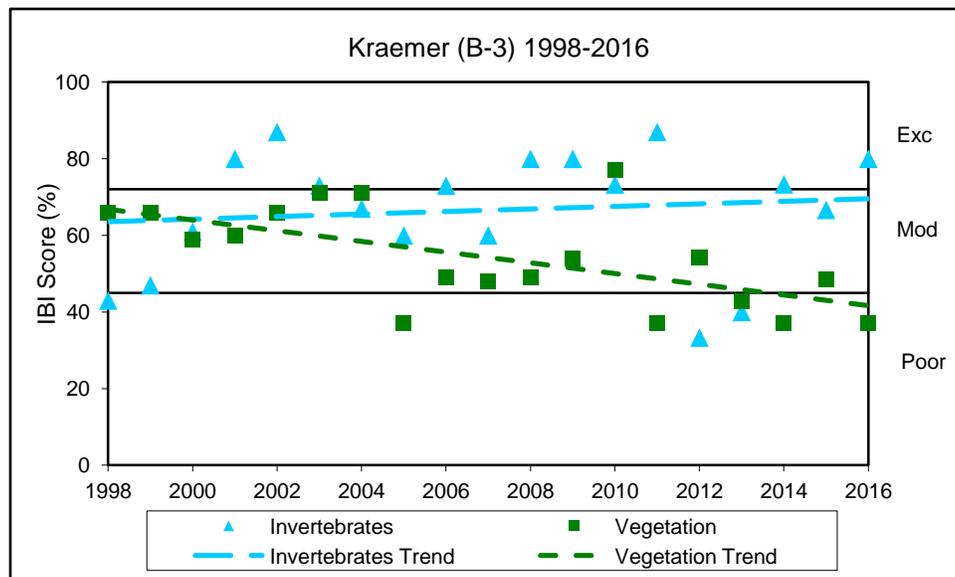
## Wetland Health

**Site Observations:** This is a large wetland surrounded by a walking trail. Dense cattail surround the wetland, encroaching 20 or more meters from the shore to the open water. There is an approximately two foot drop off from the edge of the cattail into the open water. The wetland bottom is solid to moderately mucky. Catfish were observed.

**Table 4.2.2 Kraemer Preserve (B-3) Wetland Health based on Index of Biotic Integrity**

	Invertebrates 	Vegetation 
<b>2016 Data (B-3)</b>		
<b>Wetland Health Rating (IBI score)</b>	Excellent (24)	Poor (13)
<b>Trend 1998-2016</b>	Variable but stable	Variable but declining

**Figure 4.2.2 Invertebrate and vegetation trends for Kraemer Preserve (B-3)**



**Site summary:** This is the nineteenth consecutive year of sampling for Kraemer Preserve (B-3), and was first surveyed in 1998. Invertebrate and vegetation scores have been inconsistent in 2014, 2015, and 2016 with invertebrates scoring higher (excellent or nearly excellent) than vegetation (poor or nearly poor). Despite a couple of years scoring poor, in 2012 and 2013, the invertebrates trend appears to be stable. The vegetation trend implies decreasing health, though it appears to be stable since 2005. Prior to 2005 vegetation scores were high moderate.

### 4.2.3 Alimagnet Dog Park (B-6)

Alimagnet Dog Park (B-6) is a 3.5 acre, type 3 wetland located within the Lake Alimagnet subwatershed within the Vermillion River Watershed. The Lake Alimagnet Subwatershed is 1,392 acres and 10 percent impervious. There is one inlet on the west side of the wetland and no outlets. The wetland is part of the City’s stormwater management plan. It is designated as an Improvement Class wetland and is managed for aesthetic, recreation, education, and science.



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

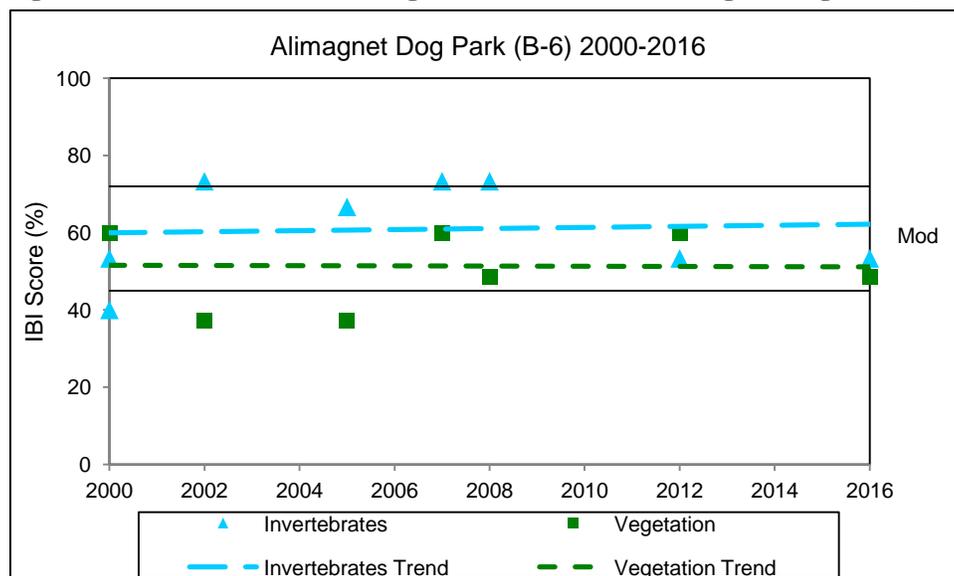
#### Wetland Health

**Site Observations:** The wetland substrate is mucky and the slope is gentle. Some woody vegetation overhangs the water. Cattail and pondweed were plentiful. The vegetation plot contained more open water than the rest of the wetland as a whole.

**Table 4.2.3 Alimagnet Dog Park (B-6) Wetland Health based on Index of Biotic Integrity**

	Invertebrates 	Vegetation 
<b>2016 Data (B-6)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (16)	Moderate (17)
<b>Trend 2000-2016</b>	Stable	Stable

**Figure 4.2.3 Invertebrate and vegetation trends for Alimagnet Dog Park (B-6)**



**Site summary:** This is the seventh time that Alimagnet Dog Park (B-6) has been surveyed since originally surveyed in 2000. Invertebrate and vegetation scores were consistent with each other in 2012 and 2016. The invertebrate data has varied over the years, but indicates a stable trend. Besides vegetation scores of poor in 2002 and 2005, the other years of data have been similar, and the overall data indicates a stable trend, as well.

#### 4.2.4 Terrace Oaks North (B-7)

Terrace Oaks North (B-7) is a 2.2 acre, type 4 wetland located within the E15 Drainage Area of the East Subwatershed (2,171 acres) of the Black Dog Watershed (3,700 acres). The E15 Drainage area is 15.7 acres and approximately five percent impervious. The wetland is part of the City’s stormwater management plan. It has no inlets and one 12-inch outlet in the southeast corner of the wetland. It is a protected wetland and is being managed to maintain the wetland and its existing functions, values, and wildlife habitat.

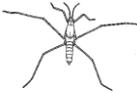


Terrace Oaks North is located on the north end of Terrace Oaks Park. There is an approximately 150-foot buffer on its northern edge. Burnsville Parkway runs less than 50 feet south of the wetland. Invasive species, winter road salt and sand, and stormwater runoff are disturbances of concern. Nearby streets are swept twice per year.

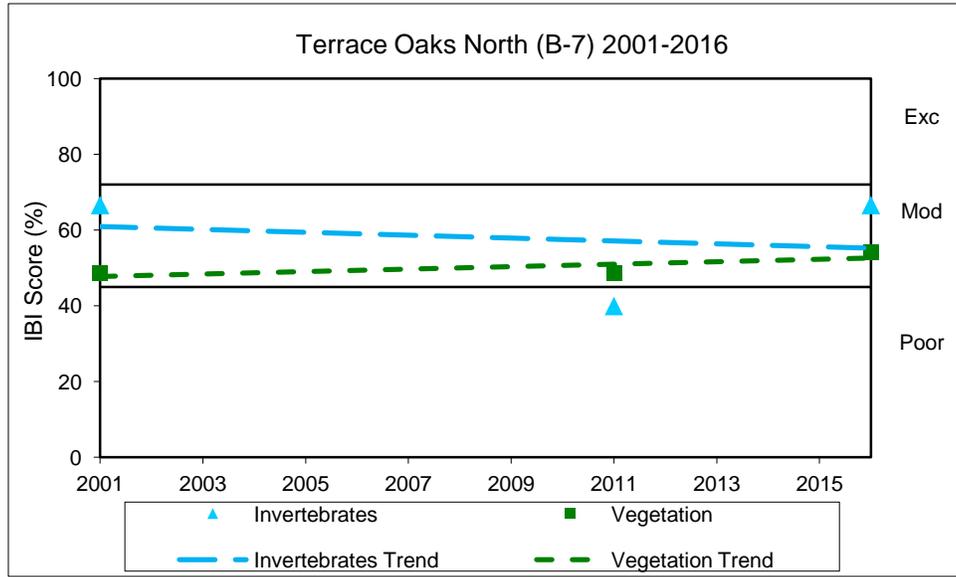
#### Wetland Health

**Site Observations:** The wetland has a steep slope and a mucky substrate. A lot of reed canary grass, duckweed, and other vegetation is present. It is surrounded by woody vegetation. Ducks, hummingbirds, dragonflies, damselflies, water beetles, and muskrat hut were observed.

**Table 4.2.4 Terrace Oaks North (B-7) Wetland Health based on Index of Biotic Integrity**

	Invertebrates 	Vegetation 
<b>2016 Data (B-7)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (20)	Moderate (19)
<b>Trend 2001-2016</b>	Not enough data	Not enough data

**Figure 4.2.4 Invertebrate and vegetation trends for Terrace Oaks North (B-7)**



**Site summary:** This is the third time that B-7 has been surveyed since 2001. The invertebrate and vegetation scores were inconsistent with each other; however, both scored moderate. 2016 scores are similar to the initial survey in 2001. Vegetation scores have remained stable for all three surveys. More data is necessary to determine a reliable health trend.

### 4.3 Dakota County Parks Wetlands

Four wetlands were monitored for Dakota County in 2016. This is the second year that Dakota County has monitored wetlands with WHEP, and the first year that an organized WHEP team has been dedicated to monitoring these wetlands.

**Team Leaders:** Rachel Crownhart

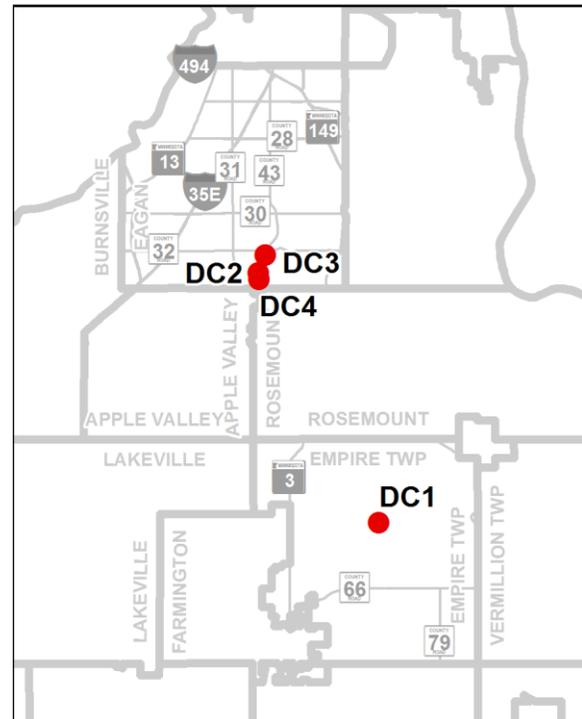
**Team Members:** Georg Fischer, Thomas Fischer, Amy Fischer, Laura Huseby, Ronald Johnson, Sarah Pronschinske, Samantha Putlak, and John Valo



Rachel Crownhart

This is Rachel’s second year as a WHEP team leader. She was previously Hastings’ team leader. She has worked Dakota County’s Natural Resource Department since fall of 2015. She said that she was more than happy to jump into the role of team leader for Dakota County Parks when the opportunity arose. She remarked, “This season was extra special for me because of the work my department has been doing on restoring one of

**Dakota County WHEP Sites Monitored in 2016**



Dakota County’s wetlands: Buck Pond. Everyone was amazed to see the transformation in just one year of restoration work. I feel a special bond to our wetlands because I work so closely with each park on a daily basis. I can’t wait to see all the positive changes that our natural resource’s restoration practices will have. Thanks to all my dedicated volunteers this summer! I hope to have you all back next year.”



Meghan Manhattan with Quinn Jones

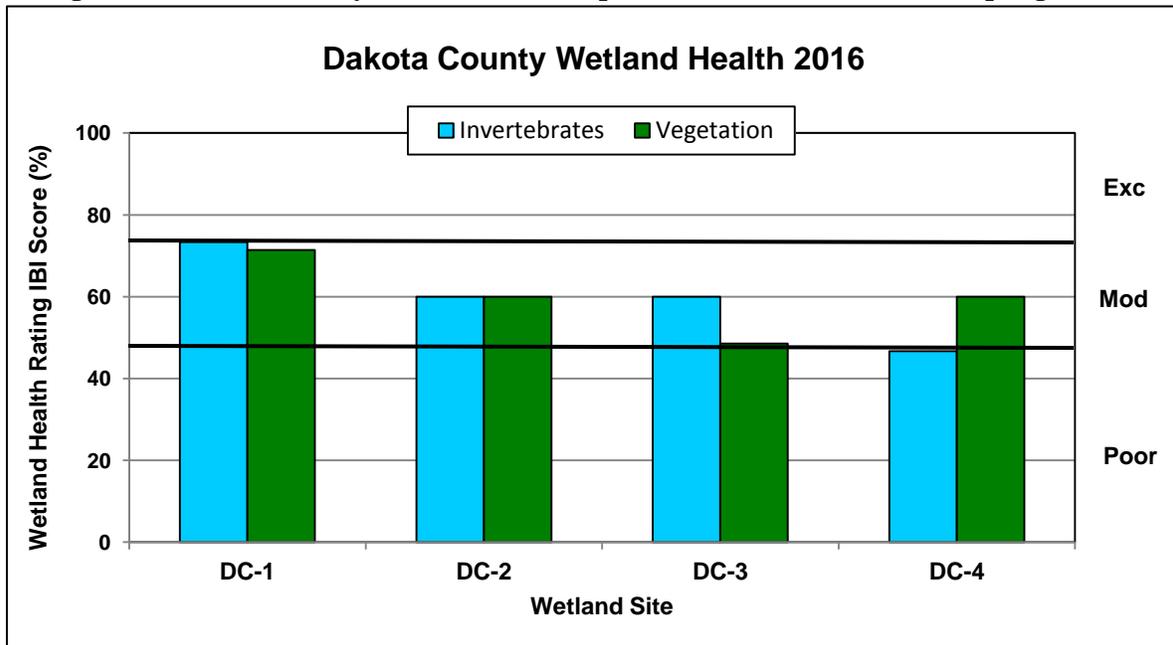
Meghan Manhattan is Dakota County Parks’ WHEP contact. She said, “Dakota County Parks’ mission is to enrich lives by providing high quality recreation and education opportunities in harmony with natural resource preservation and stewardship. We’re currently managing over \$2 million in natural resource restoration projects across 800 acres within our park system. We’re committed to ongoing monitoring of our restorations to ensure that we achieve positive outcomes for wildlife and vegetation in our park system.

“We began our partnership with WHEP in 2015 at one wetland site, Buck Pond, planned for restoration the following year. The data we received helped inform our restoration approach at that site. In 2016, we expanded to four locations within areas of our parks where we’re actively doing restoration. WHEP is a great resource for important water quality measures, and is a great complement to our other vegetation and wildlife monitoring programs. We also love that this program engages volunteers in such a meaningful way.”

## Dakota County Parks General Wetland Health

Figure 4.3 presents an overall view of wetland health for all of the 2016 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. Four wetlands were monitored in the Dakota County Parks in 2016. The invertebrates and vegetation scores for DC-1 and DC-2 were consistent. All sites scored moderate, except for DC-4 which scored poor for vegetation.

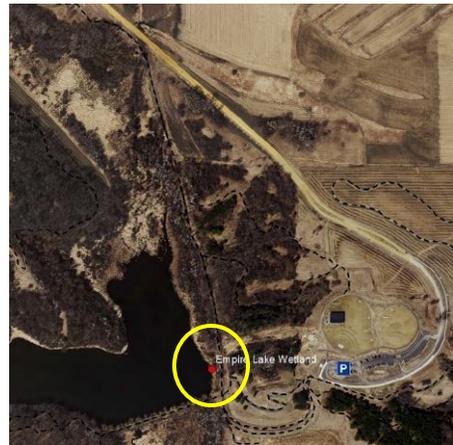
**Figure 4.3 Dakota County Parks site scores (percent form) for the 2016 sampling season**



### 4.3.1 Empire Lake (DC-1)

Empire Lake (DC-1) is a 25.1 acre, type 5 wetland located in the Vermillion River watershed. The watershed is 6 square miles and 5 percent impervious. Empire Lake is the man-made result of impounding an unnamed tributary stream to the Vermillion River. This dike was build starting in 1965. Some improvements have been made to the dike since the original construction. Water enters the lake on the west side via a stream channel and exits at the dike on the east.

Empire Lake is located within Whitetail Woods Regional Park. The surrounding area includes agricultural fields, natural areas, and gravel mining. The adjacent woodland is highly disturbed by invasive buckthorn. Dakota County began implementing major ecological restoration of the adjacent uplands, including buckthorn removal, in the fall of 2015 and will continue completing restoration plans until June 2019. Data collected before, during, and after the restoration will monitor the affects of the project on the wetland. A Natural Resources System Management Plan is being completed for Dakota Coutny, along with an individual Management Plan for Whitetail Woods Regional Park which will address water quality and lake quality. A water quality survey was completed on this lake in 2009 measuring healthy phosphorus levels. Secchi disk measurements also indicate higher water clarity.



