Minnesota

Wetland Health Evaluation Program

2008 Final Report

Dakota County

2008 Wetland Health Evaluation Program Report
Dakota County, MN

Coordinated By:

Dakota County

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January 2009

Report
Prepared by:

FORTIN CONSULTING, INC.
serving the environment

Acknowledgements

The following organizations participated in and provided funding for the 2008 Wetland Health Evaluation Program

Local Government:
Dakota County
City of Apple Valley
City of Burnsville
City of Eagan
City of Farmington
City of Hastings
City of Lakeville
City of Mendota Heights
City of Rosemount
Vermillion River Watershed

Special Recognition:
Mark Gernes, Joel Chirhart, Michael Bourdaghs, John Genet; MPCA Technical Experts
Paula Liepold, Dakota County WHEP Coordinator
Mary Karius, Hennepin County WHEP Coordinator
Mary Kay Lynch, Co-Citizen Monitoring Coordinator
Chris Kline, Co-Citizen Monitoring Coordinator
Carolyn Dindorf, Katie Schonhorst, Connie Fortin, Kseniya Arsenyeva; Fortin Consulting

Cover design by:
Paula Liepold

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 Water Resources Department or visit ***www.mnwhep.org.***

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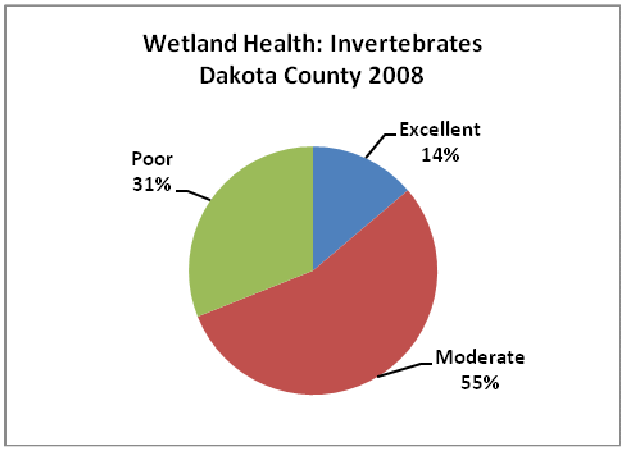
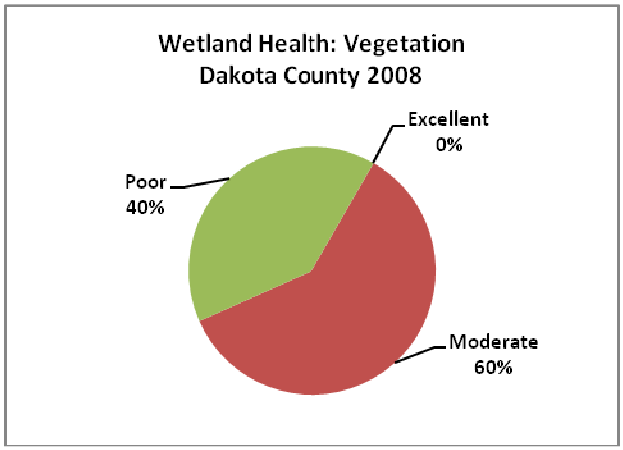
Executive Summary
Dakota County Wetland Health Evaluation Program 2008

Dakota County began sponsoring the Wetland Health Evaluation Program (WHEP) in 1997. Since then, 127 wetlands have been monitored by many volunteers across the County. In 2008, eight cities participated in WHEP, monitoring 31 different wetlands. 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 plants and invertebrates 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.

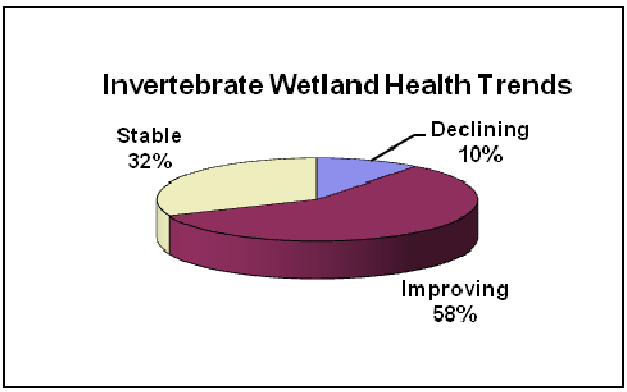


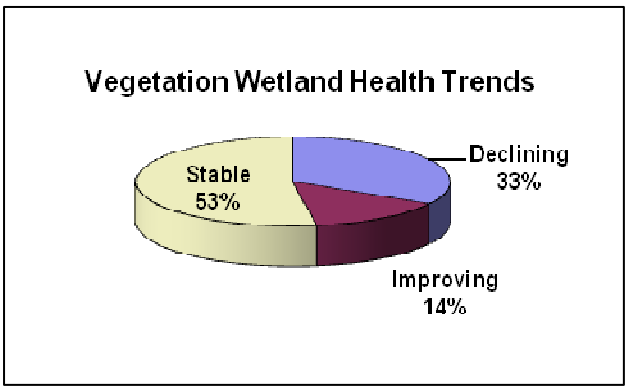


The results of the monitoring for 2008 showed a variety of wetland conditions. The Index of Biotic Integrity was used to determine wetland health ranging from poor to excellent. The majority of wetlands were in the moderate category for both macroinvertebrates and vegetation. Only 14% rated excellent for invertebrates while no wetlands rated excellent for vegetation.

The City of Burnsville wetlands rated the highest, with two excellent and one moderate rating for invertebrates and three moderate and one poor rating for vegetation. The three Farmington wetlands rated the lowest in terms of wetland health. All three wetlands rated poor for vegetation and invertebrates. One site was not sampled due to low water levels. The high ratings for Burnsville wetlands as well as the low ratings for the Farmington wetlands is the same as found in 2007. Most wetlands tested in 2008 were rated as moderate in both invertebrate and vegetation health.

A trend analysis was conducted for all of the wetlands monitored in 2008 that had enough data to analyze trends. For invertebrates, there was a high percentage (58%) of wetlands that appear to be improving. For vegetation, only 14 percent of the wetlands showed improved wetland health while 33 percent are declining. The majority of the wetlands with enough data to analyze trends remained fairly stable in terms of vegetation health.





2008 Dakota County Wetland Health Trends*
*excludes wetlands that did not have adequate data for trend analysis

Low water level was a problem in 2008 as it was in 2007, in some cases preventing collection of invertebrate samples. Some wetlands were not sampled at all because of low water.

WHEP volunteers donated hundreds of 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, 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. Developed in 1997, WHEP uses sampling methods and evaluation metrics developed by the Minnesota Pollution Control Agency (MPCA) to evaluate wetland health (Appendices A and B). The metrics are based on species diversity and richness for both vegetation and invertebrate. 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) at the MPCA. 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.


Judy Helgen, Program co-founder

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.


Mark Gernes, Program co-founder

In 1996, the MPCA partnered with Minnesota Audubon, forming a large contract with them (with EPA funds) to help us 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.

Eventually, WHEP took on a life of its own, under the leadership of Charlotte Shover and Dan Huff, and now Paula Liepold at Dakota County, and others in Hennepin County. MPCA continues to provide the training, but the organization of teams and other logistics are handled by the counties and communities.

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 USEPA grant, Minnesota Legislature (LCMR grant), and participating cities. Eventually, WHEP took on a life of its own, under the leadership of Charlotte Shover and Dan Huff, and now Paula Liepold at Dakota County. MPCA continues to provide the training, but the organization of teams and other logistics are handled by the counties and communities. Up to eleven cities/citizen teams have participated in the project in Dakota County.

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 plants and 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.

Citizen volunteers have been contributing to WHEP in Dakota County since 1997. 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.

According to Iowater, Iowa's volunteer monitoring program, there are 17 states in the United States with a functioning volunteer wetland monitoring program. Most of these programs are less than ten years old. Minnesotans can be proud to be one of the leaders in understanding and protecting these often overlooked and undervalued water resources.

Although ten million acres of wetlands remain, Minnesota has lost approximately 50 percent of its wetland 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

With 24,501 acres of wetlands, wetlands make up about 6.5 percent 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 totals, 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 covered with water periodically with usually 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, spikerush, 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, spikerush, and wild rice grow in these wetlands. Pondweed, naiad, coontail, watermilfoil, waterweed, duckweed, waterlily, and spatterdock can often be found in the open water areas.

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

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

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

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

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

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

Total wetland area in Dakota County: 24,501 acres

Many federal and state agencies are involved in wetland regulation, protection, and restoration. In Minnesota, the state wetland regulations are overseen by the Board of Water and Soil Resources and Department of Natural Resources. To learn more about regulations and programs that affect or protect wetlands, visit www.bwsr.state.mn.us and click on wetlands. Many cities, watershed organizations and counties have adopted local administration of the state Wetland Conservation Act.

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, Dakota County WHEP Coordinator, says that "WHEP serves as a model for citizen wetland monitoring around the country. It is extremely successful not only at providing a unique educational experience for volunteers but also producing quality data because of the program's protocol design and training. WHEP is an exciting way to learn about wetlands. Ordinary people with an interest in water resources and who like spending time outside become trained as citizen biologists. The results are provided to city, county, and watershed water resource managers." Paula enjoys coordinating the program "because I know the volunteers and participants have a passion for understanding the health of area wetlands. They are committed to learning about wetland health and confident in sharing the results with decision-makers."

Mary Kay Lynch is the WHEP Field Monitoring Coordinator. 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 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. She says, "Each year I'm impressed with the high level of motivation and dedication of volunteers. Even if participants have little science background or have physical limitations, there are roles for them on a team. All of them are welcome, and team members and leaders help each other. Team leaders are keys to the success of the program. Effective team leaders facilitate members' learning throughout the experience and provide opportunities for active volunteer participation. As important, they help develop a positive experience and team spirit. The fact that team members return year after year, some becoming team leaders, is indicative of the success of leaders. I've observed much resourcefulness and creativity as leaders have developed field techniques and tools for recording and processing data. One of the most interesting examples is the use of boards for navigating over deep muck in these recent dry years! With experience, team leaders and members seem to relax and have even more fun."

Mary Kay Lynch

Chris Kline

Chris Kline is a zoologist at the Minnesota Zoo, and has been involved with WHEP since 1997 playing a variety of roles. Currently, he helps collect required equipment, and he reviews/corrects data sheets for the Dakota County WHEP teams. He thinks, "The project successfully works in both directions, simultaneously collecting meaningful data while educating people about wetland communities and their value."

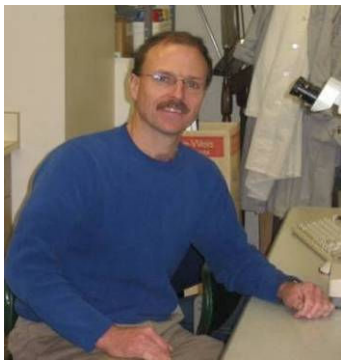
Each participating city team collects data on up to four wetlands. Over the 12 years of the project, 127 wetlands have been evaluated in Dakota County. Data for all of the years of monitoring of Dakota County wetlands is provided in Appendices D and E. The results of the data collection efforts have been documented in annual summary reports and presented to City staff and citizen teams at annual appreciation dinners.

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.

Vegetation and Invertebrate Experts



Mark Gernes

Michael Bourdaghs

Joel Chirhart

John Genet

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 invertebrate training and technical assistance.

Mark says, "The Wetland Health Evaluation Program opens new educational horizons for people interested in wetlands. WHEP serves as an outstanding framework for citizen science (volunteer monitoring). It provides high quality wetland biological data to aid local cities in better protecting and managing the quality of targeted wetlands in their city." The MPCA staff support WHEP and have been very helpful in making WHEP a success.

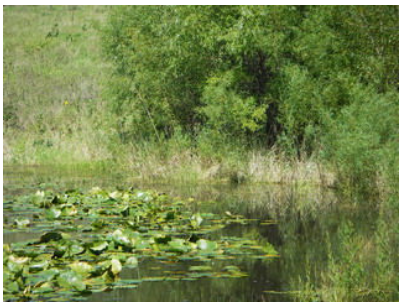
2.2 Data Collection

In order to use the data to interpret the health or condition of the wetlands, a scoring process called the Index of Biological Integrity (IBI) is used. Separate IBIs are calculated for plants and macroinvertebrates. Several measures, referred to as metrics, are used to calculate an IBI. The IBI scores are categorized into poor, moderate or excellent. Biological integrity is commonly defined as "the ability to support and maintain a balanced, integrated, and adaptive community of organisms having a species composition, diversity and functional organization comparable to those of natural habitats within a region" (Karr, J. R.

and D. R. Dudley. 1981. Ecological perspectives on water quality goals. Environmental Management 5: 55-68). Biological integrity is equated with pristine conditions, or those conditions with no or minimal disturbance (U.S.EPA www.epa.gov/bioindicators/html/about.html). Each city participating in WHEP has identified "reference" wetlands, those that are believed to be minimally disturbed and represent the most pristine conditions within the city.

Vegetation Index of Biological Integrity (IBI)

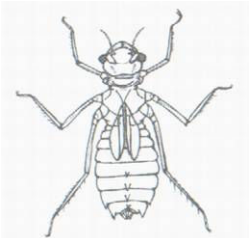
Vegetation is analyzed using a 100 square meter releve plot. All species within the sampling plot are identified to the genus level, and documented on the field data sheet. Vegetation is divided into categories based on their ecological function or relationship. The categories include nonvascular, woody,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



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

Invertebrate IBI

Macroinvertebrates (small aquatic animals with no backbone) are analyzed by collecting samples using six bottle traps and one dip netting effort. 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 (Appendix B).



Dragonfly Graphic: MPCA

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

2.3 Spot Checks and Quality Control

Each city is responsible for evaluating one wetland in another city as a means of providing a spot check. The citizen spot check provides a second sample for the selected wetland. The purpose of the spot 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. The co-coordinator (Chris Kline) 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. The technical expert conducts QC checks on the wetlands sampled. The technical expert also reviews the vegetation sample plot that was selected and evaluated by the citizen team. The technical expert reviews the insects collected by the citizen team for the invertebrate IBI. Thus, the QC is not a second sample of the same wetland site; rather it is a review of the sample collected and evaluated by the citizen team.