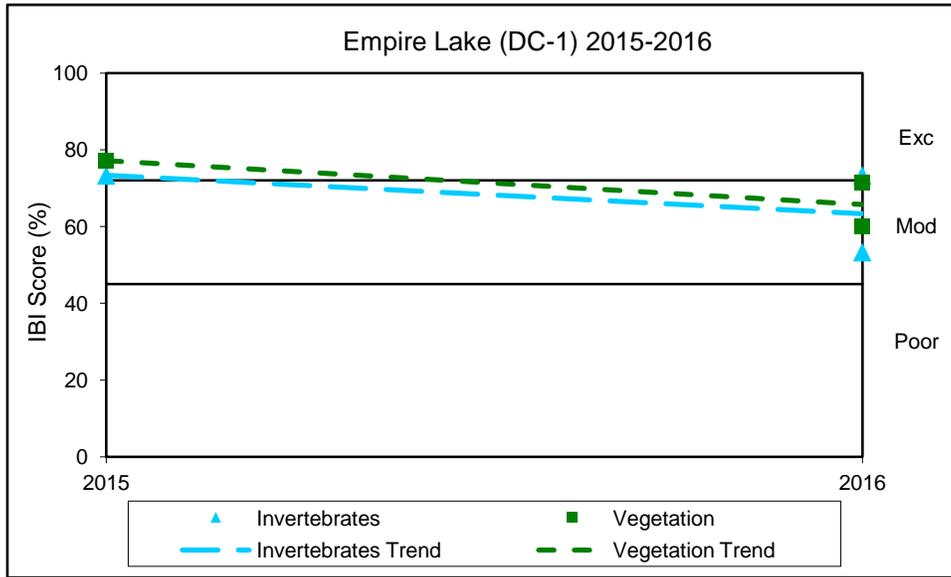
### Wetland Health

**Site Observations:** The wetland has a gentle slope. The substrate is very mucky and difficult to walk. The monitoring site is located in the southeast corner of Empire Lake. A hiking trail leads to the lake from a parking area. Near the releve were many floating mats of vegetation, most of which are sedges.

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

	Invertebrates 	Vegetation 
<b>2016 Data (DC-1)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (22)	Moderate (25)
<b>Cross-check Rating (IBI score)</b>	Moderate (16)	Moderate (21)
<b>Trend 2015-2016</b>	Not enough data	Not enough data

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



**Site summary:** This is the second year that Empire Lake has been monitored by WHEP. The invertebrate and vegetation scores were consistent with each other. Scores by the City team are very similar to 2015 scores. The cross-check team calculated lower scores than the City team for both invertebrates and vegetation. The City team collected a more diverse sample of invertebrates than the cross-check team which improved the invertebrate score. Slight differences in plant identification and cover class imposed scoring differences between the two teams. More years of monitoring is needed to determine a more reliable wetland health trends.

### 4.3.2 Buck Pond (DC-2)

Buck Pond (DC-2) is a 1.6 acre, type 3 wetland located in the Lower Minnesota River watershed. The pond’s watershed is approximately 12 acres with zero impervious surface. It is a small, round pond/wetland located roughly in 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. There is very low plant diversity within the basin and very little native emergent vegetation. The soils are fine sands.



Dakota County began implementing major ecological restoration of this wetland in December 2015 and will continue 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 to expose and reestablish the native wetland seed bank. It is uncertain if the seed bank is still viable. Seeding and plugging may be necessary in the future. Data collected before, during, and after the restoration will monitor the affects of the project on the wetland.

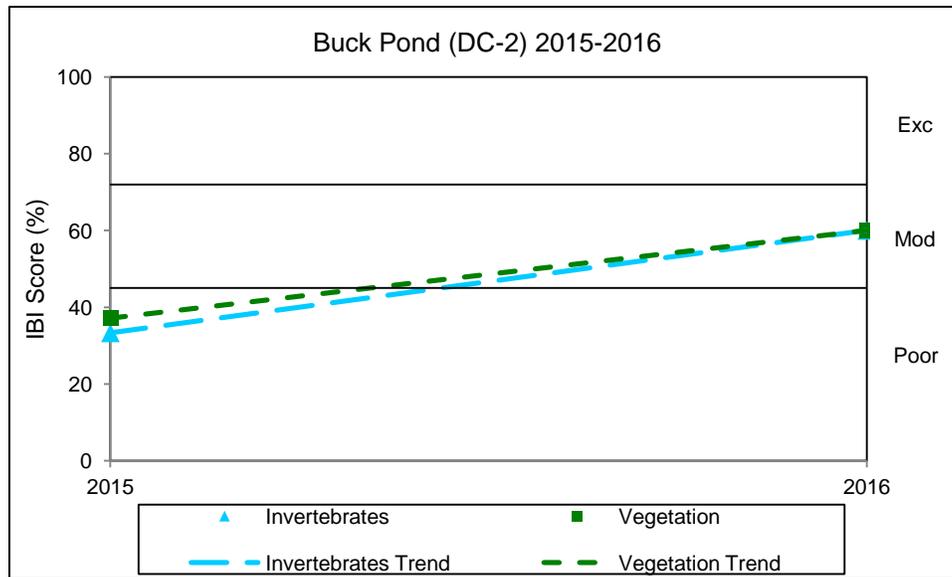
## Wetland Health

**Site Observations:** The wetland slope is gentle. The wetland substrate is moderately solid. Water plantian, spike rush, smartweed, duckweed, and muskgrass were present.

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

	Invertebrates 	Vegetation 
<b>2016 Data (DC-2)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (18)	Moderate (21)
<b>Trend 2015-2016</b>	Not enough data	Not enough data

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



**Site summary:** This is the second year that Buck Pond has been monitored by WHEP. The invertebrate and vegetation scores were consistent with each other, and both scored moderate. This is an improvement from the poor scores in 2015. It may indicate that the existing seed bank is viable. More years of monitoring is needed to determine more reliable wetland health trends.



Rachel Crownhart and John Salo



Georg Fischer



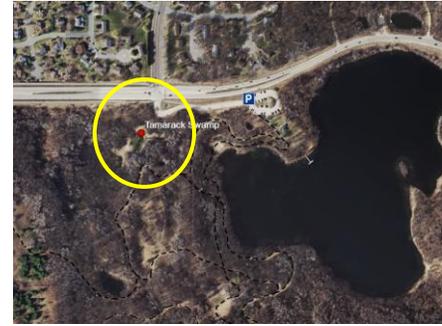
Amy Fischer



Rachel Crownhart, Georg Fischer, John Salo, Anna Fischer, Amy Fischer, and Thomas Fischer

### 4.3.3 Tamarack Swamp (DC-3)

Tamarack Swamp (DC-3) is a 7.7 acre, type 3 wetland located in the Lower Minnesota River watershed. The wetland’s watershed is approximately 40 acres with zero impervious surface. No large scale alterations to the historic hydrology of the swamp have been detected, and efforts have been made throughout the history of the park to protect this unique feature from human impact.



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. The wetland substrate is very mucky and makes walking difficult. A very dense layer of duckweed was present at the water surface and made dipnetting efforts difficult. Reed canary grass surrounds the wetland site.

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

	Invertebrates 	Vegetation 
<b>2016 Data (DC-3)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (18)	Moderate (17)
<b>Trend 2016</b>	Not enough data	Not enough data

**Site summary:** This is the first year that Tamarack Swamp has been monitored by WHEP. The invertebrate and vegetation scores were consistent with each other, and both scored moderate. More years of monitoring is needed to determine reliable wetland health trends.

### 4.3.4 Jensen Lake (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/altere d 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 natural community. The south and east woodlands are more degraded with invasive species like buckthorn and honeysuckle which will be removed and treated with the completion of the restoration of this area. Baseline data is wanted to monitor the change over time in this natural area as the land is restored and maintained to the proper native plant community. Dakota County would like to use the WHEP data to monitor this restoration area. Dakota County is in the process to apply for another grant with the Minnesota Department of Natural Resources for lakeshore restoration around Jensen Lake.

### Wetland Health

**Site Observations:** The sampling site of Jensen Lake is located in the northeast corner of the lake. The wetland slope is gentle. The wetland substrate is mucky but accessible. Moderate amounts of emergent vegetation and high amount of subergent vegetation were present.

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

	Invertebrates 	Vegetation 
<b>2016 Data (DC-4)</b>		
<b>Wetland Health Rating (IBI score)</b>	Poor (14)	Moderate (21)
<b>Trend 2016</b>	Not enough data	Not enough data

**Site summary:** This is the first year that Jensen Lake has been monitored by WHEP. The invertebrate and vegetation scores were inconsistent with each other, scoring poor and moderate, respectively. More years of monitoring is needed to determine reliable wetland health trends.

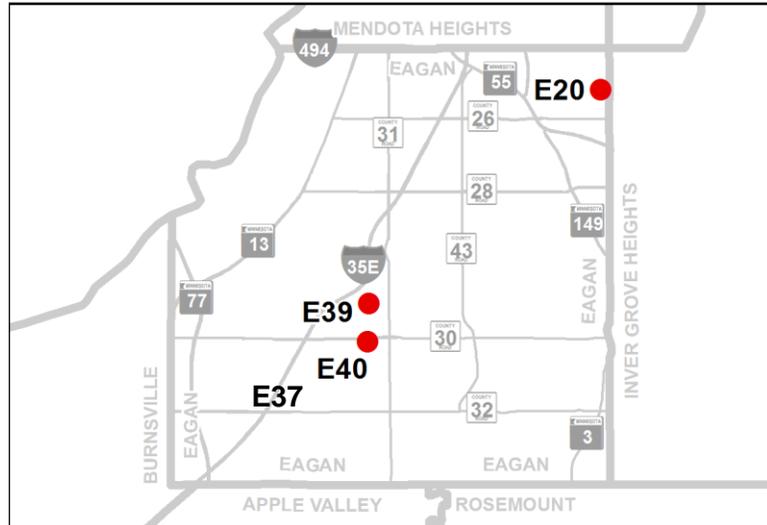
## Eagan WHEP Sites Monitored in 2016

### 4.4 Eagan Wetlands

The Eagan team monitored three wetlands in 2016. Since WHEP began in 1997, Eagan has monitored 39 wetlands.

**Team Leaders:** Marianne McKeon

**Team Members:** Nicole Deziel, Patrick Francek, Robert Giefer, Craig Harnagel, Ava McKeon, Susan Melvin, Mark Niznik, Greg Searle, Lindsey Terres, Rachel Turin, Edward Turin, and Danny Turin



Marianne McKeon

Marianne McKeon has been involved in WHEP since 2007, and has been Eagan’s team leader for the past 6 years. She commented, “2016 proved to be another year of surprises. It was definitely a case of not judging a pond by its appearance. Shanahan Lake had been historically one of the most pristine wetlands in Eagan and we arrived somewhat eagerly to assess any potential impacts the installation of a road in recent years may have had on it. From the outside you would’ve thought it had tremendous invertebrate diversity with decent vegetation but we had a hard time finding anything and there were many fish in our traps--we even did a second sample with the same poor results. The opposite was the case with Black Hawk Middle School Pond--we all took one look and thought we wouldn’t find much but it ended up being the most diverse pond in terms of invertebrates with quite the array of leeches no

less! The plants were, however, not diverse. We can only speculate on what the data means as we continue to collect over the years. I was very grateful to once again have such a dedicated and flexible team of citizen scientists--and they really are great (and funny) company!”



Jessie Koehle

Jessie Koehle is the Water Resources Technician for the City of Eagan. She explained, “I have been involved with selection of Eagan’s WHEP testing 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.

“At the City of Eagan, WHEP data is 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 which is how to track 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.”

Eric Macbeth is the manager of Eagan’s water resources programs that focus on protecting and improving lakes, conserving wetlands, and preventing stormwater pollution. “We have supported WHEP since being an original city when the program began in 1997. We think it gives residents a wonderful opportunity to be educated and involved. WHEP volunteers literally get their hands wet,” he says. “With about 830 lakes and wetlands in our city, most residents live very near a wetland or regularly visit parks with wetlands. WHEP helps strengthen our community’s appreciation of these surface waters and builds support of our water resources programs.”

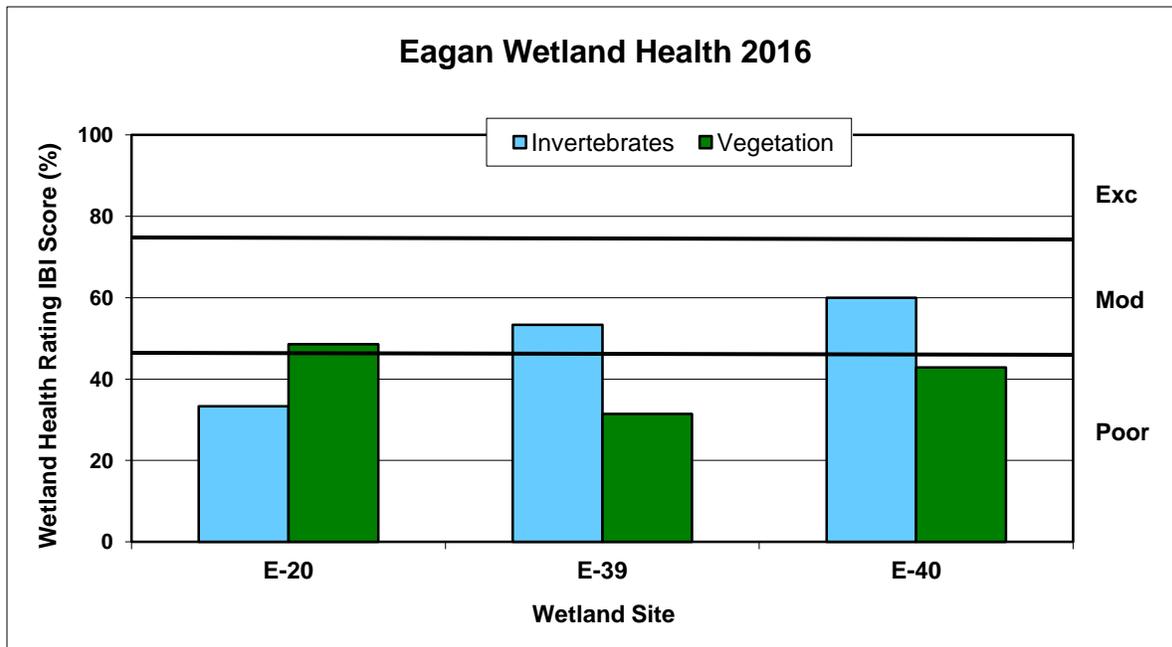


Eric Macbeth

## Eagan General Wetland Health

Figure 4.4 presents an overall view of wetland health for all of the 2016 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 2016. The invertebrates and vegetation scores for each of the sites were inconsistent. E-20 scored poor for invertebrate health and moderate for vegetation health. E-39 and E-40 each scored moderate for invertebrate health and poor for vegetation health.

Figure 4.4 Eagan site scores (percent form) for the 2016 sampling season



### 4.4.1 Shanahan Lake (E-20)

Shanahan Lake (E-20) is a Public Water #19-0054. This 13-acre, type 5 wetland is within the City of Eagan’s “F” drainage district within the Eagan-Inver Grove Heights Watershed which eventually drains to the Minnesota River. The wetland watershed is 56.4 acres and approximately one percent impervious. Storm ponds have been created near the west side of the lake to intercept much of the runoff from area roads and business development. Shanahan Lake is part of the City of Eagan’s stormwater management plan, and it is also designated by the City as a Class L2 lake which emphasizes fishing and canoeing as highest management goal. There is one inlet midway on the southern shore and one inlet at the southwestern area of the lake. The lake drains via one outlet at the northeastern shore. A conservation easement was established around the perimeter of the lake in 2008, ensuring a wooded and grassy buffer area. There is land development potential to the north and south in Eagan and all around the lake in Inver Grove Heights.



### Wetland Health

**Site Observations:** The wetland is more mucky than solid and has a very steep slope. This site appears well preserved at a glance, but scores were less than expected. Sunfish and minnows were observed.

**Table 4.4.1 Shanahan Lake (E-20) Wetland Health based on Index of Biotic Integrity**

	Invertebrates 	Vegetation 
<b>2016 Data (E-20)</b>		
<b>Wetland Health Rating (IBI score)</b>	Poor (10)	Moderate (17)
<b>Cross-check Rating (IBI score)</b>	Poor (12)	Excellent (27)
<b>Trend 2005-2016</b>	Not enough data	Not enough data



Greg Searle and Marianne McKeon

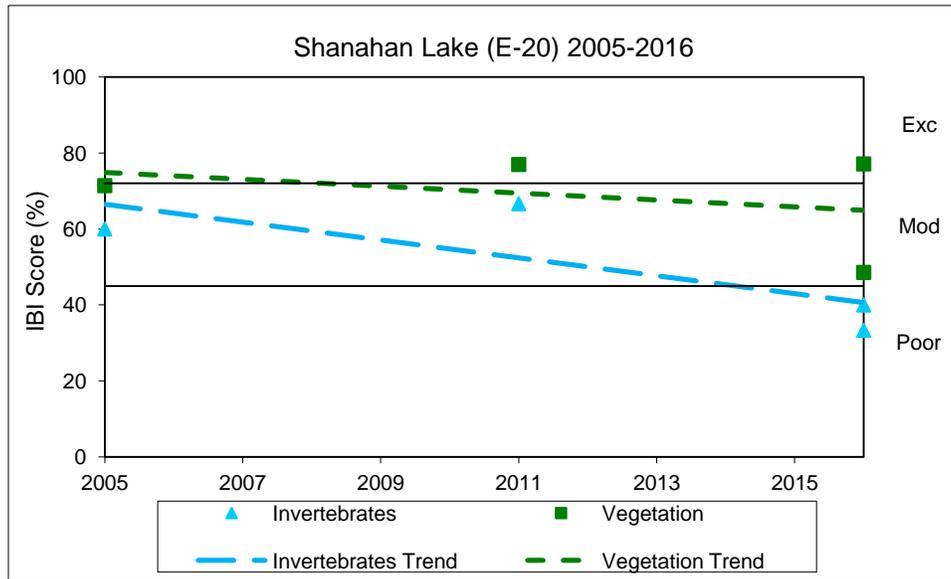


Bob Giefer and Mark Niznik



Craig Harnagel and Nicole Deziel

**Figure 4.4.1 Invertebrate and vegetation trends for Shanahan Lake (E-20)**



**Site summary:** This is the third time that Shanahan Lake has been surveyed since 2005. This WHEP site was cross-checked in 2016. The invertebrate and vegetation scores were inconsistent per team. The City team scored poor for invertebrate health and moderate for vegetation health. The cross-check team scored poor for invertebrate health and excellent for vegetation health. The invertebrate scores of each team were consistent with each other. Both the City team and cross-check team commented that the bottle trap results were poor due to large number of predators including fish, tadpoles, and crayfish. The vegetation scores of each team were inconsistent with each other. The cross-check team located a vegetation plot with a larger diversity of vegetation than the City team. In addition, the cross-check team identified bladderwort within the plot which helps to increase the vegetation score. The vegetation score calculated by the cross-check team is similar to past vegetation scores. The invertebrate scores dropped from moderate to poor in 2016. More years of data will determine reliable health trends.