FCI staff: Connie Fortin, Roman Rowan, Caitlin Fortin, Kseniya Arsenyeva, Nathan Ebnet, Katie Schonhorst, and Carolyn Dindorf

Over the duration of the project, the work of each citizen team has been reviewed on a rotational basis. The technical expert reviews 10% of the vegetation plots and one invertebrate collection from each team. In 2008, Fortin Consulting cross-checked the vegetation plots of three wetlands, one in Apple Valley, Burnsville (cross-check of Farmington team), and Mendota Heights: AV-1, B-1, and MH-2. 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, it is the City team's data with any corrections found during the data transfer and mathematical checks conducted by Chris Kline and the field vegetation and invertebrate identification checks conducted by Fortin Consulting. 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 minimal 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 IBI (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 dissolved oxygen 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 2008 Sampling Season Results

During the 2008 sampling season, eight citizen teams monitored 31 wetlands in eight cities in Dakota County (Apple Valley, Burnsville, Eagan, Farmington, Hastings, Lakeville, Mendota Heights, and Rosemount) and a Dakota County Park in West St. Paul. Eight of these wetlands were sampled twice through citizen spot checks. Three wetland vegetation samples and eight invertebrate samples were checked for accuracy through the Fortin Consulting quality control check.

Figure 3.1.1 Dakota County Wetland Ratings

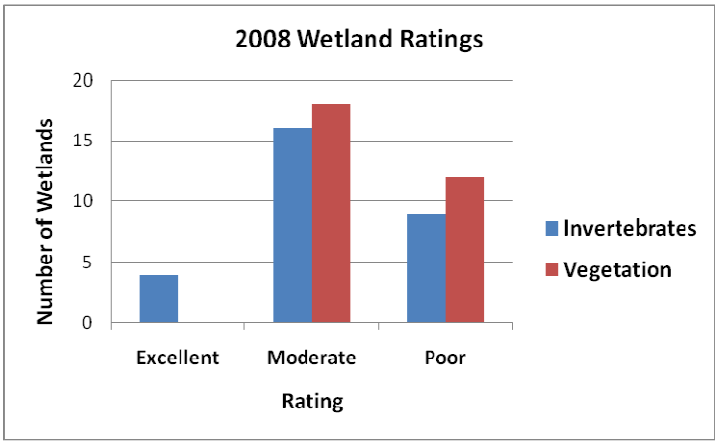


Figure 3.1.1 and Table 3.1.1 show the vegetation and invertebrate ratings for all of the wetlands assessed during the 2008 sampling season. More than half (18) of the wetlands were rated moderate based on vegetation. This is consistent with previous years. Twelve wetlands were rated poor. Not one of the wetlands rated excellent for the vegetation analysis. Vegetation scores ranged from 7 to 25 out of a maximum of 35 points.

The invertebrate analysis resulted in nine wetlands rating poor, sixteen rating moderate and four excellent. Two of the wetlands could not be sampled due to dry conditions. Invertebrate scores ranged from 8 to 26 out of a maximum of 30 points. The wetlands rated excellent included, AV-1, B-1, B-3, and R-18. Burnsville had the most (two) wetlands with excellent ratings. Farmington wetlands all ranked poor. Several of the sites showed different ratings for vegetation versus invertebrates. In general, vegetation scores were lower than invertebrate scores. There are different factors that may be influencing the plant and invertebrate communities in each wetland.

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)	1/3	2/1	1/0
Burnsville (B)	0/1	1/3	2/0
Eagan (E)	0/1	4/3	0/0
Farmington (F)	3/3	0/0	0/0
Hastings (H)	2/2	2/2	0/0
Lakeville (L)	2/1	2/3	0/0
Mendota Heights (MH)	1/0	½	0/0
Rosemount (R)	0/1	3/3	1/0
West Saint Paul (MH)	0/0	1/1	0/0
Totals	9/12	16/18	4/0

Figures 3.1.2 and 3.1.3 below show the distribution of wetland health ratings for each of the sites monitored in 2008.