#### 4.4.2 Black Hawk Middle School Pond (E-39)

Black Hawk Middle School Pond (E-39), also known as BP-29.6, is a 0.3-acre, type 4 wetland area within the City of Eagan’s “B” drainage district within the Eagan-Inver Grove Heights Watershed that drains toward Blackhawk Lake. The watershed is 24 acres and is 31 percent impervious. Located alongside the entrance road to Black Hawk Middle School, the pond is part of the City’s stormwater management system. The designated storm basin captures stormwater runoff from the nearby school grounds. The City built an iron-enhanced sand filter along the northern high-water edge of the basin to strip phosphorus from the stormwater before it drains to Blackhawk Lake. There is one inlet on the west side and one outlet in the northeast area. The shoreline is bordered by cattails. Grasses and trees also nearby.



## Wetland Health

**Site Observations:** Four species of leeches were collected, as well as one family of dragonfly, one family of planar snail, and several beetles and truebugs. Floating leaved forbs and cattail dominated the vegetation near the wetland site.

**Table 4.4.2 Black Hawk Middle School (E-39) Wetland Health based on Index of Biotic Integrity**

	Invertebrates	Vegetation
<b>2016 Data (E-39)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (16)	Poor (11)
<b>Trend 2016</b>	Not enough data	Not enough data

**Site summary:** This is the first time the Black Hawk Middle School Pond has been surveyed. Invertebrate and vegetation scores were not consistent. Invertebrates received a moderate health score, and vegetation received a poor health score. The leech diversity and Corixidae proportion metrics aided the invertebrate score. More years of data will help determine reliable health trends.

### 4.4.3 Heine Pond (E-40)

Heine Pond (E-40) is Public Water #19-0153. This 7.4-acre, type 5 wetland is within the City of Eagan’s “B” drainage district within the Eagan-Inver Grove Heights Watershed. The wetland watershed is 17 acres and 15 percent impervious. It occasionally drains north toward Blackhawk Lake. Heine Pond is within the City of Eagan’s stormwater management system, and is designated by the City as a Class L1 lake, which is the highest water quality classification. There are no inlets and there is only one outlet on the western shore, but the pond only discharges when water levels are high. The stormwater flow was redirected around Heine Pond in the 1990s in order to protect the pond. Most of the shoreline is buffered by woody vegetation. The surrounding area includes a public park on the northern and western sides of the wetland and residential properties. There is a sandy beach area on the north park trail and a fishing pier that was installed in 2015.



## Wetland Health

**Site Observations:** This wetland has a gentle slope and a mucky substrate. Woody species including maple, ash, cottonwood, and willows hang over the water. Eurasian water milfoil, reed canary grass, purple loosestrife, and oriental mystery snails are present. Snails, dragonflies, and fingernail clams were collected in 2016.

**Table 4.4.3 Heine Pond (E-40) Wetland Health based on Index of Biotic Integrity**

	Invertebrates 	Vegetation 
<b>2016 Data (E-40)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (18)	Poor (15)
<b>Trend 2016</b>	Not enough data	Not enough data

**Site summary:** This is the first year that Heine Pond has been surveyed. The invertebrate and vegetation scores were inconsistent with each other. Though a low diversity of invertebrates were collected, it still scored moderate for invertebrate health. The high snail diversity and Corixidae proportion metrics aided the invertebrate score. The invasive water-milfoil dominated the vegetation community; possibly restricting vegetation diversity. More years of data will determine reliable health trends.

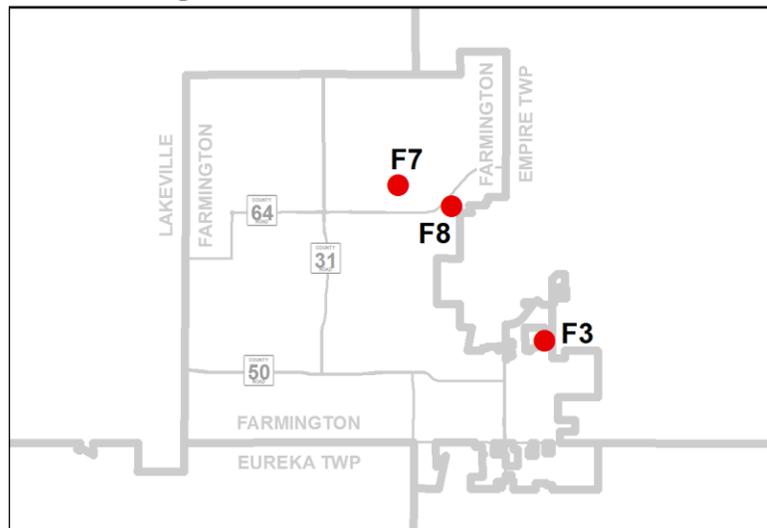
### 4.5 Farmington Wetlands

The Farmington team sampled three wetlands in 2016. The City has monitored eight wetlands through the WHEP program since 1997, and has many years of data.

**Team Leader:**  
Rick Schuldt

**Team Members:** Rollie Greeno, Josiah Hakala, Katie Koch-Laveen, Paige Letourneau, Liz McCarty, Laurie Ollhoff, and Marcia Richter

**Farmington WHEP Sites Monitored in 2016**



Rick Schuldt

Rick Schuldt has been involved with WHEP since 2010. He assumed leadership of the Farmington team this year following the retirement of Katie Koch-Laveen. He has a far greater appreciation for Katie’s contribution to the program over the years after completing his first year in that role. The Farmington team members were a huge help with the transition and their commitment to the program. Their comradery is much appreciated. He also wants to apologize for getting them lost in a cattail marsh on a hot steamy summer’s eve.

Rick is a retiree of the U.S. Fish and Wildlife Service where he spent many years working in tributaries to the Great Lakes. He enjoys the switch to small wetlands to learn about a different suite of organisms and plants and to follow their changes from year to year.



Jen Dullum

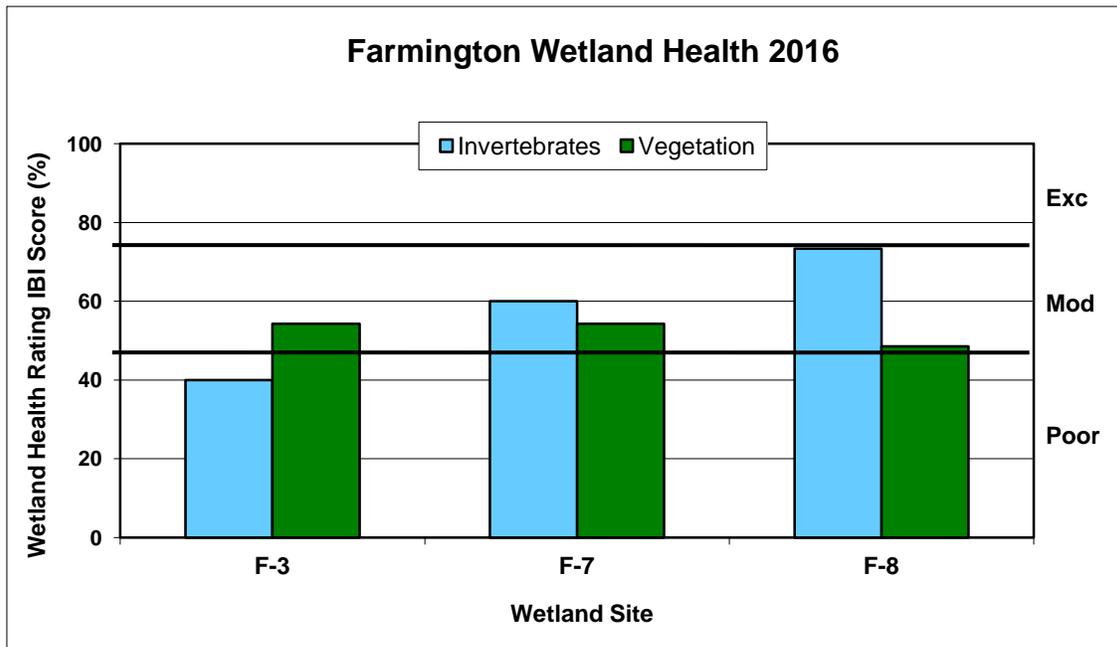
Jen Dullum directs the WHEP program for the city of Farmington. Her role is to publicize the program, determine the wetlands monitored, provide any team needs, and review collected data. The City has been a WHEP participant since 1997. They collect data from one long-term monitoring site and several newer sites which are selected for project specific decision-making needs. Data is also used to compare development impacts on local water resources.

Jen commented, “2016 brought change within our WHEP Team. Katie Koch-Laveen, who had been team lead since 2000, decided to take a break from the lead position. Her dedication and expertise will be missed. Farmington was lucky to have her for so long! Rick Schuldt has proven to be a devoted new team leader, fostering open lines of communication. He and the rest of the team consistently gather valuable information and we cannot thank them enough for the service that they provide for the city.”

## Farmington General Wetland Health

Figure 4.5 presents an overall view of wetland health for all of the 2016 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; however, only the invertebrates score for F-3 was found to be poor. This is similar to 2014 data. Invertebrate and vegetation health scores were inconsistent for F-3 and F-8.

Figure 4.5 Farmington site scores (percent) for the 2016 sampling season



### 4.5.1 Kral Pond (F-3)

F-3, also known as Kral Pond, is a ten acre wetland with a drainage area of 41.8 acres which is 6.6 percent impervious. It is a type 4 wetland located within the Vermillion River Watershed. 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 designated as a Manage 2 wetland in the City wetland management plan. 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 housing and agriculture impact the man-made wetlands.



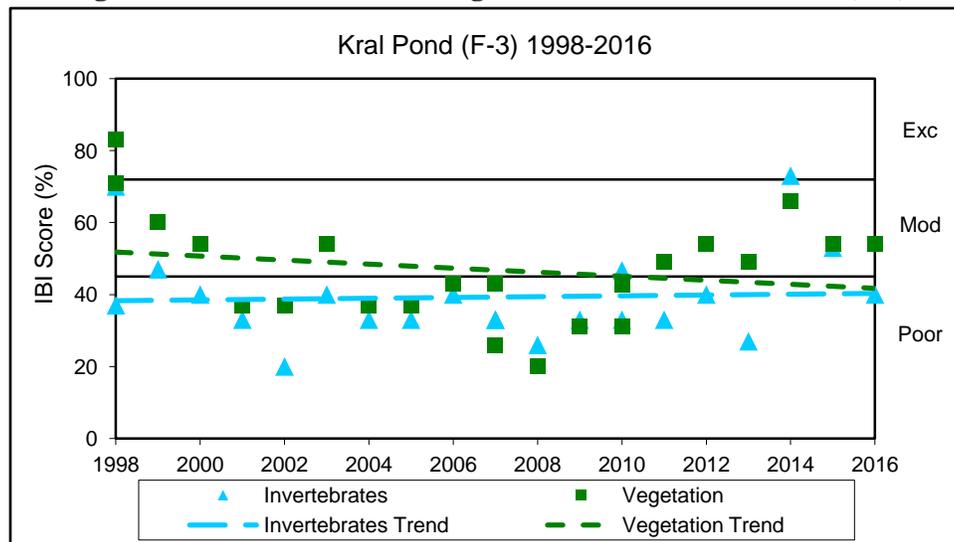
### Wetland Health

**Site Observations:** This is a large wetland with extensive stands of cattail. The slope to the wetland is steep, but gentle into the water. The substrate is solid near shore and more mucky beyond cattails. Fewer invertebrates were collected in 2016 compared to prior years of data. Reed canary grass is present.

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

	Invertebrates 	Vegetation 
<b>2016 Data (F-3)</b>		
<b>Wetland Health Rating (IBI score)</b>	Poor (12)	Moderate (19)
<b>Trend 1998-2016</b>	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 19 consecutive years. The invertebrate and vegetation scores were not consistent in 2016. Invertebrates received a poor health score while vegetation received a moderate health score. The data throughout the years has been variable; gradually decreasing from 1998 to 2008 and then improving from 2008 to 2016. 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 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 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.

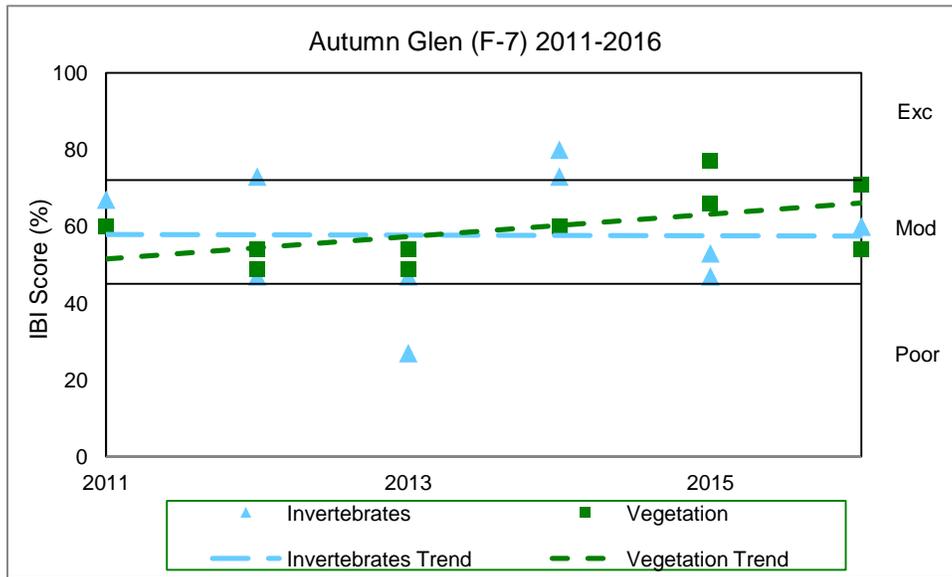
#### Wetland Health

**Site Observations:** The wetland slope is very gentle. The wetland substrate is fairly solid. Reed canary grass surrounds the wetland. Duckweed, water-meal, and pondweed dominated the vegetation. A bicycle path runs along the south side of the wetland separated by a wide stand of reed canary grass. The low water experienced during 2015 sampling period was not a problem this year due to ample rains throughout the summer. 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 
<b>2016 Data (F-7)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (18)	Moderate (19)
<b>Cross-check Rating (IBI score)</b>	Moderate (18)	Moderate (25)
<b>Trend 2011-2016</b>	Variable, but stable	Improving

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



**Site Summary:** This is the sixth consecutive year that Autumn Glen has been monitored. The invertebrate and vegetation scores surveyed by the City team were consistent with each other, each scoring moderate. In 2016, the invertebrate scores between the City team and the cross-check team were consistent, but the vegetation scores were not. The City team and cross-check team found very similar plant species; however, the cross-check team identified bladderwort which improved their vegetation score. The vegetation trend appears to be improving. The invertebrate scores are variable, though the trend appears stable. The City team commented that the invertebrate diversity seemed low in 2016.

### 4.5.3 Mystic Meadows (F-8)

Mystic Meadows (F-8) is a 6.2-acre, type 2 wetland within the Vermillion River Watershed. The wetland drainage area is 8.2 acres and flows north to North Creek. There is one inlet on the southwest corner of the wetland. There is one outlet in the southeast corner and one outlet in the northeast corner of the wetland.



Mystic Meadows wetland is a created wetland which accompanied a City road construction project. The wetland is being managed to better understand the dynamics of a created wetland and actively managed upland prairie. There is development to the south and agriculture to the north. Wetland buffers are in place.

### Wetland Health

**Site Observations:** The sampling site is in a circle of open water completely surrounded by cattails. A controlled burn was done several years ago to reduce cattail, but appears to have had little effect. Brook stickleback and bluntnose minnows were observed in the site, indicating a connection to nearby ponds. Although a difficult location to access, the site appears to show promise for continued sampling especially for invertebrates. Since the site is surrounded by cattails, there is no opportunity in the vegetative surveys to collect plants in the low vascular, woody, grasslike, or emergent forbs from a distinct stem groups.

**Table 4.5.3 Mystic Meadows (F-8) Wetland Health based on Index of Biotic Integrity**

	Invertebrates	Vegetation
<b>2016 Data (F-8)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (22)	Moderate (17)
<b>Trend 2016</b>	Not enough data	Not enough data



Rick Schuldt, Marcia Richter,  
Paige Letourneau



Josiah Hakala, Marcia Richter



Paige Letourneau, Josiah Hakala,  
Liz McCarty, Rick Schuldt

**Site Summary:** This is the first time that Mystic Meadows has been surveyed. Invertebrate and vegetation scores were not consistent with each other; however, each category scored moderate health. Muskgrass dominated the vegetation community. Very little diversity of vegetation was present in the vegetation plot. The team commented that the dense stand of cattails deprives the vegetation plot from emergent and grasslike vegetation.

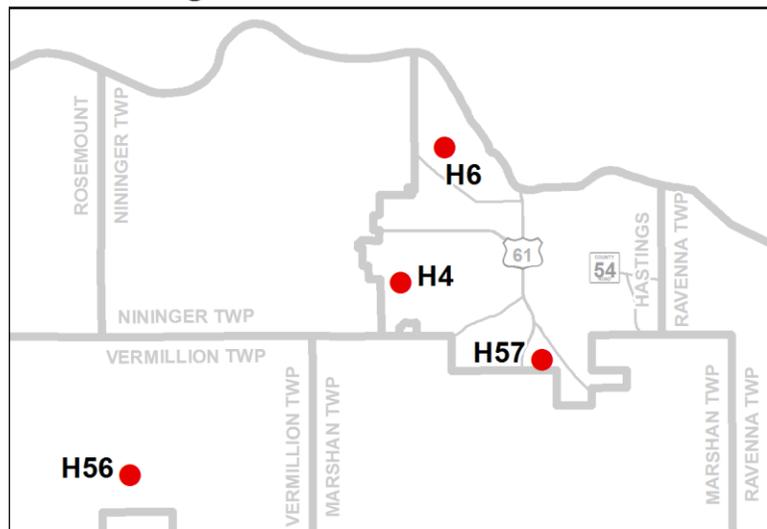
### 4.6 Hastings Wetlands

Four wetlands were monitored in Hastings in 2016. Nine wetlands have been sampled in the City of Hastings through the WHEP program since 1999.

**Team Leader:** Jessie Eckroad

**Team Members:** Alex Frazen, Sue Gerlach, Andrew Hilger, Brian Huberty, Mike Nelson, Megan Orthman, Mike Shelhamer, Kevin Smith, Dwight Smith, Alexander Theisen, and Jackie Vierck

**Hastings WHEP Sites Monitored in 2016**





Jessie Eckroad

This was Jessie Eckroad’s second year as a WHEP team leader. She wrote, “I joined WHEP in the Spring of 2015 with the intent to gain experience as a leader and scientist, and although field sessions and lab ID work were incredibly fascinating and educational, I found that my favorite part of WHEP was the amazing group of people I am privileged to call my team *and* my friends. Because of their incredible patience, dedication, experience, and support, I transformed from an apprehensive rookie into a confident, knowledgeable, fun-loving leader. This summer, it was great to build on the relationships I formed with my team mates last year, and we made many great memories this season! For me, the most meaningful moment happened when we came across a family of Pie-billed Grebes at the 180<sup>th</sup> Street Marsh location. The chicks had bailed from the nest, and we spent time carefully trying to find and return them to their floating home (only to find out later that grebe are EXCELLENT swimmers and very comfortable in the water from a young age). It was wonderful for us to admire not only the grebe family, but ALL the life in the wetland. Sometimes I get so focused on collecting and

identifying samples that I forget to look up and appreciate the complexity and importance of the entire ecosystem. Those little birds helped to remind me of the big picture. Ever since then, I have taken time at each location to observe wildlife and reflect on the larger purpose of the service that WHEP provides to our communities.”

John Caven is the Assistant City Engineer for the City of Hastings. He has been the WHEP City contact and administrator since 2010. His role includes selecting the wetlands to be monitored as well as being a communication link for the City. He said, “The City really appreciates the volunteers’ hours of hard work. The data collected provides the City a biological snapshot of the health of area ponds. Through time, the City can see how surrounding land management practices affect a local ponding basin.”



John Caven

## Hastings General Wetland Health

Figure 4.6 presents an overall view of wetland health for all of the 2016 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 excellent wetland health in 2016. Invertebrate and vegetation scores for H-57 were inconsistent. H-56 scored excellent for both invertebrates and vegetation.



Alex Franzen



Jackie Vierck

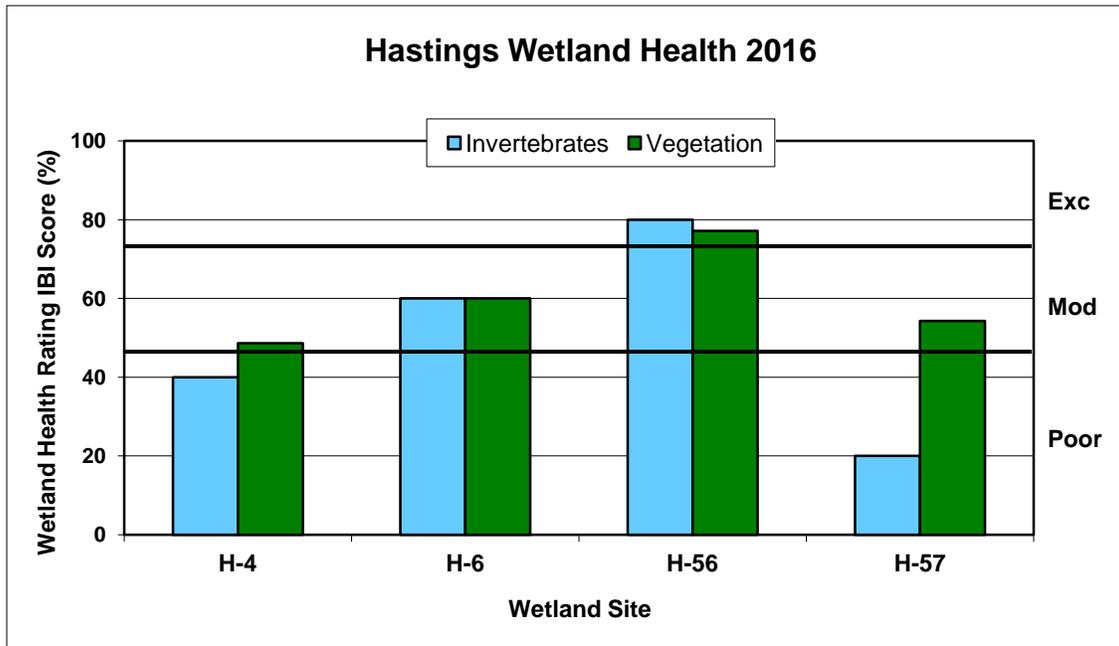


Kevin Smith



Jackie Vierck, Andrew Hilger, and Mike Nelson

**Figure 4.6 Hastings site scores (percent) for the 2016 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, type 4 stormwater detention pond 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 with a goal 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.

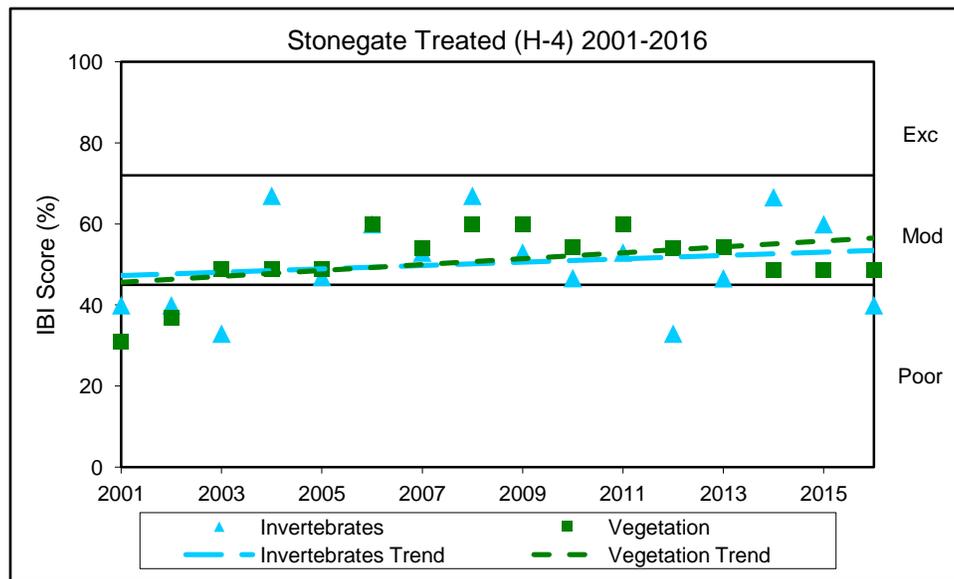
#### Wetland Health

**Site Observations:** The wetland has an immediate step into the wetland but then becomes gentle slope. The substrate is very mucky. The cattail population is very dense and appears larger than in previous years. Willows overhang the sample area. Very little submergent vegetation is present.

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

	Invertebrates 	Vegetation 
<b>2016 Data (H-4)</b>		
<b>Wetland Health Rating (IBI score)</b>	Poor (12)	Moderate (17)
<b>Trend 2001-2016</b>	Variable, but stable	Variable, but stable

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



**Site summary:** This is the sixteenth consecutive year that Stonegate Treated has been surveyed. The vegetation trend analysis indicates that wetland health is gradually improving; although it has been fairly stable remaining in the moderate category since the poor scores found in 2001 and 2002. Vegetation scores were identical in 2014, 2015, and 2016. The plant community has been similar in all three years with slight variability of emergent forbs. The invertebrate data varies from year to year; however, the trend analysis indicates stable invertebrate health. The invertebrate score decreased to poor health in 2016. Minnows were present in the bottle traps and may have impacted the invertebrate diversity. In addition, there were few submergent plants present to provide habitat in the sampling area. The snail diversity and Corixidae Metric is the greater factor affecting vegetation scores in the last three years.

**4.6.2 Lake Rebecca Wetland (H-6)**

H-6, also known as Rebecca EM 1&2, is a public water wetland in the City of Hastings. It is a 19 acre, type 5 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 growing concern. Purple loosestrife and zebra mussels are present, and compromise the health of the lake.

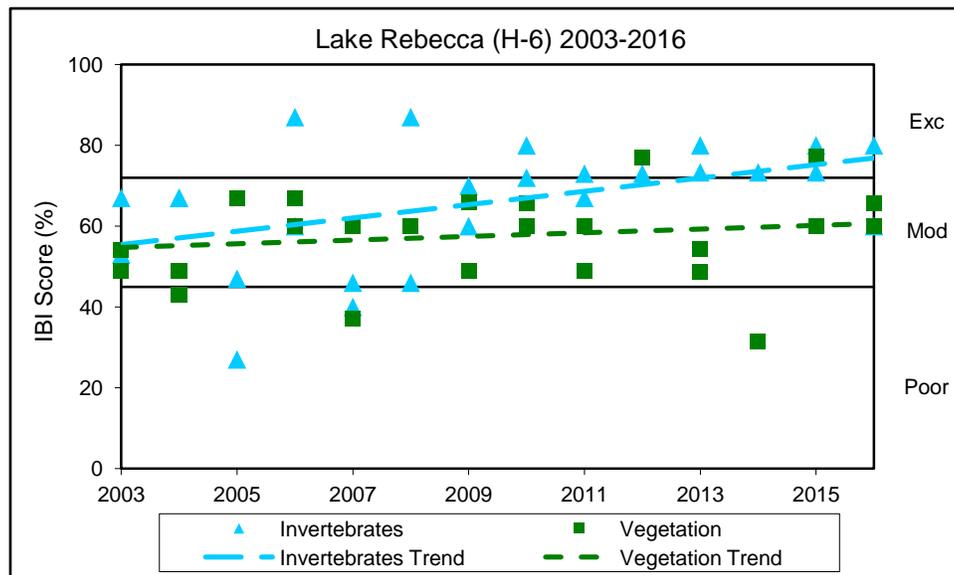
### Wetland Health

**Site Observations:** 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. 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. Coontail dominates the submergent vegetation.

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

	Invertebrates 	Vegetation 
<b>2016 Data (H-6)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (18)	Moderate (21)
<b>Cross-check Rating (IBI score)</b>	Excellent (24)	Moderate (23)
<b>Trend 2003-2016</b>	Improving	Stable

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



**Site summary:** This is the fourteenth consecutive year of monitoring for Lake Rebecca. There was a lot of variability in the invertebrate data prior to 2009; however since then, the invertebrate health has remained stable and the long term trend appears to be improving for invertebrates. The vegetation data is still variable; however, the long term trend appears stable. The invertebrate and vegetation scores were consistent for the City team; however, the scores collected by the cross-check team were inconsistent, and their vegetation score was lower than the invertebrate score. The invertebrate scores were inconsistent between the City team and the cross-check team. The cross-check team calculated a higher Corixidae Proportion Metric, as well as identified a larger diversity of damselflies and snails, which improved the invertebrate score.

### 4.6.3 180<sup>th</sup> Street Marsh (H-56)

H-56, also known as 180<sup>th</sup> Street Marsh, is a 20 acre type 5 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 180<sup>th</sup> Street. This wetland is not part of the City’s stormwater management plan; it is in Dakota County and not under the management of the City.



The wetland is a part of several natural ponds in this agricultural area. The ponds partially cover several parcels of land, each parcel owned by a different party. Management practices are dependent on individual property owners. The landowner has 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 the surrounding land, and wildlife habitat management to be practiced in the wetland areas. Reed canary grass is a dominant vegetative cover.

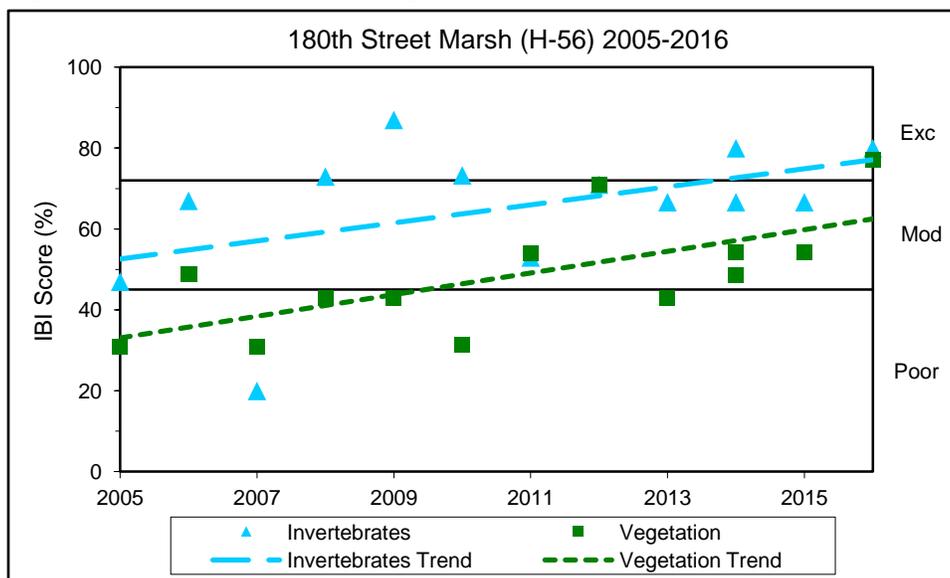
### Wetland Health

**Site Observations:** The wetland slope is gentle and the wetland substrate is slightly mucky. A 5x20 vegetation releve was surveyed in order to incorporate a larger diversity of plant species than just the dominating reed canary grass population. Turtles, swallow, pied-billed grebe, redwinged blackbird, leopard frogs, and Canada geese were observed.

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

	Invertebrates 	Vegetation 
<b>2016 Data (H-56)</b>		
<b>Wetland Health Rating (IBI score)</b>	Excellent (24)	Excellent (27)
<b>Trend 2005-2016</b>	Improving	Improving

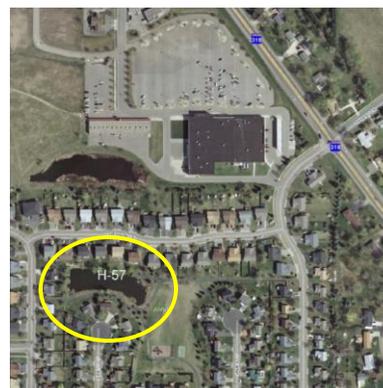
**Figure 4.6.3 Invertebrate and vegetation trends for 180<sup>th</sup> Street Marsh (H-56)**



**Site summary:** This site has been monitored twelve consecutive years since 2005. Both the invertebrate and vegetation data is variable from year to year; however, both trends appear to be increasing. Invertebrate and vegetation data were consistent in 2016, and both categories scored excellent health. The vegetation score is the highest in all the years of WHEP monitoring. Besides a few random years of receiving lower health scores, the invertebrate health scores have been high-moderate to excellent.

#### 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.

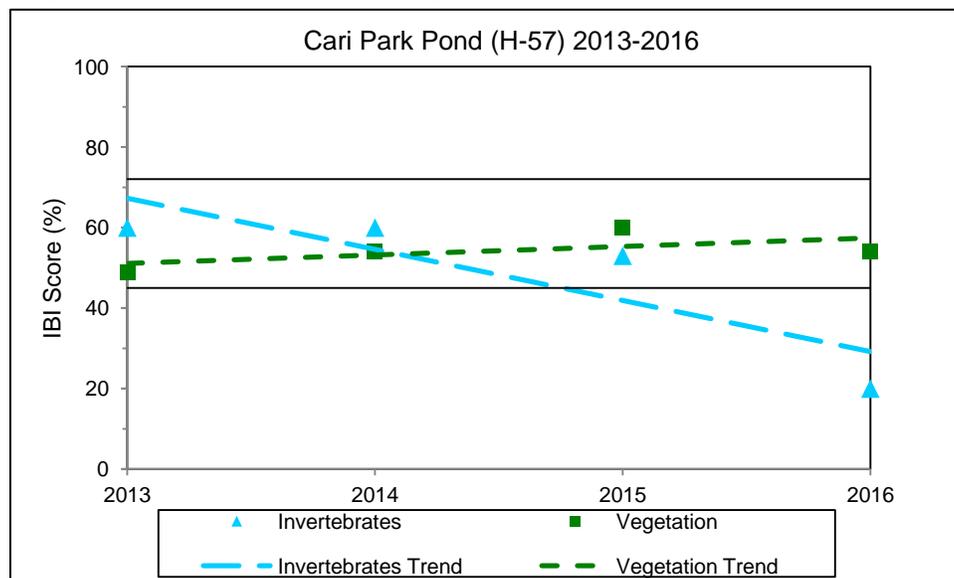
## Wetland Health

**Site Observations:** The wetland is surrounded by residential homes, and a nearby park. The wetland substrate is very mucky, and the slope is gentle. Trees overhang portions of the wetland shoreline. Many species of emergent vegetation and very few submergent vegetation were present. Dozens of minnows and possibly 100 tadpoles/small frogs were caught in the bottle traps. The wetland is full of trash and stinks. Mallards are being fed on the west side of the pond.

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

	Invertebrates 	Vegetation 
<b>2016 Data (H-57)</b>		
<b>Wetland Health Rating (IBI score)</b>	Poor (6)	Moderate (19)
<b>Trend 2013-2016</b>	Not enough data	Not enough data

**Figure 4.6 .4 Invertebrate and vegetation trends for Cari Park Pond (H-57)**



**Site summary:** This is the fourth consecutive year that Cari Park Pond has been monitored. The vegetation and invertebrate scores were inconsistent with each other in 2016. The vegetation score remains moderate and similar to previous years of data. The invertebrate health score declined to poor in 2016. The presence of minnows and tadpoles in the bottle traps may have affected the score. The predatory species may also be affecting the invertebrate population, in general. More years of data will determine reliable health trends.

## 4.7 Lakeville Wetlands

Two wetlands were monitored in 2016 within the City of Lakeville. Ten wetlands have been sampled in the City of Lakeville through the WHEP program since 1998.