Figure 3.1.2

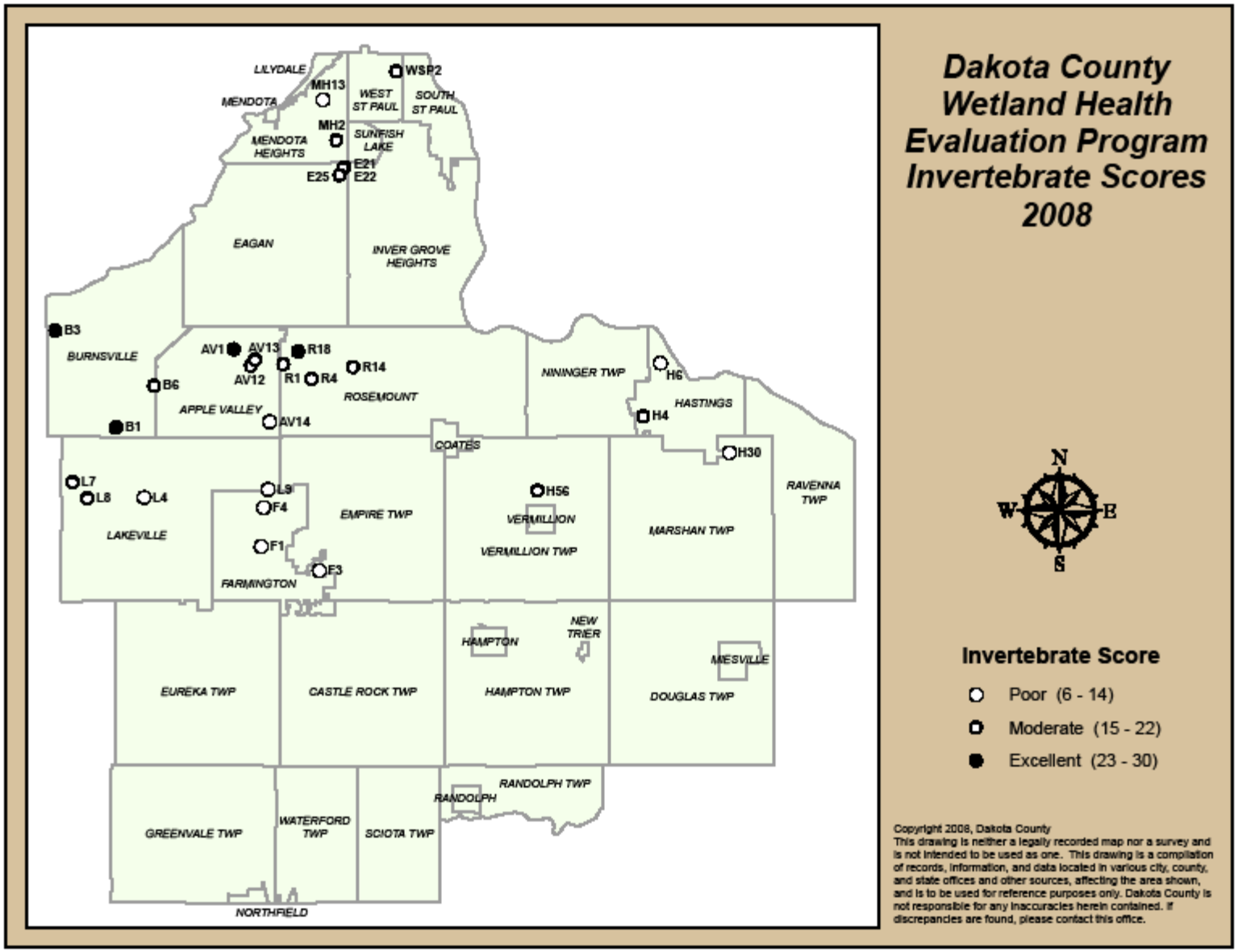

Dakota County
Wetland Health
Evaluation Program
Invertebrate Scores
2008
LILYDALE
MENDOTA
MENDOTA HEIGHTS
WEST ST PAUL
SOUTH ST PAUL
SUNFISH LAKE
WSP2
MH13
MH2
E25
E21
E22
EAGAN
INVER GROVE HEIGHTS
B3
BURNSVILLE
AV1
AV13
AV12
R18
R1
R4
R14
B6
APPLE VALLEY
AV14
B1
ROSEMOUNT
NININGER TWP
H6
HASTINGS
H4
COATES
H30
L7
L8
L4
L9
F4
F1
F3
LAKEVILLE
FARMINGTON
EMPIRE TWP
H56
VERMILLION
VERMILLION TWP
MARSHAN TWP
RAVENNA TWP
HAMPTON
NEW TRIER
MIESVILLE
EUREKA TWP
CASTLE ROCK TWP
HAMPTON TWP
DOUGLAS TWP
RANDOLPH TWP
RANDOLPH
GREENVALE TWP
WATERFORD TWP
SCIOTA TWP
NORTHFIELD
N
W
E
S
Invertebrate Score
Poor (6 - 14)
Moderate (15 - 22)
Excellent (23 - 30)
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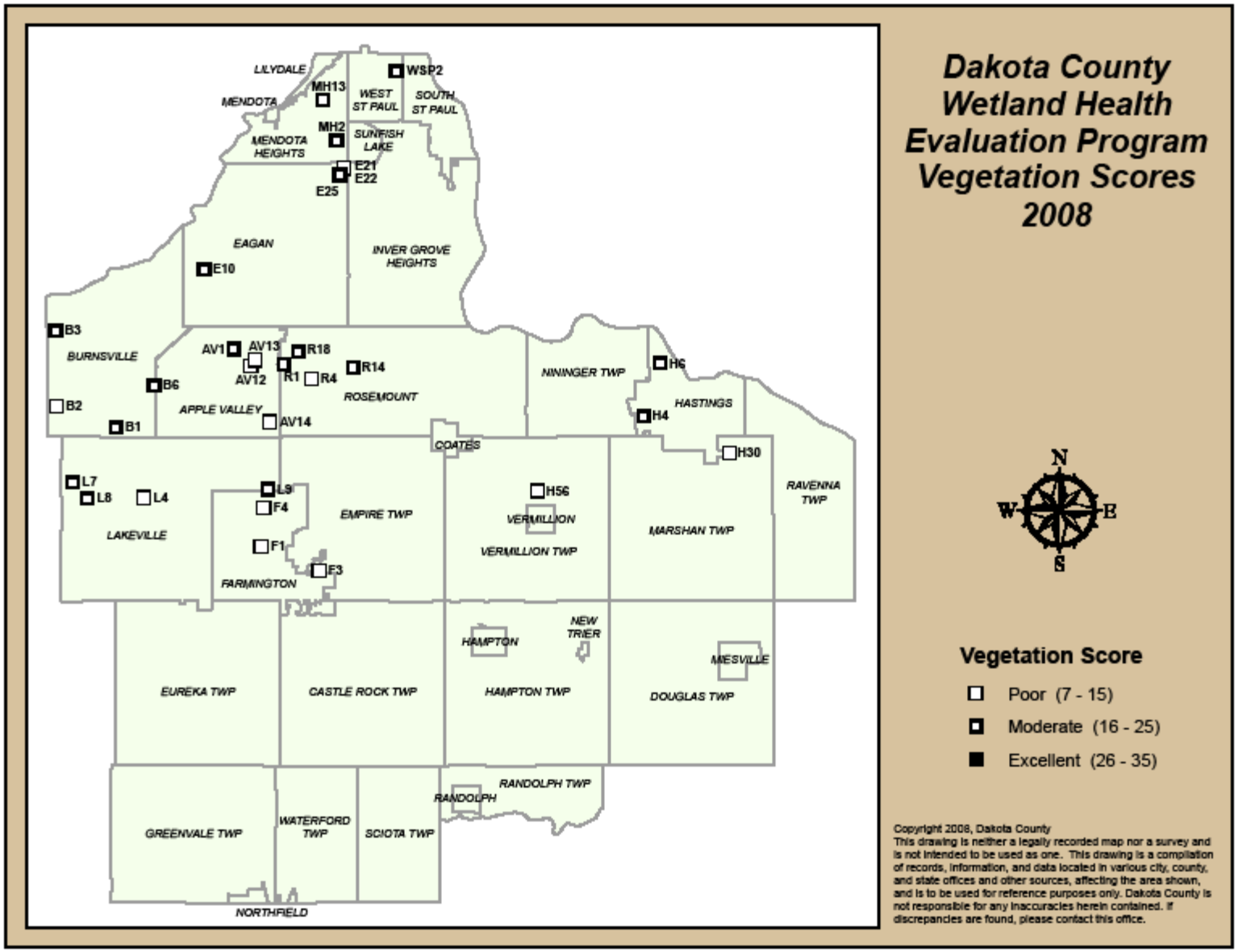
Figure 3.1.3


Dakota County
Wetland Health
Evaluation Program
Vegetation Scores
2008
LILYDALE
MENDOTA
MENDOTA HEIGHTS
WEST ST PAUL
SOUTH ST PAUL
SUNFISH LAKE
INVER GROVE HEIGHTS
EAGAN
BURNSVILLE
APPLE VALLEY
ROSEMOUNT
NININGER TWP
HASTINGS
COATES
LAKEVILLE
FARMINGTON
EMPIRE TWP
VERMILLION
VERMILLION TWP
MARSHAN TWP
RAVENNA TWP
HAMPTON
NEW TRIER
MIESVILLE
EUREKA TWP
CASTLE ROCK TWP
HAMPTON TWP
DOUGLAS TWP
RANDOLPH TWP
RANDOLPH
GREENVALE TWP
WATERFORD TWP
SCIOTA TWP
NORTHFIELD
WSP2
MH13
MH2
E21
E22
E25
E10
B3
B6
B2
B1
AV1
AV13
AV12
R18
R1
R4
R14
AV14
H6
H4
H30
H56
L7
L8
L4
L9
F4
F1
F3
N
W
E
S
Vegetation Score
Poor (7 - 15)
Moderate (16 - 25)
Excellent (26 - 35)
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3.1.1 Natural Versus Altered Wetlands

Wetlands were classified as natural, altered by stormwater input or created based on information provided in the site identification form or from city staff. Average IBI scores for each of the three categories were calculated. In the past, WHEP team leaders have commented that the created wetlands seem to exhibit poorer insect diversity. For the 2008 data, natural wetlands scored higher for both invertebrates and vegetation (Table 3.1.2). An EXCEL analysis of variation (ANOVA) was run to determine if the differences were statistically significant. For invertebrates, there was a significant difference between the scores of all three categories. Also, the natural wetlands differed significantly from the created wetlands and stormwater wetlands, but the created wetlands did not differ significantly from the stormwater wetlands. The natural wetlands showed the best invertebrate health, thus proving the observations of our trained volunteers to be correct.

For vegetation, although the natural wetlands scored the highest on average, none of the scores were considered significantly different from each other. However, if the low score of 11 for B-2 is removed as a possible outlier, there are statistically significant differences between the scores for natural versus created and natural versus stormwater wetlands. The average score for natural wetlands without B-2 is 23.