**Team Leader:** Steve Weston

**Team Members:** Nate Barnes, Rachel Barnes, William Barnes, Cheryl Fox, Tatjana Gleixner, Tom Goodwin, Dominique Menard, Tim Perry, Marilyn Whiteside, and Wes Whiteside

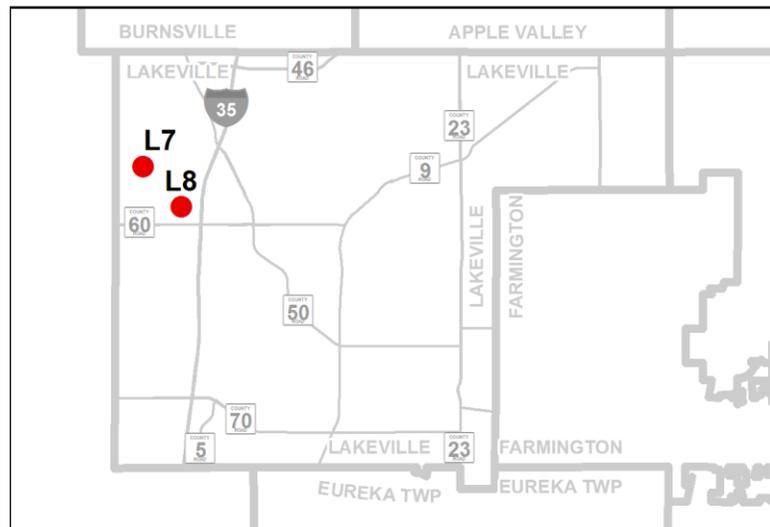


Steve Weston



Ann Messerschmidt

### Lakeville WHEP Sites Monitored in 2016



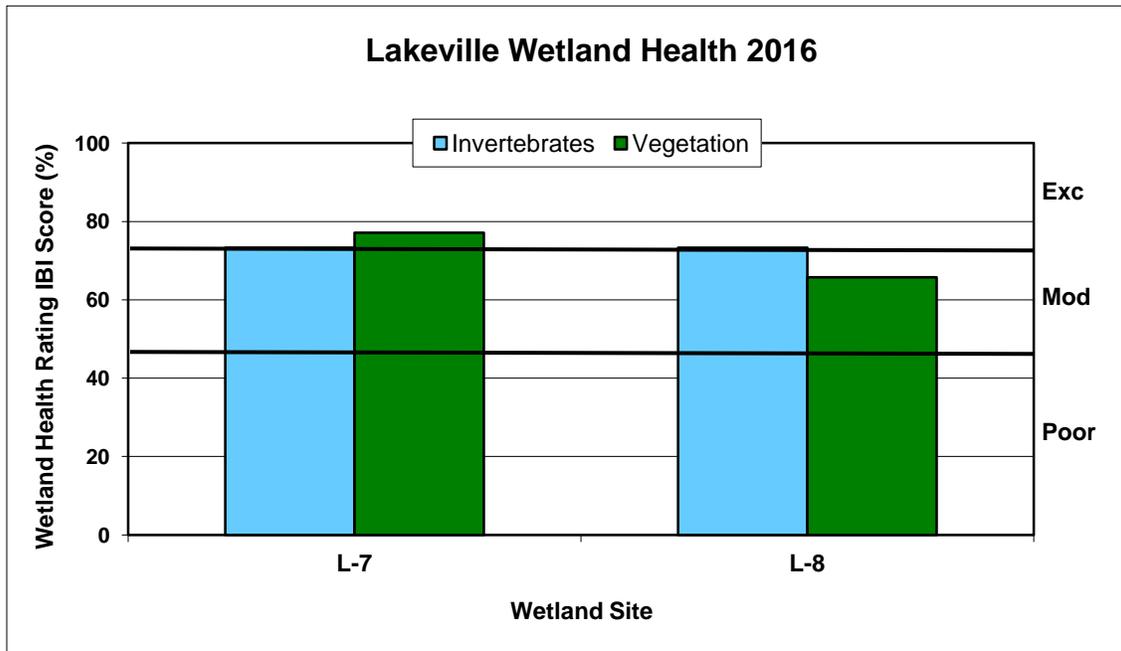
Steve Weston has participated in WHEP for over 14 years. He describes himself as a naturalist, and says, "I am best known for my bird observations, but people who join me on field trips realize that I am really interested in all components of the environment. I have little formal biological training."

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 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

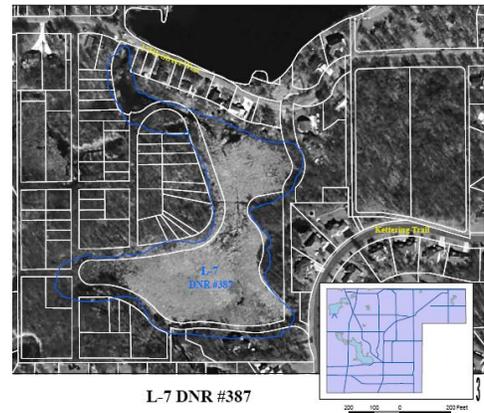
Figure 4.7 presents an overall view of wetland health for all the 2016 monitoring sites in Lakeville based on the IBI scores for invertebrates and vegetation presented as a percent. Figure 4.7 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate 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. L-7 scored moderate invertebrate health and excellent vegetation health. Site L-8 scored moderate health for both invertebrates and vegetation.

**Figure 4.7 Lakeville site scores (percent) for the 2016 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.

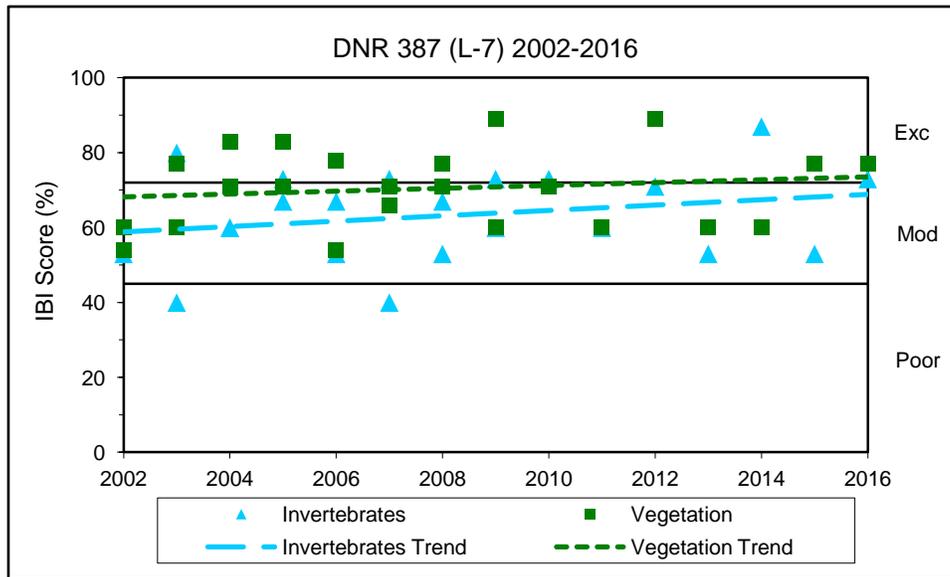
#### Wetland Health

**Site Observations:** The slope is steep and the substrate muddy. The wetland is dominated by cattails, although the area around the site is quite diverse in vegetation including sedges, bladderwort, arrowhead, and duckweed. Several species of dragonflies, damselflies, snails, and trueflies were collected. Purple loosestrife and reed canary grass are present.

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

	Invertebrates 	Vegetation 
<b>2016 Data (L-7)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (22)	Excellent (27)
<b>Trend 2002-2016</b>	Variable but stable	Variable but stable

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



Tim Perry and Steve Weston

**Site summary:** This is the fifteenth consecutive year that DNR 387 has been monitored. The invertebrate and vegetation scores are both variable throughout the years. The vegetation scores remain moderate to excellent while the invertebrate scores fluctuate from poor to moderate to excellent. In 2016, the invertebrate and vegetation scores were consistent. The vegetation scored excellent health while the invertebrates scored high-moderate (nearly excellent) health. The vegetation score is the same as 2015. The invertebrate score improved from 2015. Both categories indicate variable, yet stable health trends.

**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 as much as possible. 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.



Tim Perry and Steve Weston

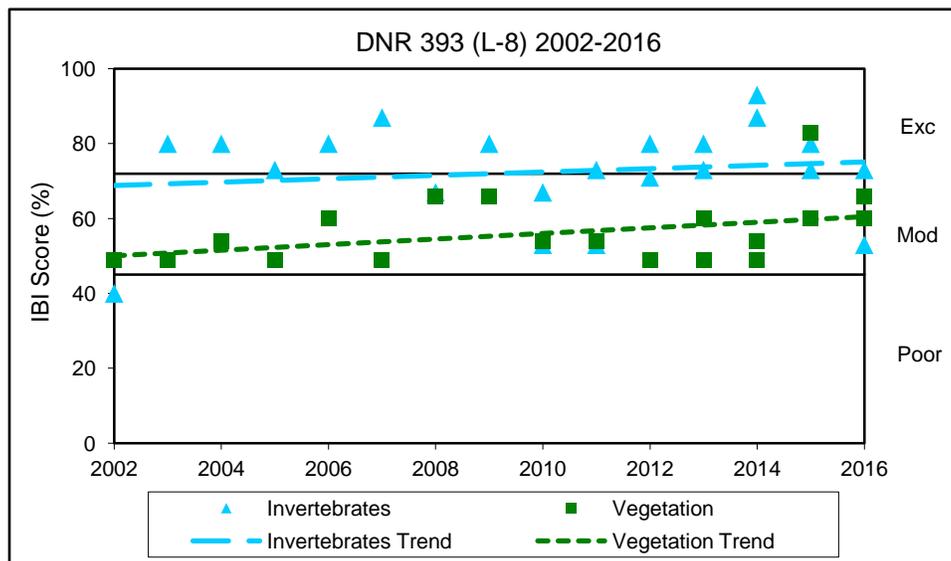
## Wetland Health

**Site Observations:** The wetland slope is steep and the substrate is solid. Water milfoil, coontail, several species of pondweed, and water-shield were present. A large mass of algae was also observed.

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

	Invertebrates 	Vegetation 
<b>2016 Data (L-8)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (22)	Moderate (23)
<b>Cross-check Rating (IBI score)</b>	Moderate (16)	Moderate (21)
<b>Trend 2002-2016</b>	Stable	Improving

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



**Site summary:** DNR 393 has been monitored fifteen consecutive years. The invertebrate scores show a stable trend while the vegetation trend is showing slight improvement. The City scores and cross-check scores are consistent with each other for vegetation, but not for invertebrates. The City team collected a larger diversity of dragonflies, damselflies and snails than the cross-check team, calculating a higher invertebrate score. The invertebrate and vegetation scores were consistent with each other per team.

## 4.8 Mendota Heights Wetlands

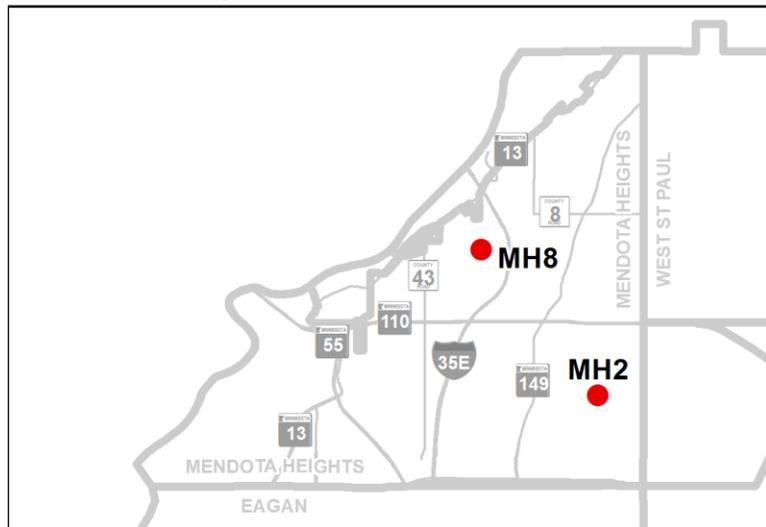
In 2016, the Mendota Heights team monitored two wetlands in Mendota Heights. Seventeen wetlands have been monitored in Mendota Heights since the start of the WHEP program.

### Team Leader:

Darcy Tatham

**Team Members:** John Bottomley, James Chastek, Alison Hruby, Marie Rivard, Marjorie Savage, Michelle Skog, Anneliese Tatham, and Allyson Tenold

### Mendota Heights WHEP Sites Monitored in 2016



Darcy Tatham

Mendota Heights' team leader, Darcy Tatham, has been part of the program for 16 plus years. She reflected on the 2016 season, "We had a good summer. Again, new volunteers are always welcome, but I also like to see the faces of people I know year after year. Jim did a great job in training the new people while I was busy with my daughter's graduation in the beginning of the summer. I appreciate his dedication and enthusiasm throughout these many years.

"Although I see Copperfield every year, and it's always different, I expect to be able to predict results. It doesn't happen that way. It's dynamic, not static. We, as people, like to be in control and say what affects different outcomes. That's easier said than done. One would likely expect that in

an established neighborhood, with little change and no houses around the pond, that the results would be consistent year after year. Instead, this year, we found that we had fewer caddisflies, fewer cattails, more invasive purple loosestrife, and other changes. We did find a lot of varieties of fish which we haven't had before. Very unusual, but that may be the reason why our macro-invertebrate sampling (and possibly also the vegetation) did not do as well as we had hoped. Where did the fish come from? The answer is still to be determined.

"Victoria pond was a new pond for us this year. Unfortunately, it had disappointing results. For the sake of the people enjoying the park that it is in and the residents who live around it, I always hope for good results. But with the steep and greasy slope into the water, along with lots of tree cover and tree debris in the pond, vegetation sampling did not do well. While we did the macro-invertebrate sampling, we experienced large water level fluctuations. That may also be a reason why our results weren't as favorable as we would've liked them to be.

"No matter what the results are, though, I'm always encouraged by the positive attitudes of my team and the residents who live around these ponds who have a vested interest in the health of the ponds. We all want to know how the ponds are doing health-wise and that is the data our teams provide each summer. The next step is how we can collectively work together to improve them. That is our challenge."



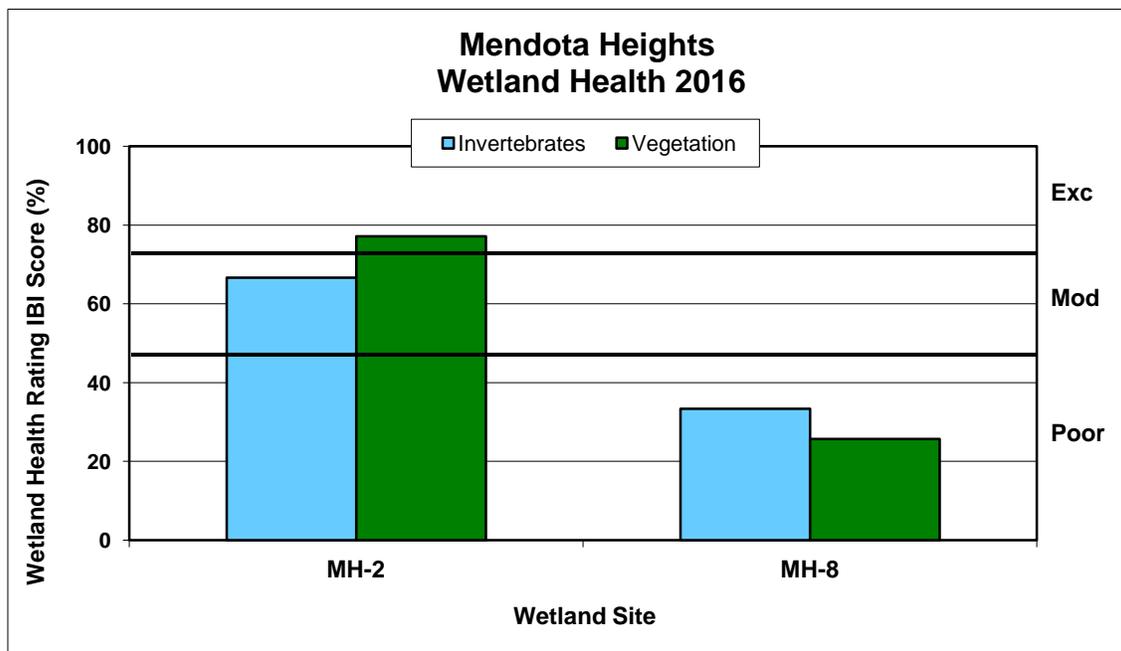
Ryan Ruzek

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."

## Mendota Heights General Wetland Health

Figure 4.8 presents an overall view of wetland health for all of the 2016 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. Invertebrate and vegetation scores were consistent with each other for each of the two sites. MH-2 scored moderate for invertebrates and excellent for vegetation. MH-8 scored poor health in both categories.

Figure 4.8 Mendota Heights' site scores (percent) for the 2016 sampling season



### 4.8.1 Copperfield (MH-2)

Copperfield (MH-2) is a 9.4-acre, type 4 wetland within the IV-18 subwatershed of the Lower Mississippi River watershed. The subwatershed is 865.3 acres and is 20 percent impervious. The basin is surrounded by grasslands and trees within a residential neighborhood in Mendota Heights. Many of these ponds receive surface runoff from residential and road development. The wetland has several inlets on the south side and one outlet on the northwest side at Huber Drive. The two wetlands are connected when water levels are high. The wetland is part of the City’s stormwater management plan and is designated PUBG (intermittently exposed, unconsolidated bottom). It is monitored for invasive species and vegetative growth trends that impact water quality. It is a natural park area surrounded completely by development. Copperfield is designated as a reference site.



### 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 wetland slope is gentle, and the substrate is very mucky. Dominant vegetation included reed canary grass, cattails, coontail, pondweed, waterweed, duckweed, water-meal, arrowhead, and white water lily. Cattails seem less prevalent than in past years. Bladderwort was present.

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

	Invertebrates 	Vegetation 
<b>2016 Data (MH-2)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (20)	Excellent (27)
<b>Cross-check Rating (IBI score)</b>	Poor (14)	Moderate (21)
<b>Trend 1998-2016</b>	Variable, but stable	Variable, but stable



Marjorie Savage and Darcy Tatham

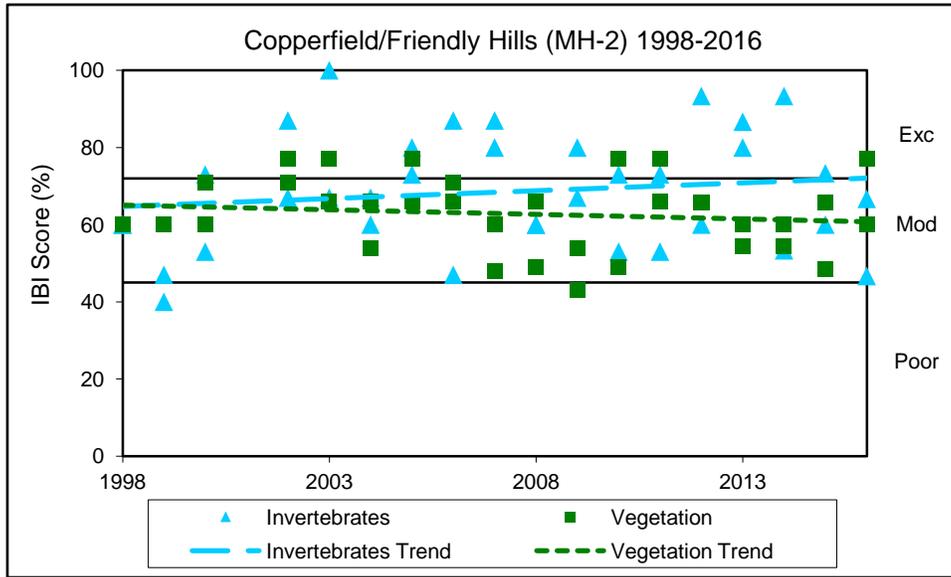


James Chastek



Darcy Tatham and James Chastek

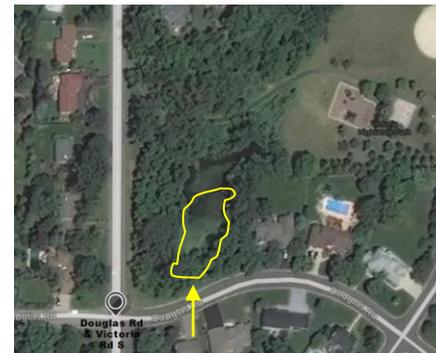
**Figure 4.8.1 Invertebrate and vegetation trends for Copperfield (MH-2)**



**Site Summary:** This is the eighteenth year that MH-2 has been monitored since 1998. There is a lot of variability in the data throughout the years of monitoring. Both trends appear stable. Both the invertebrate and vegetation scores between the City team and cross-check team were inconsistent. The City team collected a larger diversity of caddisflies and snails than the cross-check team, which improved the invertebrate health score. The City team also surveyed a vegetation releve with a higher diversity of plants which improved the vegetation health score. Both teams found bladderwort.