Table 3.1.2 IBI Scores of Created, Stormwater and Natural Wetlands

	Invertebrates			Vegetation		
Wetland	Created Wetlands	Stormwater wetlands	Natural Wetlands	Created Wetlands	Stormwater wetlands	Natural Wetlands
AV-1		24			21	
AV-12		16			11	
AV-13		22			13	
AV-14		12			9	
B-1			26			23
B-2						11
B-3		24			17	
B-6		22			17	
E-10		20			19	
E-21		22			17	
E-22		18			15	
E-25		16			19	
F-1		12			13	
F-3		8			7	
F-4	10			11		
H-30	14			13		
H-4	20			21		
H-56		22			15	
H-6		14			21	
L-4	14			13		
L-7		20			25	
L-8			20			23
L-9	12			19		
MH-13		12			21	
MH-2		20			19	
R-1		20			19	
R-14			22			25
R-18			26			19
R-4		16			15	
WSP-2		18			17	
Average	**14**	**18**	**24**	**15**	**17**	**20**

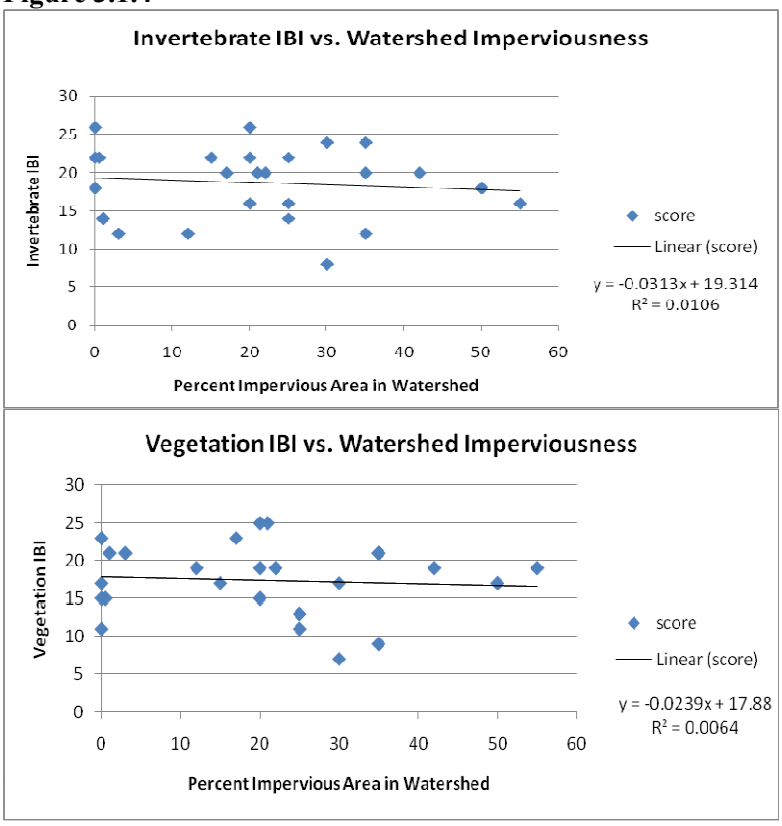
The data sets were small for the created and natural wetlands. Next year it would be interesting to look at all of the wetlands ever sampled and increase the amount of data to be evaluated. We recommend using the most current year of monitoring data for each site even though these years would vary across sites.

It is not surprising that natural wetlands would support the richest and most diverse invertebrate and plant community. We do not restore insect communities in our restored wetlands and it seems like they are having a difficult time recolonizing the new wetlands. 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. These factors are likely to affect the type and diversity of plants found in the wetlands. At this time there is no statistical data showing a decreased invertebrate community which is surprising.

3.1.2 Impervious Area in the Watershed

Data on percent impervious area in the watershed was compiled for each wetland based on the site identification forms (Appendix C.) submitted by each city. Wetlands with higher impervious areas likely receive more runoff and pollutants. Impervious areas ranged from zero to 55 percent. Studies have shown that stream degradation occurs at low levels of imperviousness (about 10%)[1]. Impacts can be measured in the aquatic community. Most of the WHEP site watersheds have substantially higher impervious areas. To help determine if a relationship exists between watershed impervious area and wetland health, linear regressions were completed using the 2008 IBI's for both invertebrates and vegetation and the watershed impervious areas for each wetland. Scatter plots of the data are shown in figure 3.1.4 below. As indicated by the low R^2 values, the variation in 2008 IBI scores cannot be explained based on watershed imperviousness. In other words, watershed impervious area may be a factor, but there are other factors that are impacting the plant and invertebrate communities.

Figure 3.1.4



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

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 trainings; citizen monitoring leaders and team leaders that check on the team's collection methods, data entry, and metric calculations; spot 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 2008 Spot Checks

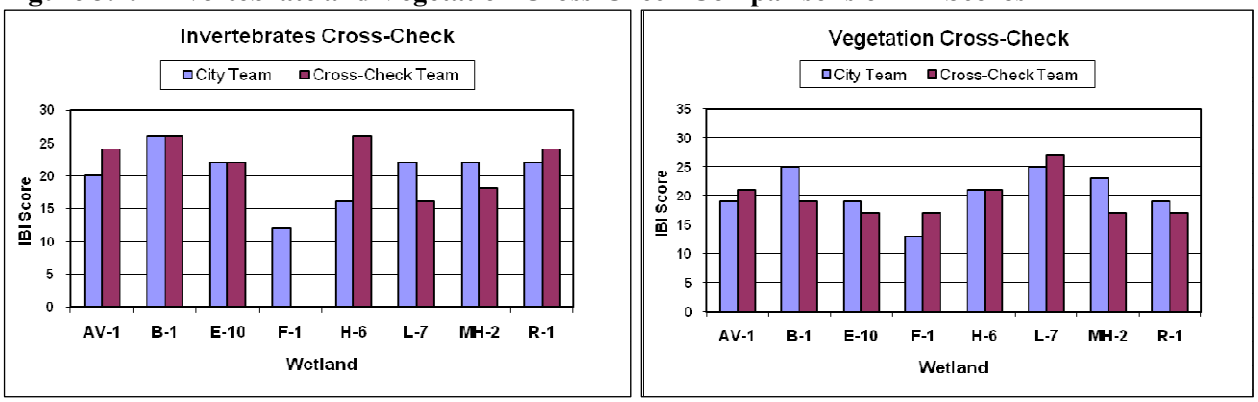
Each city team was responsible for evaluating one wetland in another city (Table 3.2). This citizen spot check provides a second sample for the selected wetland. The purpose of this check is to determine if two different samples provide similar results for the vegetation and invertebrate IBI. Large wetlands 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 point scores differ by six points or less. The Farmington site (F-1) invertebrate spot check was not completed due to dry conditions. The majority of the samples are consistent (Table 3.2.1 and Figure 3.2.1). Three found identical scores. The H-6 site was not consistent for invertebrates. There was a 10 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. The FCI checks found that the quality of both team's invertebrate identification was similar, so the difference is not likely in the identification. Three of the spot checks were at the 6 point difference. Data collected by the original city team is used for the individual wetland analysis in Section 4.0 of this report.

Upon evaluating the data sheets, it appears there may be some confusion in how the number of samples collected is recorded. Many teams indicate they've collected three bottle trap samples from 6 traps, but list only one on the data sheet. It is also unclear if the team leaders that are listing two under dip net samples are referring to two dip net sweeps or two samples (each with two sweeps). This should be clarified through the training so that the data sheets are completed consistently.