#### 4.8.2 Victoria Pond (MH-8)

Victoria Pond (MH-8) is a 0.4-acre, type 4 wetland located within the IV-134 watershed. The watershed is 209.2 acres and 40 percent impervious. There are two inlets on the south side and one outlet on the north side of the pond. Victoria Pond is part of the City’s stormwater management plan with a management goal to maintain water quality, rate control, and aesthetics. It is located in a City park within a residential neighborhood.



#### Wetland Health

**Site Observations:** The wetland slope is very steep and the substrate is somewhat firm. Cattail, duckweed, water-meal, and overhanging trees were the only vegetation in the releve. Trees surround the wetland, duckweed and water-meal cover the surface of the water, and cattail dominates the shoreline.

**Table 4.8.2 Victoria Pond (MH-8) Wetland Health based on Index of Biotic Integrity**

	Invertebrates 	Vegetation 
<b>2016 Data (MH-8)</b>		
<b>Wetland Health Rating (IBI score)</b>	Poor (10)	Poor (9)
<b>Trend 2016</b>	Not enough data	Not enough data

**Site summary:** This is the first time that Victoria Pond has been monitored for WHEP. The invertebrate and vegetation scores are consistent with each other. Both categories received a poor health score. The diversity of both vegetation and invertebrates is lacking. More years of data collection will help determine a more reliable health trend.

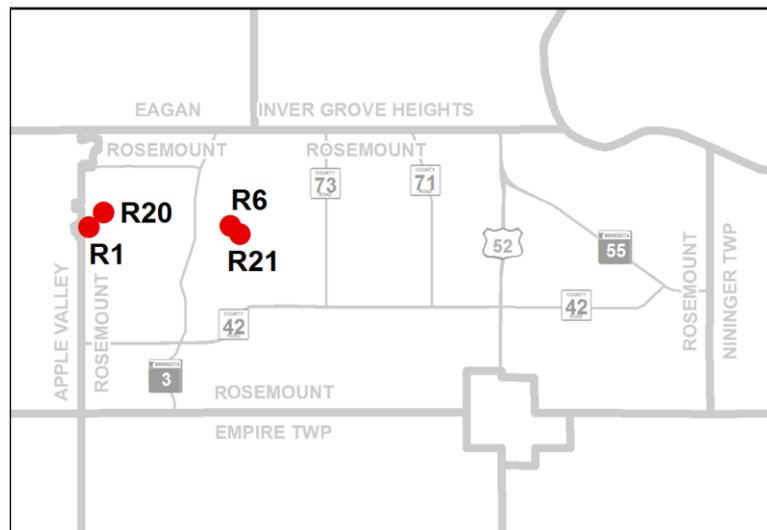
### 4.9 Rosemount Wetlands

Four wetlands were monitored in the City of Rosemount in 2016. Twenty-four wetlands have been monitored in Rosemount since the start of WHEP.

**Team Leaders:** Amy Jo Forslund

**Team Members:** Dan Dowell, Jennifer Marinson, Eric Nelson, Janet Pettersen, Jane Porterfield, Averie Simon, Andrew Simon, Peyton Simon, Denise Wilkens, and Tom Wilkens

**Rosemount WHEP Sites Monitored in 2016**



Amy Jo Forslund

Amy Jo Forslund is the new team leader for Rosemount. She explained, “This was my first year being the Rosemount team leader. I have been 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. It is honor to be a part of such a wonderful Citizen Science project.”



The City of Rosemount considers its wetlands a critical part of its Natural Resources. We have participated in the WHEP program since it began because it provides essential information that allows the city to better manage and restore its wetland biodiversity both now and in the future.

Over the years, the WHEP volunteers have provided the city with high-quality quantitative data for numerous wetlands, which would otherwise be very difficult to obtain with our limited staff time and resources. The data they collect is primarily used to document wetland quality and track changes in wetland health trends. The volunteer efforts are greatly appreciated!

## 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 4.9 presents an overall view of wetland health for all the 2016 monitoring sites in Rosemount based on the scores for invertebrates and vegetation presented as a percent. Figure 4.9 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. Invertebrate and vegetation scores that differ by ten percent or less are considered consistent. Based on the IBI scores, a wetland health rating is assigned as excellent, moderate or poor. The four wetlands scored poor to excellent health. Invertebrate and vegetation scores for site R-6 were inconsistent with each other. R-21 scored excellent for both invertebrates and vegetation.



Amy Jo Forslund, Averie Simon, Peyton Simon, Andrew Simon

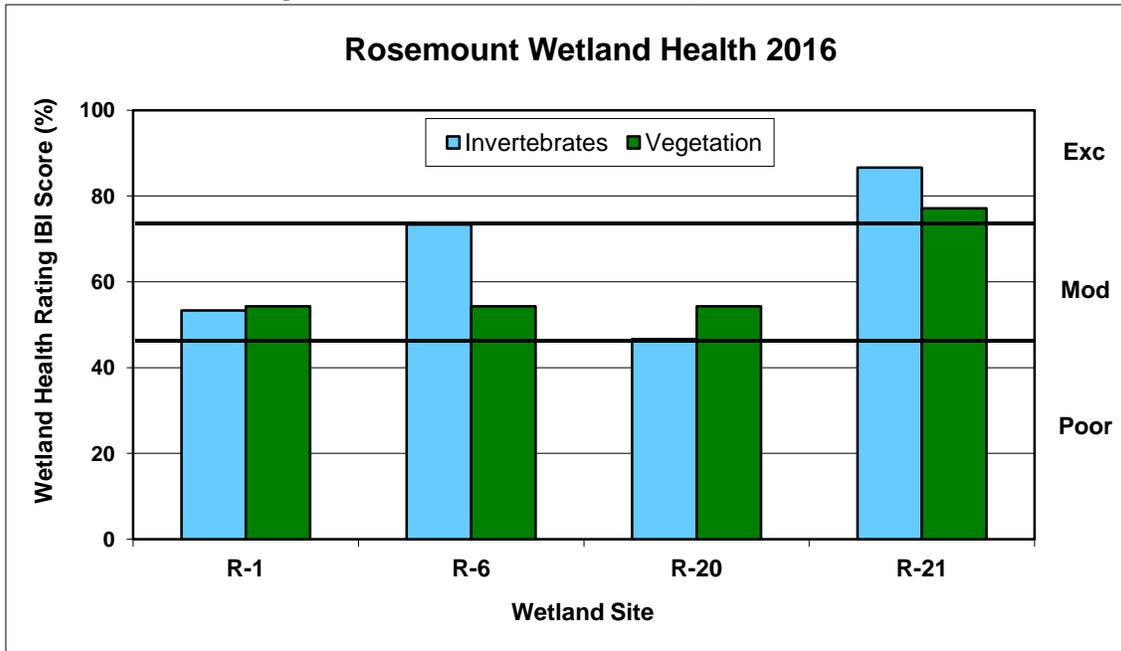


Andrew Simon, Averie Simon, Peyton Simon, Amy Jo Forslund



Amy Jo Forslund and Janet Pettersen

**Figure 4.9 Rosemount site scores (percent) for 2016**



#### 4.9.1 Kelly Marsh (R-1)

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



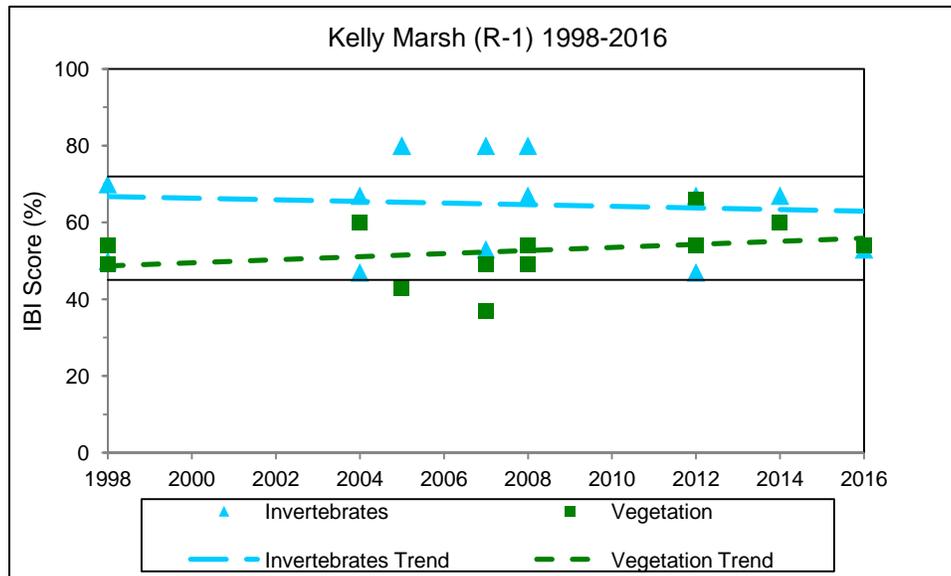
The wetland is located in a basin surrounded by a housing development and City park. The wetland basin is affected by storm water runoff from the nearby development which is encroaching upon the existing 75 foot buffer.

**Site Observations:** The wetland substrate is variable; some mucky areas and some solid areas. There is a 35-40 percent slope from the parking lot to the north side of the wetland. Duckweed, water-meal, and pond lilies grow above the water surface. Submergent vegetation including pondweed, coontail, and waterweed are present. There is a restored prairie between the park path and the wetland. Wild parsnip was observed.

**Table 4.9.1 Kelly Marsh (R-1) Wetland Health based on Index of Biotic Integrity**

	Invertebrates 	Vegetation 
<b>2016 Data (R-1)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (16)	Moderate (19)
<b>Trend 1998-2016</b>	Variable, but stable	Stable

**Figure 4.9.1 Invertebrate and vegetation trends for Kelly Marsh (R-1)**



**Site summary:** This is the eighth time Kelly Marsh has been monitored since 1998. The invertebrate and vegetation health scores are consistent. The invertebrate scores have been variable throughout the years of monitoring, but the overall invertebrate health trend appears stable. The vegetation scores have remained moderate for all years of monitoring except in 2005 and 2007 when they scored poor health, but the vegetation health trend appears stable.

### 4.9.2 Keegan Lake (R-6)

Keegan Lake (R-6), also known as WMP #310, is a 35 acre, type 5 open water wetland in the Keegan Lake watershed. The watershed is 1,530 acres of which 30 percent is impervious surface. There are no inlets and one outlet. This wetland 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.



An undedicated buffer surrounds Keegan Lake. There are roads adjacent to the wetland boundary to the east and south, and wooded area on the west and north sides of the lake. Storm water runoff from the existing roads may bring in contaminants typically found on roads.

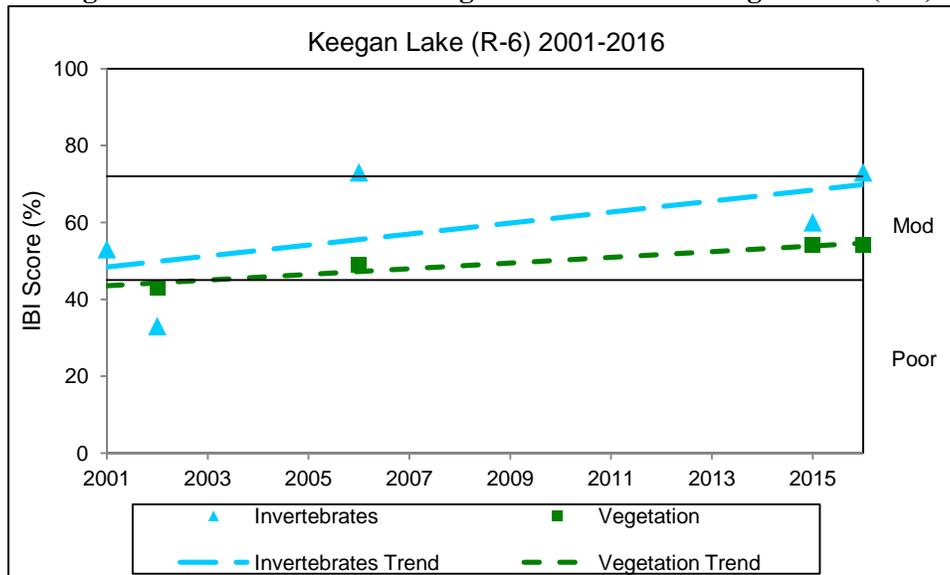
## Wetland Health

**Site Observations:** This is a deep water lake with a gradual slope. The bottom of the wetland has logs, rock, rubble, and vegetation. Tall willows were growing in 2-3 feet of water. A lot of submergent vegetation is present. Reed canary grass is present. Fish were collected in every bottletrap. Many leeches were observed in the water, but not caught in bottle traps or dipnets.

**Table 4.9.2 Keegan Lake (R-6) Wetland Health based on Index of Biotic Integrity**

	Invertebrates 	Vegetation 
<b>2016 Data (R-6)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (22)	Moderate (19)
<b>Trend 2010-2016</b>	Improving, but variable	Improving slightly

**Figure 4.9.2 Invertebrate and vegetation trends for Keegan Lake (R-6)**



**Site summary:** This is the fifth year that R-6 has been monitored since 2001. In 2016, the invertebrate and vegetation scores were inconsistent with each other. The invertebrate scores have been variable ranging from poor to nearly excellent (as in 2016); however, the overall health trend appears to be improving. The vegetation score was the same in 2015 and 2016, and the overall vegetation health trend appears stable. There were no emergent forbs recorded in the 2016 releve; however, dense populations of coontail and pondweed were recorded. Additional years of monitoring will help to determine more reliable wetland health trends.

### 4.9.3 WMP #332 (R-20)

WMP #332 (R-20) is a one acre, type 5 open water wetland in the Birger Pond watershed. The watershed is 897 acres of which 80 percent is impervious surface. There are no inlets or outlets. This wetland 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.



R-20 is surrounded by residential areas with several roads adjacent to the wetland. There is a 75 foot buffer around the wetland. Stormwater runoff from the roads, and nutrient loading from turfgrass maintenance of residential lawns may impact the wetland health.

### Wetland Health

**Site Observations:** The wetland slope is gradual. The water is murky, and the substrate is muddy and uneven. Scattered young willows grow along the south side of the wetland. Smartweed and reed canary grass surround the shore. Coontail and water lilies were prevalent in 2016.

**Table 4.9.3 WMP #332 (R-20) Wetland Health based on Index of Biotic Integrity**

	Invertebrates 	Vegetation 
<b>2016 Data (R-20)</b>		
<b>Wetland Health Rating (IBI score)</b>	Poor (14)	Moderate (19)
<b>Cross-check Rating (IBI score)</b>	Moderate (16)	Moderate (19)
<b>Trend 2009-2016</b>	Declining slightly	Declining slightly

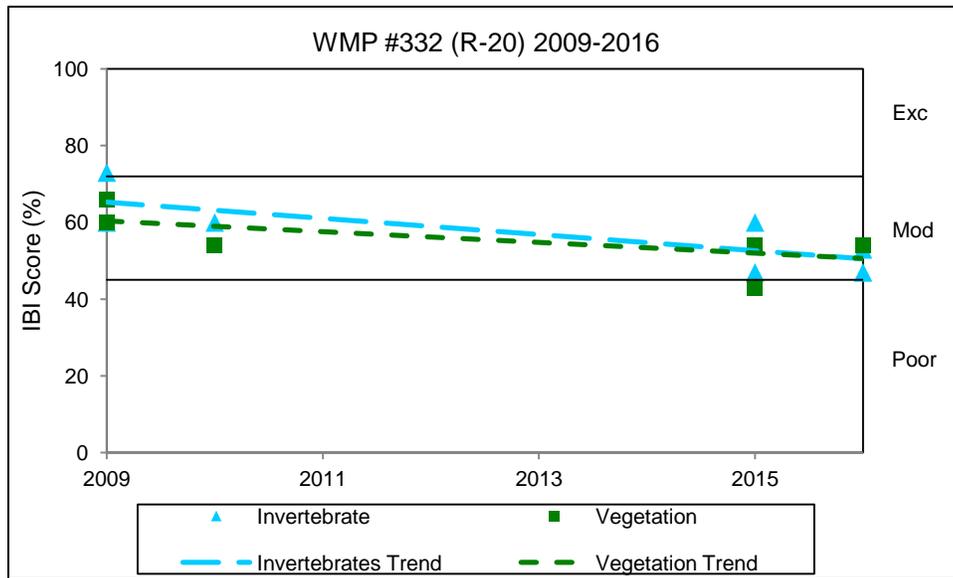


Team Rosemount at R-21



Amy Jo Forslund, Peyton Simon, Andrew Simon, Averie Simon

**Figure 4.9.3 Invertebrate and vegetation trends for WMP #332 (R-20)**



**Site summary:** This is the fourth time R-20 has been monitored since 2009. In 2016, the invertebrates and vegetation scores were consistent with each other for both the City team and the cross-check team. The scores between the City team and the cross-check team are consistent too. The invertebrate health trend appears to be declining. The vegetation health trend also appears to be declining, slightly; however, the invertebrate and vegetation scores from the cross-check team in 2015 are the same as the City team in 2016. More years of data will help determine more reliable health trends.

#### 4.9.4 CR-38 Mitigation Site 1 (R-21)

CR-38 Mitigation Site 1 (R-21) is a 1.7 acre, type 3 wetland in the Keegan Lake watershed. The watershed is 1,530 acres and 30 percent impervious. The wetland has one inlet on the east side which receives stormwater overflow from a storm pond. There are no outlets. R-21 is included in the City’s stormwater management plan. It is designated as Manage II, and is managed to maintain the wetland without any loss of its functions or values. R-21 is a depressional shallow marsh wetland. The southern portion of this wetland complex was constructed as mitigation for impacts to other wetlands as a result of street reconstruction, and is an extension of an existing wetland dominated by reed canary grass. The nutrient loading from adjacent agriculture and reed canary grass impede upon this wetland.

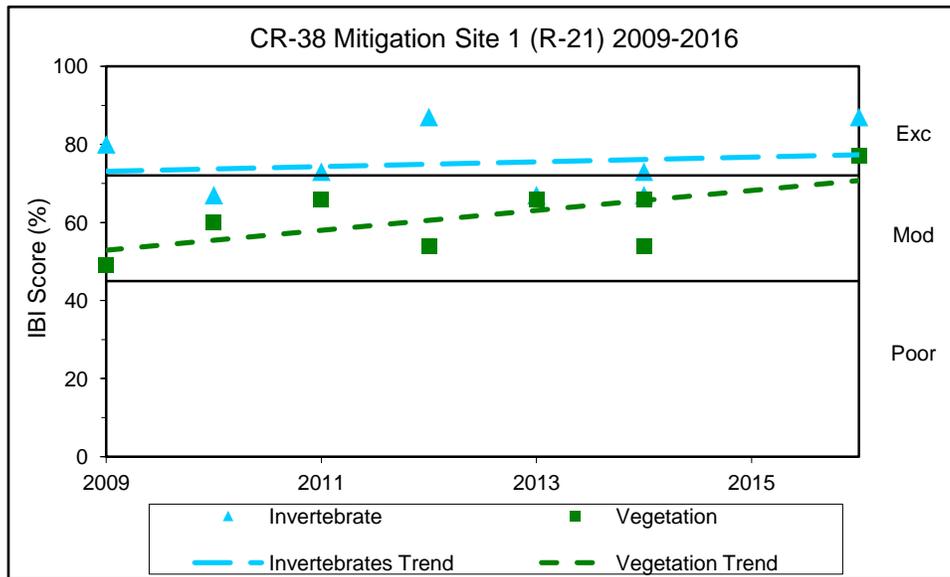


**Site Observations:** The slope of the wetland is steep and becomes flat. It has a cattail and reed canary grass perimeter. The wetland is full of bladderwort. A diverse community of invertebrates was observed in the water. Caddisflies and other invertebrates were seen swimming in the water. Larger minnows were also observed in the water. Redwing blackbirds nest in the cattails.

**Table 4.9.4 CR-38 Mitigation Site 1 (R-21) Wetland Health based on Index of Biotic Integrity**

	Invertebrates 	Vegetation 
<b>2016 Data (R-21)</b>		
<b>Wetland Health Rating (IBI score)</b>	Excellent (26)	Excellent (27)
<b>Trend 2009-2016</b>	Stable, but variable	Improving

**Figure 4.9.4 Invertebrate and vegetation trends for CR-38 Mitigation Site 1 (R-21)**



**Site summary:** This is the seventh year that R-21 has been monitored for WHEP since 2009. The invertebrate and vegetation each scored excellent health in 2016, and were consistent with each other. The invertebrate health trend appears to be stable; however, the scores fluctuate between moderate and excellent. The vegetation health trend appears to be improving. The presence of several different grasslike species improves the vegetation score.

## 4.10 South St. Paul Wetlands

Two wetlands were monitored in South St. Paul in 2016 by the South St. Paul team. Four wetlands have been monitored in South St. Paul since the start of the WHEP program. This is the fifth year that South St. Paul has had a City team of its own to monitor the City wetlands.

**Team Leaders:** Kristine Maurer and Sabrina Greene

**Team Members:** John Bottomley, Sarah Hultgren, Alison Hruby, David Kuhlmann, Carson Meissner, Michelle Skog, Tom Wambolt, and Etta Wambolt



Kristine Maurer

Kristine Maurer and Sabrina Greene are co-team leaders for the South St. Paul team.

Sabrina Greene has been a WHEP volunteer since 2014. In 2016, she was recruited as a team leader.

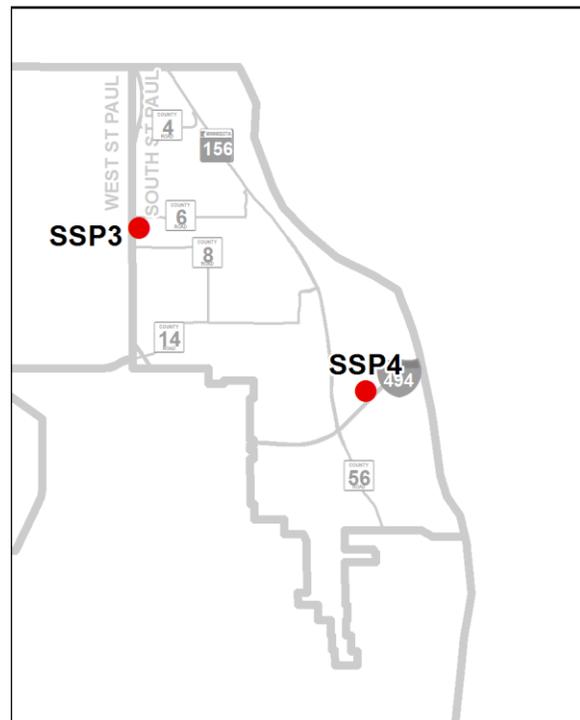
Kristine has participated in both the Hennepin County and Dakota County WHEP programs, and has been a team leader for Hennepin County WHEP since 2015. This is Kristine's first year as team leader for Dakota County. She admitted, "I am an environmental scientist and water quality specialist. I studied wetland ecology in graduate school and love being a team leader because it is a fun way to teach others about wetland ecology. I also learn new things every year, whether it is from the class instructors or fellow volunteers. One of my favorite 2016 WHEP experiences was finishing up aquatic invertebrate ID with David and Sabrina. We set up microscopes, listened to music, and did science around the kitchen table! I cannot think of a better way to spend an evening."

Chris Hartzell is the City of South St. Paul's new City Engineer. He commented, "The City of South St. Paul places a high value on the function and importance of wetlands within the community. We have relatively few wetlands compared to some communities, but the ones we do have help reduce the impacts from pollutants in our lakes and waterbodies. I look forward to getting involved in the WHEP program".

## South St. Paul General Wetland Health

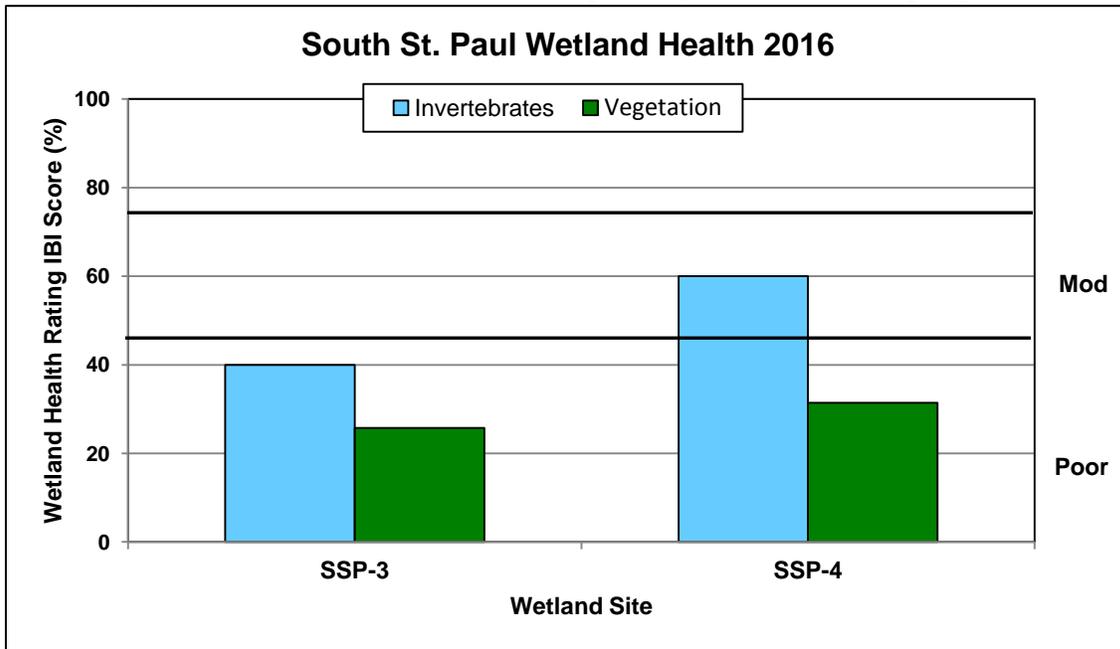
Figure 4.10 presents an overall view of wetland health for all of the 2016 monitoring sites in South St. Paul based on the IBI scores for invertebrates and vegetation presented as a percent. Figure 4.10 also illustrates the consistency between the IBI scores (in percent form) for each wetland sampled. 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 South St. Paul wetland ratings scored poor to moderate in 2016. The invertebrates and vegetation scores for SSP-3 and SSP-4 were inconsistent. This is the first time that SSP-4 was monitored for WHEP.

South St. Paul WHEP Sites Monitored in 2016

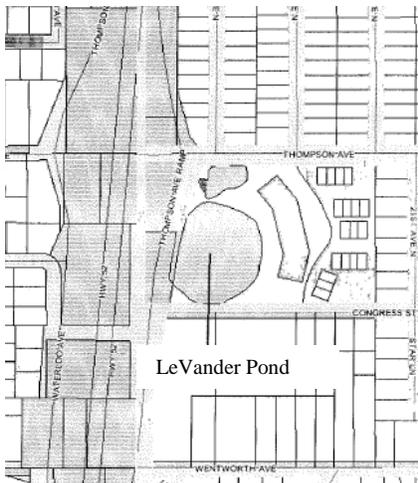


Chris Hartzell

Figure 4.10 South St. Paul site scores (percent) for the 2016 sampling season



#### 4.10.1 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 and 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. TH52 is a major contributor to LeVander Pond as is the City of West St. Paul.

#### Wetland Health

**Site Observations:** The wetland slope is gradual and easy to enter. The substrate is slightly mucky, but easy to walk. The water surface is covered by duckweed and water-meal. This site has a very low diversity of vegetation, is polluted with litter, and has a slight odor.

**Table 4.10.1 LeVander Pond (SSP-3) Wetland Health based on Index of Biotic Integrity**

	Invertebrates 	Vegetation 
<b>2016 Data (SSP-3)</b>		
<b>Wetland Health Rating (IBI score)</b>	Poor (12)	Poor (9)
<b>Cross-check Rating (IBI score)</b>	Moderate (16)	Poor (9)
<b>Trend 2009-2016</b>	Variable	Declining



John Bottomley

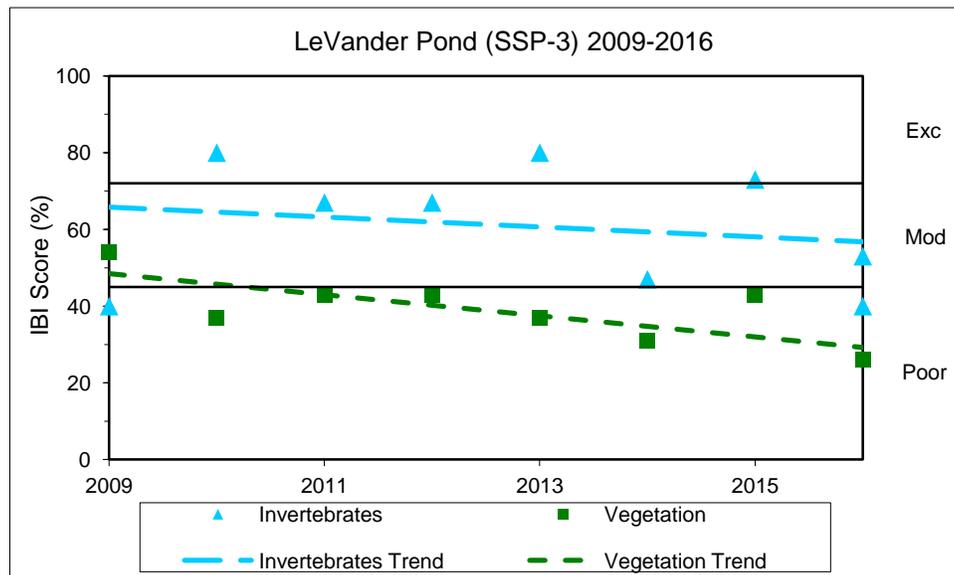


John Bottomley, David Kuhlmann, Kristine Maurer



David Kuhlmann

**Figure 4.10.1 Invertebrate and vegetation trends for LeVander Pond (SSP-3)**

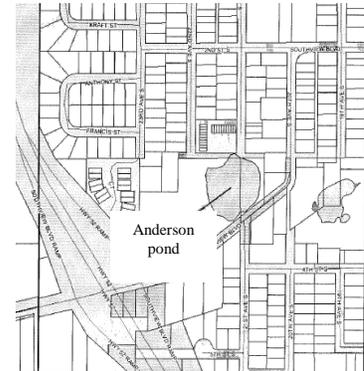


**Site summary:** This is the eighth consecutive year of monitoring LeVander Pond. The vegetation and invertebrates scores have been inconsistent over the course of monitoring. The invertebrate scores have regularly been moderate to excellent; however, the City team found a poor invertebrate health score in 2016. The vegetation health score remains poor, as it has been since the second year of monitoring. The

diversity for both invertebrates and vegetation was poor. Two families of leeches, one family of snail, one family of trueflies, and a handful of truebugs were collected in 2016. In addition to what the City team collected, the cross-check team found one family of caddisfly and four families of leeches. The larger diversity of invertebrates collected by the cross-check team enhanced the invertebrate health score. Reed canary grass and cattail dominate the vegetation. Duckweed and water-meal covered the water surface, and a few small sprigs of coontail were identified. Otherwise, the vegetation diversity is sparse.

#### 4.10.2 Villaume Pond (SSP-4)

Villaume Pond (SSP-3) is a 1.7-acre, type 4 wetland within the Lower Mississippi River watershed. The drainage area is 25 acres, and is approximately 30 percent impervious. It is publicly owned. It has one inlet at the southwest edge of the pond off of Villaume Avenue and one outlet at the north end of the wetland by Farwell Avenue. 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. Villaume Pond receives drainage from the Villaume Avenue storm sewer which collects from the surrounding areas and from I-494 which slopes directly and drains into this pond.

#### Wetland Health

**Site Observations:** This wetland is very mucky. It is located between I-494 and industrial property. Ducks were observed.

**Table 4.10.2 Villaume Pond (SSP-4) Wetland Health based on Index of Biotic Integrity**

	Invertebrates 	Vegetation 
<b>2016 Data (SSP-3)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (18)	Poor (11)
<b>Trend 2016</b>	Not enough data	Not enough data

**Site Summary:** This is the first year that Villaume Pond was monitored. The invertebrate and vegetation scores were inconsistent with each other. The invertebrate health score was moderate and the vegetation health score was poor. The Leech and Corixidae metrics were high and improved the invertebrate health score. Trees, grasslike plants and emergent forbs were included in the vegetation releve. There was no submergent vegetation identified. More years of monitoring will help determine health trends.

## 4.11 West St. Paul Wetlands

Four wetlands were monitored in West St. Paul in 2016 by the West St. Paul team. Twelve wetlands have been monitored in West St. Paul since the City became involved with WHEP in 1999. This is the third year that the City of West St. Paul has had its own designated WHEP team again since 1999-2003.

### Team Leaders:

Maggie Karschnia and Tim Martin

**Team Members:** Jan Henley, Jeannette Henrikssen, Delaney Karschnia, and Anna Klein



Maggie Karschnia

Maggie became a WHEP volunteer in 2007, and was eventually enlisted as a team leader for West St. Paul ahead of the 2013 season. This was her third year as team leader. She expressed, “We had another great

monitoring season this year with one of the best volunteer teams I've ever worked with. I couldn't imagine a more fun, capable, and supportive team.

This year, we also had the opportunity to represent WHEP at a booth at the

Take a Kid Fishing event held at Thompson Park in West St Paul. It was a great opportunity to highlight what we're doing to the residents in the local community.”



Tim Martin

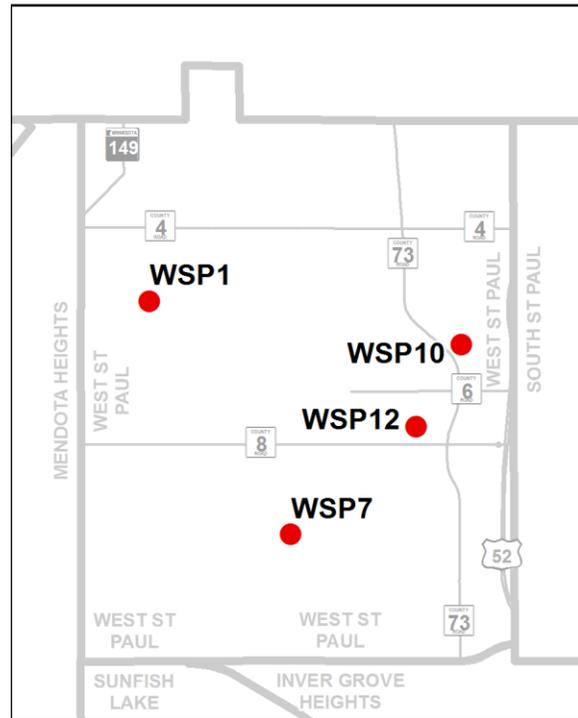
This was Tim Martin's third year as team leader of West St. Paul. He admitted, “I developed a passion for field biology during my undergraduate studies in environmental science and WHEP has given me an outlet to expand my knowledge of wetland ecosystems. Partly inspired by my work with WHEP, I entered a Master's degree in Water Resource Science at the University of Minnesota in 2015. In addition to the educational benefits, this program also gives me a chance to spend time outdoors, which I greatly appreciate after a long day of working at a desk. It also helps to have a great team helping us. The volunteers we had this year were all eager to learn and chip in. Such a dedicated group makes all of the work much easier”

Ross Beckwith is the City of West St. Paul's new City Engineer/Public Works and Parks Director. He commented, “I am thankful that Dave Schletty was here to lead the coordination of the WHEP program. I certainly do place a high value on the function and importance of wetlands and am grateful for the volunteers who perform monitoring here in West St. Paul. I really got a firsthand look at wetlands during my first internship with the Wisconsin Department of Transportation in the Environmental Group. I spent much of that summer in waders taking plant inventories in northern Wisconsin wetlands and performing monitoring tasks



Ross Beckwith

### West St. Paul WHEP Sites Monitored in 2016



on newly constructed wetlands which were built for mitigation of highway projects. Water quality is a very important issue, and I certainly look forward to working towards improving the health of West St. Paul's wetlands and getting involved in WHEP.”