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

City Team	Spot Check Team	Wetland Evaluated	Invertebrate Score Comparison		Vegetation Score Comparison	
			City	Spot Check	City	Spot Check
Apple Valley	Rosemount	Hidden Valley (AV-1)	20	24	19	21
Burnsville	Farmington	Crystal West (B-1)	26	26	25	19
Eagan	Mendota Heights	AP-3 Cedar Pond (E-10)	22	22	19	17
Farmington	Burnsville	Pine Knoll (F-1)	12	Dry- no sample	13	17
Hastings	Lakeville	Lake Rebecca (H-6)	**16**	**26**	21	21
Lakeville	Hastings	DNR 387 (L-7)	22	16	25	27
Mendota Heights	Eagan	Copperfield (MH-2)	22	18	23	17
Rosemount	Apple Valley	Kelly Marsh (R-1)	22	24	19	17

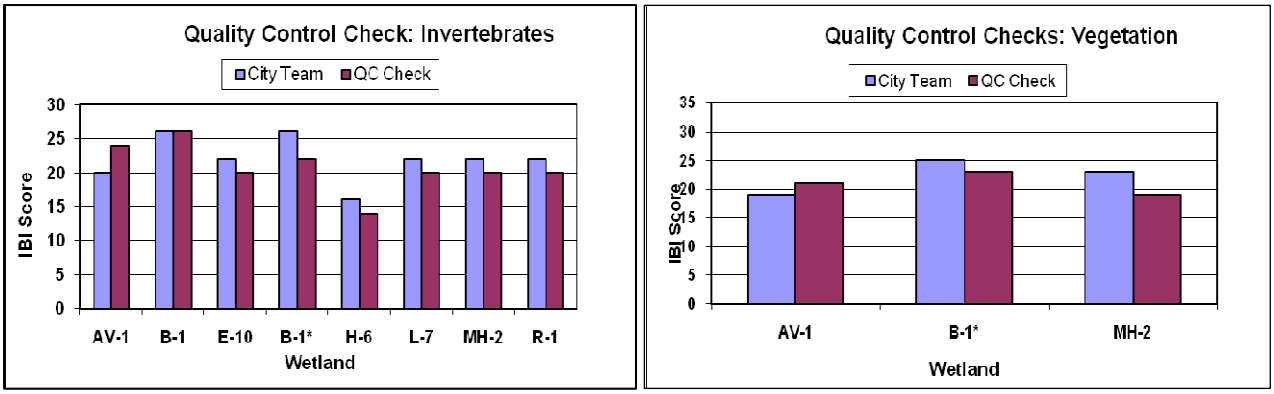
Figure 3.2.1 Invertebrate and Vegetation Cross-Check Comparisons of IBI Scores



3.2.2 2008 Quality Control Checks

Quality control checks were conducted at three sites for vegetation and eight sites for invertebrates in 2008 (Figure 3.3.2) by Fortin Consulting (FCI), an environmental consulting firm hired to assist with WHEP. 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.

Figure 3.2.2 Quality Control Checks (IBI Score Comparison)



*Note: Farmington cross-checked B-1. FCI did QC on the B-1 site for Farmington.

The team scores were found to be consistent with the quality control checks. All sites were within the 6 point margin expected.

WHEP also provides review of the data sheets for scoring and data transfer errors. This review is conducted by Chris Kline. Table 3.2.2 shows the data sheet review results. Most of the errors found were in data transfer. Most of the mathematical errors were the math in the data sheet. There were 16 data transfer errors and 17 math errors in the scoring total. Ten of the errors were with metric number six. Only three of the errors resulted in score changes, two changed by four points and one changed by two points. Many of these errors could be prevented by double-checking the transfer and math work on the data sheets. The Mendota Heights team had no errors. The quality control checks are working well. Errors are identified and corrections are made.

Table 3.2.2 Data Sheet Review

		Invertebrate IBI Scores				Vegetation IBI Scores		
Team Name	**Site**	**Team**	**Review**	**errors**		**Team**	**Review**	**errors**
Apple Valley	AV-1	20	20			19	19	1
	AV-12	16	16	2		11	11	
	AV-13	22	22	1		13	13	
	AV-14	12	12			9	9	
	R-1 sc*	34	34			17	17	
Burnsville	B-1	26	26			25	25	
	B-2	no water				11	11	
	B-3	24	24	3		17	17	1
	B-6	22	22			19	17	1
	F-1 sc	no water				17	17	
Eagan	E-10	22	22			19	19	1
	E-21	22	22			17	17	
	E-22	18	18			15	15	1
	E-25	16	16			19	19	1
	MH-2 sc	18	18			17	17	1
Farmington	F-1	12	12			13	13	
	F-3	12	8	1		7	7	1
	F-4	10	10			11	11	1
	B-1 sc	26	26			19	19	2
Hastings	H-4	20	20	1		21	21	1
	H-6	16	16			21	21	
	H-30	14	14			13	13	
	H-56	22	22			15	15	
	L-7 sc	16	16	2		31	27	1
Lakeville	L-4	14	14	2		13	1	
	L-7	22	22			25	25	
	L-8	20	20			13	13	
	L-9	12	12			19	19	2
	H-6 sc	26	26			21	21	2
Rosemount	R-1	22	22			19	19	
	R-4	16	16	1		15	15	1
	R-14	22	22			25	25	
	R-18	26	26			19	19	1
	AV-1 sc	24	24			21	21	1
Mendota Heights	MH-2	22	22			23	23	
	MH-13	12	12			21	21	
	WSP-2	18	18			17	17	
	E-10 sc	22	22			17	17	

*sc- indicates spot check of another team's wetland

3.3 WHEP Historical Data

Since WHEP began in 1997, 127 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. Appendices D and E list the data for each site since the start of the program. Section 4.0 includes the sites sampled in 2008 with an analysis of historical data, identifying sampling history and trends based on a trend analysis.

Figure 3.3.1

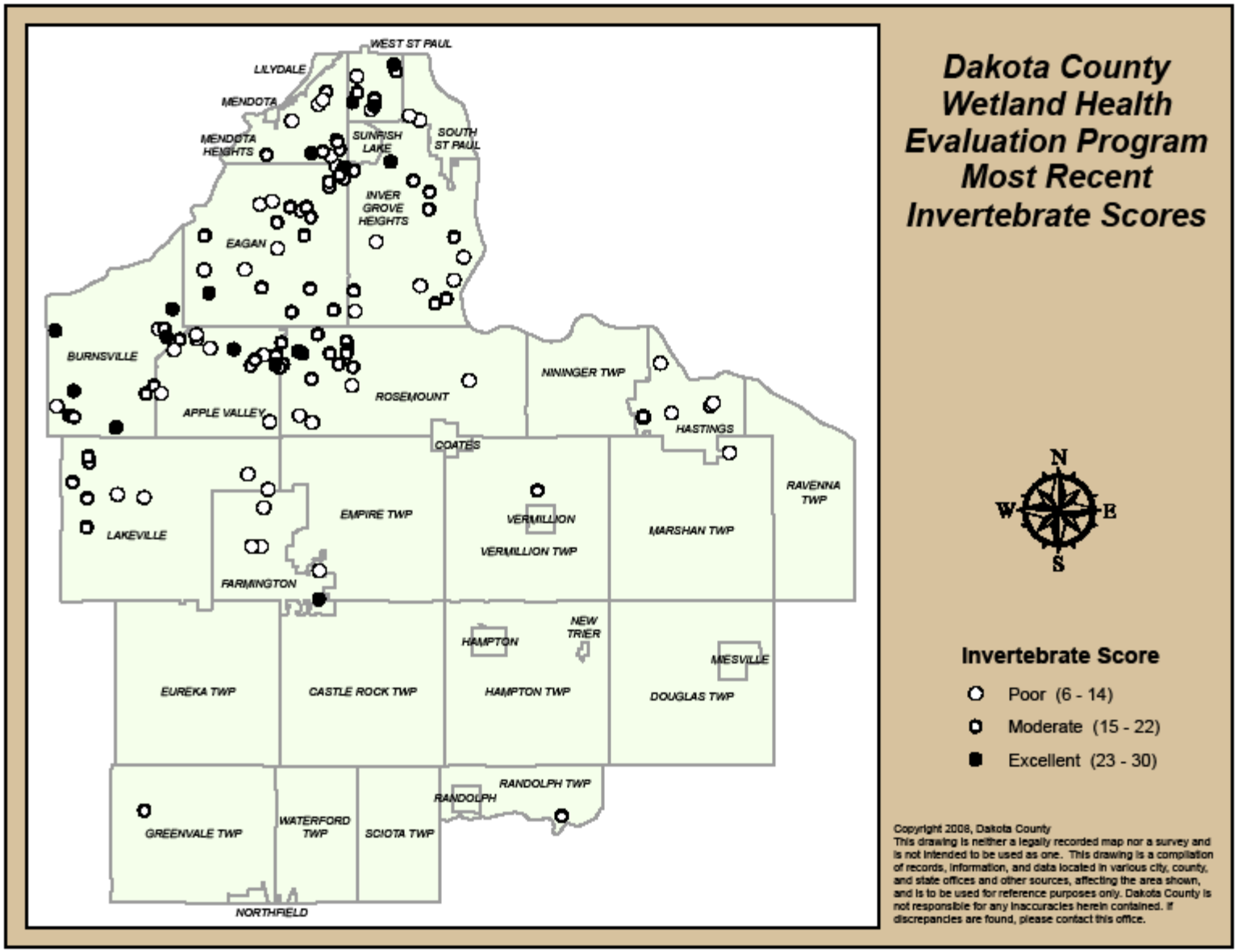

Dakota County
Wetland Health
Evaluation Program
Most Recent
Invertebrate Scores
WEST ST PAUL
LILYDALE
MENDOTA
MENDOTA HEIGHTS
SUNFISH LAKE
SOUTH ST PAUL
INVER GROVE HEIGHTS
EAGAN
BURNSVILLE
APPLE VALLEY
ROSEMOUNT
NININGER TWP
HASTINGS
COATES
RAVENNA TWP
LAKEVILLE
EMPIRE TWP
VERMILLION
VERMILLION TWP
MARSHAN TWP
FARMINGTON
NEW TRIER
HAMPTON
MIESVILLE
EUREKA TWP
CASTLE ROCK TWP
HAMPTON TWP
DOUGLAS TWP
RANDOLPH TWP
RANDOLPH
GREENVALE TWP
WATERFORD TWP
SCIOTA TWP
NORTHFIELD
N
W
E
S
Invertebrate Score
Poor (6 - 14)
Moderate (15 - 22)
Excellent (23 - 30)
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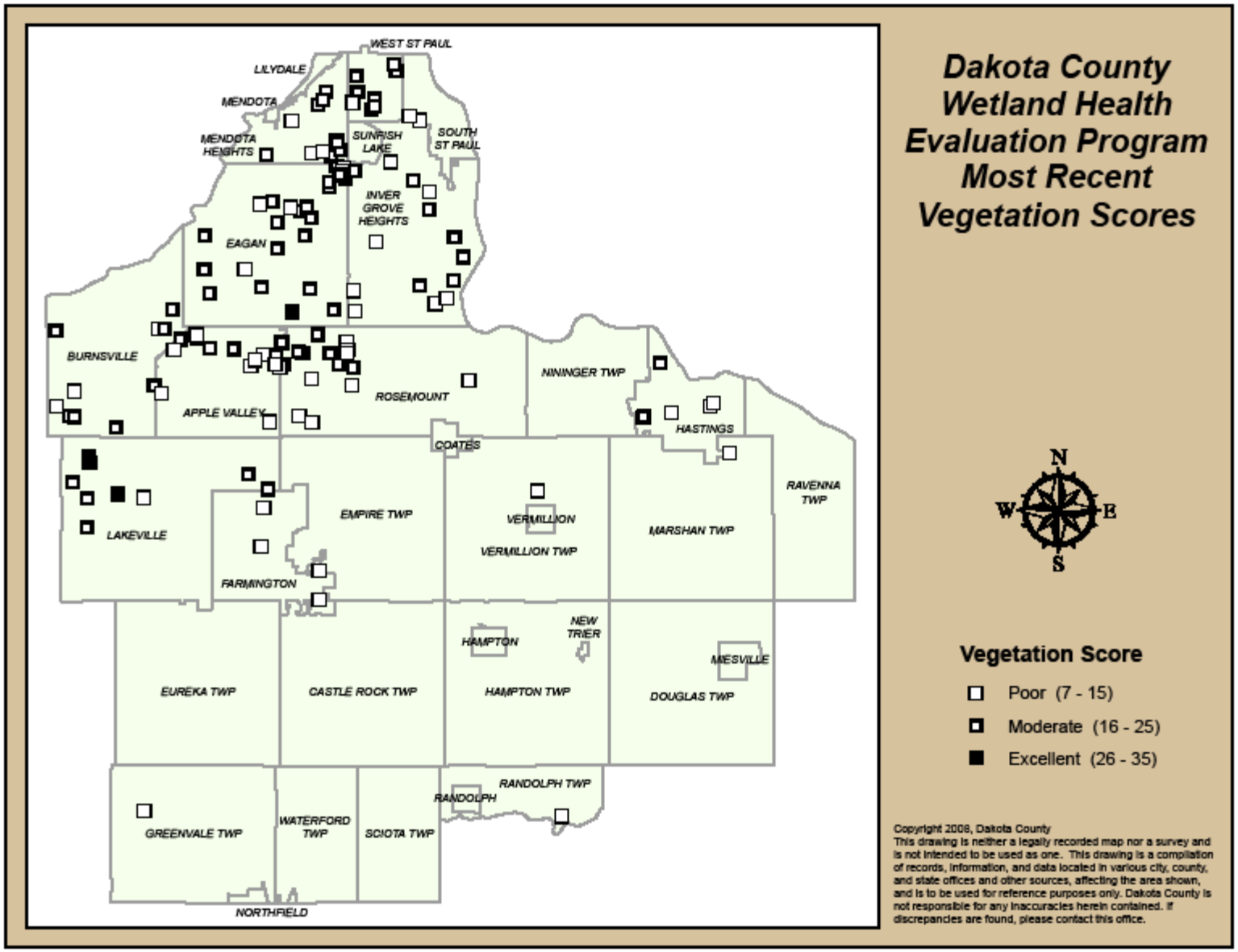
Figure 3.3.2