Dave Schletty, Assistant Parks & Recreation Director for the City of West St. Paul, helps coordinate the program. Since many of the wetlands are within City parkland, Dave has a vested interest in their water quality. He has been very interested in reviewing the old data and watching the trends in each wetland tested. Dave continues to learning more and enjoys working with the community to improve water quality.



Dave Schletty

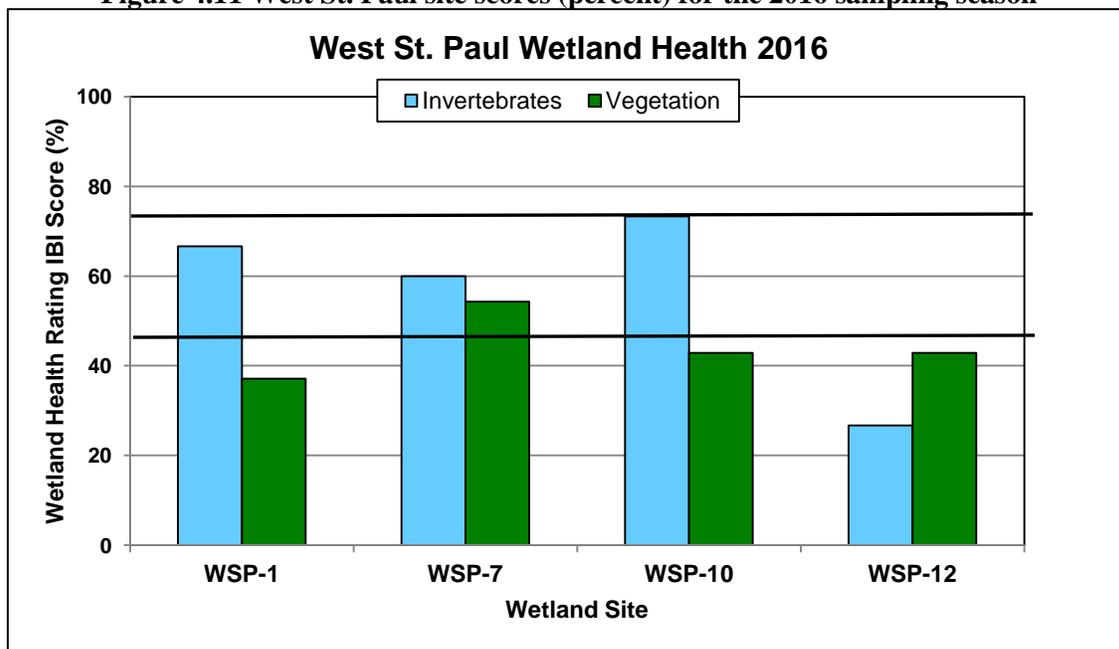
### West St. Paul General Wetland Health

Figure 4.11 presents an overall view of wetland health for all of the 2016 monitoring sites in West 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. The West St. Paul wetland ratings ranged from poor to moderate wetland health in 2016. The invertebrate and vegetation scores were inconsistent for each of the wetlands monitored in 2016, except WSP-7.



Tim Martin, Jan Henley, Jeannette Henrikssen, and Anna Klein

**Figure 4.11 West St. Paul site scores (percent) for the 2016 sampling season**



### 4.11.1 Mud Lake (WSP-1)

Mud Lake (WSP-1) is a 3.1 acre, type 3 wetland (an inland, shallow marsh which is usually waterlogged early during a growing season and consistently covered with six inches or more of water) within the Riverview Tunnel Drainage District. The drainage area is 34.2 acres, receiving stormwater from the surrounding residential area. WSP-1 is publicly owned and is part of Mud Lake Park, an 8-acre City park. The eastern shoreline of the park was restored over a decade ago through a Conservation Partners grant provided by LCCMR to the City and was mowed this year to discourage invasive species from taking over the site. The neighbors at this site have expressed their interest in the water quality of the wetland to the team leaders and a local boy scout troop that visits this park site to learn about nature. A family of Canadian geese have been spotted here every year for the past four seasons with their goslings in tow. There is an inlet on the east side and an outlet on the west side of the wetland. Mud Lake is part of the City's stormwater management plan.



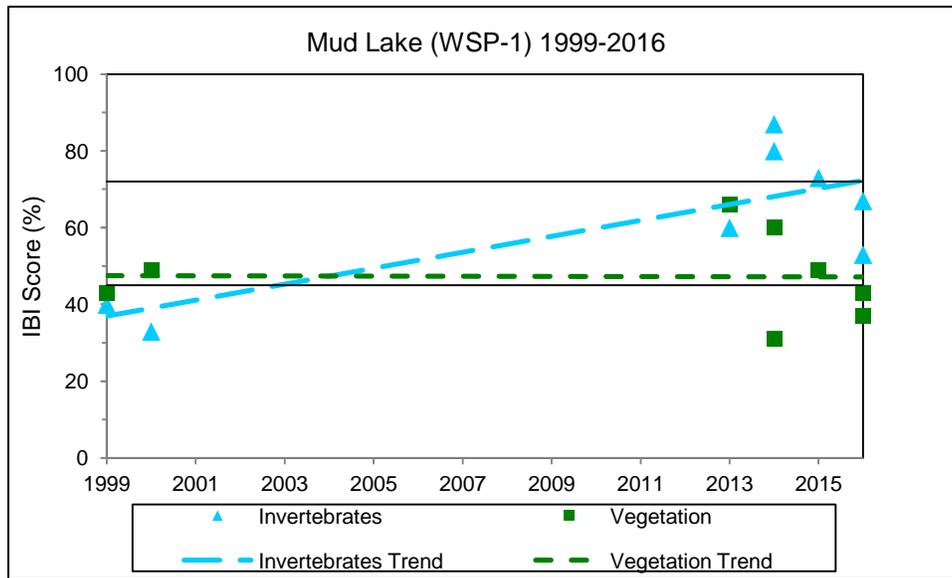
### Wetland Health

**Site Observations:** This wetland is located in a mostly residential area, but has large trees surrounding it, making it appear more natural in setting. The wetland slope is gentle, and the substrate is mucky but with some firm areas. Cattails surround most of the perimeter of the wetland, averaging approximately 10-meters wide. The surface of the wetland is covered with duckweed, and has large groups of white water lily in the open water areas. There is a public park on the east side which is frequently used by neighborhood residents.

**Table 4.11.1 Mud Lake (WSP-1) Wetland Health based on Index of Biotic Integrity**

2016 Data (WSP-1)	<b>Invertebrates</b> 	<b>Vegetation</b> 
<b>Wetland Health Rating (IBI score)</b>	Moderate (20)	Poor (13)
<b>Cross-check Rating (IBI score)</b>	Moderate (16)	Poor (15)
<b>Trend 1999-2016</b>	Improving	Variable

**Figure 4.11.1 Invertebrate and vegetation trends for Mud Lake (WSP-1)**



**Site Summary:** This is the fourth consecutive year that WSP-1 has been monitored, and the sixth time it has been monitored since 1999. The vegetation and invertebrate scores were inconsistent again in 2016. Just as in 2014 and 2015, the invertebrate score was much higher than the vegetation score. Except for the poor scores in 1999 and 2000, the invertebrate scores calculated by the City team have stayed high-moderate to excellent. The vegetation scores are variable.

#### 4.11.2 Humboldt Pond (WSP-7)

Humboldt Pond (WSP-11), also known as Vivian Pond, is a 1.2-acre, type 4 wetland (deep marsh usually covered with up to three feet of water during spring and summer) within the Simons Ravine District. The drainage area is 23 acres, receiving stormwater from the surrounding residential area. The City recently completed an alum treatment to this wetland which has helped to improve the water clarity this year. It is publicly owned by the City, but is not part of the City park system. It has one inlet and one outlet. It is part of the City's stormwater management plan.



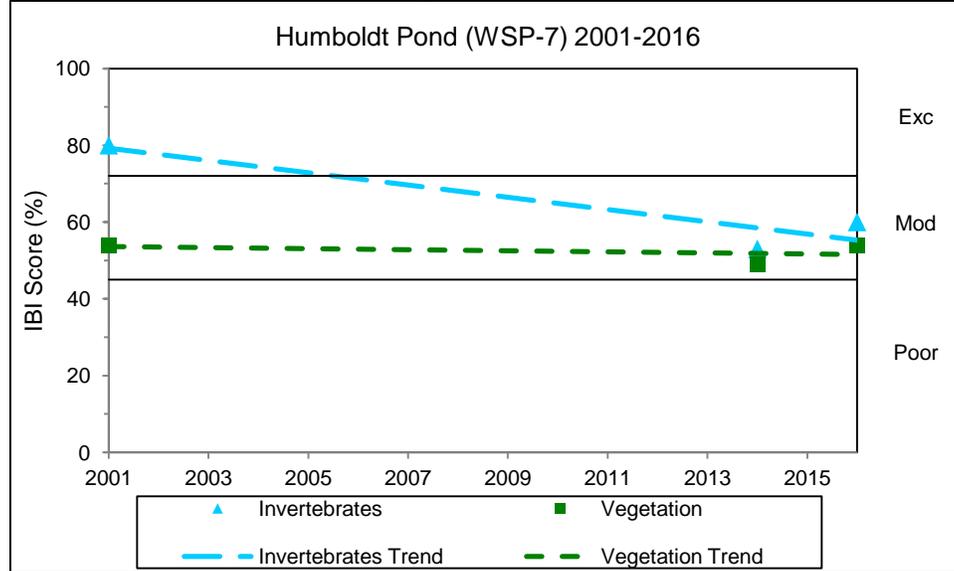
#### Wetland Health

**Site Observations:** The wetland has a moderate slope. The substrate is mucky but firm. The wetland is surrounded by overhanging trees and there are many tree limbs submerged in the water. Pondweed, water-nymph, duckweed, and water-meal were identified in the open water. Small patches of cattail and bulrush were found in patches along the shoreline of Humboldt Pond, but were not present in the releve. Many species of woody and emergent plants were identified within the vegetation releve. Four families of leeches, one family of caddisfly, one family of dragonfly, one family of snail, two families of crustaceans, and three families of trueflies were collected. A fun observation of this wetland every year is the presence of water scorpions in the invertebrate sample which look like a walking stick in the water.

**Table 4.11.2 Humboldt Pond (WSP-7) Wetland Health based on Index of Biotic Integrity**

	<b>Invertebrates</b> 	<b>Vegetation</b> 
<b>2016 Data (WSP-7)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (18)	Moderate (19)
<b>Trend 2016</b>	Not enough data	Not enough data

**Figure 4.11.2 Invertebrate and vegetation trends for Humboldt Pond (WSP-7)**



**Site Summary:** This is the third time that WSP-7 has been surveyed for WHEP since 2001. Vegetation scores have remained stable all three surveys. Invertebrate scores are similar for 2014 and 2016 surveys; however, the invertebrate health score has declined since receiving an excellent health score in 2001. In 2016, as in 2014, the invertebrate and vegetation scores were consistent with each other, each scoring moderate. More years of monitoring will help determine a more reliable health trend.

### 4.11.3 Emerson Pond South (WSP-10)

Emerson Pond South (WSP-10) is a 2.3 acre, type 4 wetland (deep marsh usually covered with up to three feet of water during spring and summer) within the Simon Ravine District drainage area. Its watershed is 23 acres, receiving stormwater from the surrounding residential area, as well as from Thompson Lake and golf course which crosses the road north to the wetland before flowing to St. Paul. Although it is publicly owned by the City, it is not part of the City park system and the wetland is not visible from the nearby public road. There is one inlet on the north side and one outlet on the south side of the wetland, but no outlet. It is part of the City's stormwater management plan.



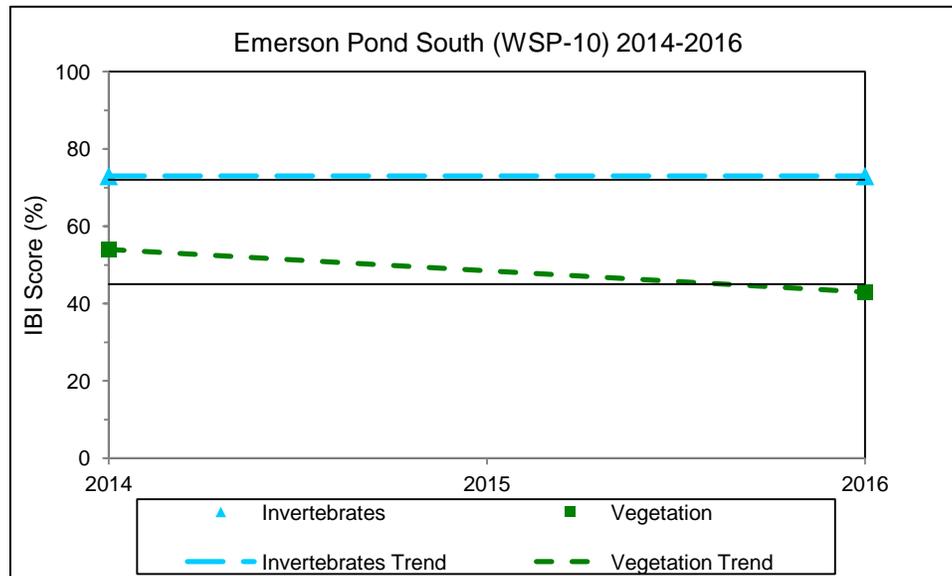
## Wetland Health

**Site Observations:** Emerson Pond South is within a residential area. The wetland has mostly a gentle slope and a solid substrate, with deep slopes and underwater pockets near the inlets where the water rushes in during storm events. The wetland receives stormwater quickly before it slowly releases it through the outlet and is very “flashy”. Before setting bottle traps for invertebrates at the site, team leaders have been careful to check the weather forecast to make sure that a rain event is not predicted for several consecutive days to reduce the risk of losing the sample. Although the wetland’s perimeter is surrounded by overhanging trees, the wetland looks more like a stormwater pond than a natural wetland due to the lack of emergent vegetation. Leeches, dragonflies, damselflies, caddisflies, snails, scuds, and truebugs were collected at the site. Coontail, waterweed, pondweed, and duckweed, along with woody species were identified in the vegetation releve.

**Table 4.11.3 Emerson Pond South (WSP-10) Wetland Health based on Index of Biotic Integrity**

	Invertebrates	Vegetation
<b>2016 Data (WSP-10)</b>		
<b>Wetland Health Rating (IBI score)</b>	Moderate (22)	Poor (15)
<b>Trend 2014-2016</b>	Not enough data	Not enough data

**Figure 4.11.3 Invertebrate and vegetation trends for Emerson Pond (WSP-10)**



**Site summary:** This is the second time that Emerson Pond has been monitored. The invertebrate and vegetation scores are inconsistent with each other, as in 2014. The invertebrate score is high-moderate and identical to the 2014 score. The vegetation score has declined to poor health, and remains lower than the invertebrate score. More years of data collection will help determine a more reliable health trend.

#### 4.11.4 Wentworth Pond (WSP-12)

Wentworth Pond (WSP-12) is a six-acre, type 5 wetland (open water wetland less than six feet deep and fringed by a border of emergent vegetation) within the Simons Ravine District drainage area. Its watershed is 71.2 acres and is publicly owned by the City. There are two inlets, one on the west side and one on the south side, and one outlet on the east side of the wetland.



A tree lined buffer surrounds Wentworth Pond. It is surrounded by Thompson Oaks Golf Course to the north and east. The Wentworth Library is adjacent to the southwest side of the wetland. Private residences line the nearby streets. It is part of the City's stormwater management plan and receives water from the surrounding golf course.

#### Wetland Health

**Site Observations:** The wetland slope is steep and the substrate is mucky. The bathymetry is especially irregular on the west side where a very deep ravine exists near the inlet with a sedimentation area just beyond it, creating an island in the drier seasons. This wetland can also be very “flashy” as it receives water from a larger watershed and can quickly fill up with water after storm events. Team leaders are very careful to watch the weather forecast before setting the bottle traps at this site. Vegetation is present along the shoreline, but little emergent or submergent vegetation exists. In both years this site has been sampled, the WHEP team has observed large swarms of adult blue damselflies near the shoreline.

**Table 4.11.4 Wentworth Pond (WSP-12) Wetland Health based on Index of Biotic Integrity**

	Invertebrates 	Vegetation 
<b>2016 Data (WSP-12)</b>		
<b>Wetland Health Rating (IBI score)</b>	Poor (8)	Poor (15)
<b>Trend 2015-2016</b>	Not enough data	Not enough data



Tim Martin, Anna Klein, and Jan Henley

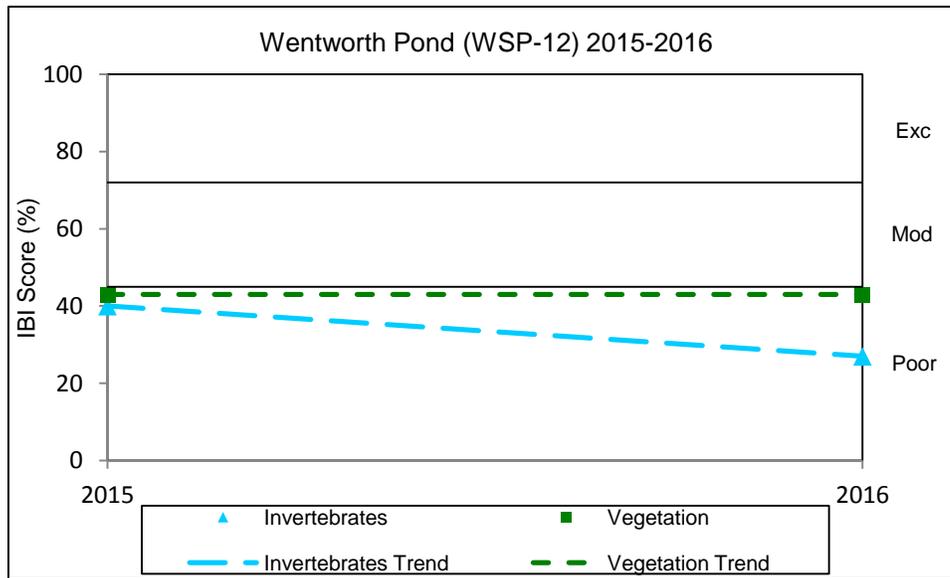


Jan Henley



Jeannette Henrikssen, Anna Klein, and Tim Martin

**Figure 4.11.4 Invertebrate and vegetation trends for Wentworth Pond (WSP-12)**



**Site summary:** This is the second year of monitoring Wentworth Pond. In 2016, both the invertebrate and vegetation indexes scored poor but the numbers had a large spread and were considered inconsistent. The invertebrate score decreased in 2016, but the vegetation score is the same as 2015. More years of monitoring will help determine health trends.