WEST ST PAUL
LILYDALE
MENDOTA
MENDOTA HEIGHTS
SUNFISH LAKE
SOUTH ST PAUL
INVER GROVE HEIGHTS
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BURNSVILLE
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HAMPTON TWP
DOUGLAS TWP
RANDOLPH TWP
RANDOLPH
GREENVALE TWP
WATERFORD TWP
SCIOTA TWP
NORTHFIELD
Dakota County Wetland Health Evaluation Program Most Recent Vegetation Scores
N
W
E
S
Vegetation Score
Poor (7 - 15)
Moderate (16 - 25)
Excellent (26 - 35)
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4.0 Wetland Evaluations

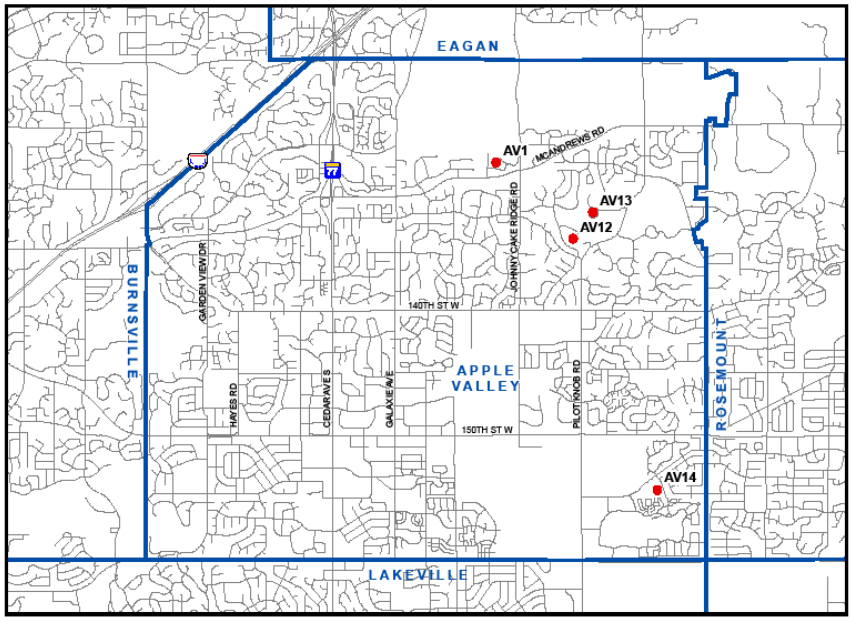
4.1 Apple Valley Wetlands

Four wetlands were monitored within the City of Apple Valley in 2008. Many team members have been monitoring since the start of WHEP.

Team Leader: Jeff Korpik

Team Members: Andrea Brownlow, Colin Brownlow, Duncan Brownlow, Melanie Chaput, Brian Flagg, Devin Flagg, Kate Fridley, Helen Goeden, Christine Miller, Erin Peterson, and Kevin Sealy.
Training Only: Ruchika Kaundal, Patricia Koors, Jeff Sluiter, Jodi Sodergren, and Catherine Zimmer.

Apple Valley WHEP Sites Monitored in 2008



Jeff Korpik

This is Jeff Korpik's first year as team leader, though this is not his first year volunteering in WHEP. He writes that "the 2008 sampling season was enjoyable, but also had a few slight glitches, most of which were corrected by our veteran team members (especially the Brownlow family)." He feels that Team Apple Valley is "a very good and hard working crew, and Apple Valley is fortunate to have them volunteering for this fun and important project. I definitely look forward to next year."

This is the eleventh year the City has participated in WHEP. Jeff Kehrer is the Natural Resources Coordinator at the City of Apple Valley and has been the city contact for WHEP since 2002. His main role has been to get information out to past volunteers and recruit new volunteers through articles in the city newsletter, city website, and phone conversations. City staff also sends out letters from the team leader announcing training dates and times. The team leader is in charge of the program, and each year city staff members have participated in data collection and/or lab identification sessions.

Colin Brownlow, Jeff Korpik, and Duncan Brownlow

"I feel WHEP provides a great hands-on opportunity for volunteers and city staff to take a close look at a variety of wetlands, and allow each to see what is really out there. It is really interesting to see the wildlife, and plant communities associated with different wetland areas. WHEP sampling can provide sound data for measuring the effectiveness of BMP's. In Apple Valley we have sampled a wetland that had a pre-treatment basin constructed upstream to treat parking lot and site runoff prior to discharge into the

wetland. WHEP data provided support that the pre-treatment basin was effective. WHEP provides sound baseline data about wetland quality in Apple Valley, which we can also compare to neighboring WHEP wetlands. Ongoing wetland sampling data is important for monitoring wetland health and necessary for making sound decisions on project proposals."

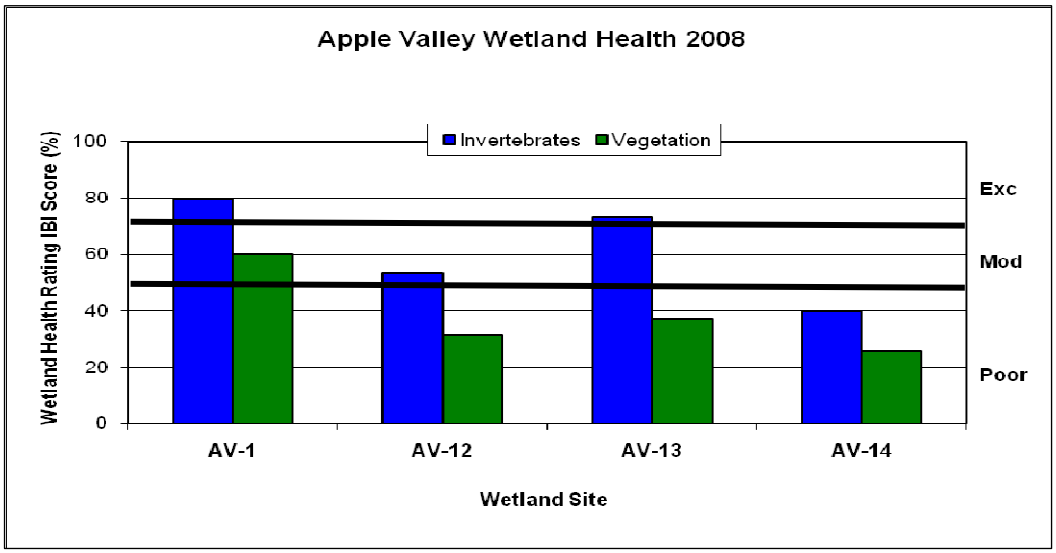
Jane Byron

Jane Byron's 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, "not only does WHEP provide our residents with an important educational experience, but it also provides the City with valuable information. The information gathered by WHEP volunteers can help the City evaluate the impacts of conservation projects or development within the contributing watershed."

Apple Valley General Wetland Health

Figure 4.1 presents an overall view of wetland health for all of the 2008 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. Scores that differ by less than 10 percent are considered consistent. Based on the IBI scores, a wetland health rating is assigned as excellent, moderate or poor. Two of the four wetlands were monitored for the first time this year. The Apple Valley wetlands exhibited poor to moderate wetland health based on vegetation and poor to excellent health based on invertebrates. These can be compared to the reference wetland AV-1, which generally exhibits moderate to excellent wetland health and had the highest scores of the Apple Valley sites in 2008. AV-13 also had an excellent score for invertebrates.

Figure 4.1 Apple Valley site scores (percent form) for the 2008 sampling season



4.1.1 Hidden Valley (AV-1)

Hidden Valley (AV-1), also known as EVR-P53, is a 2.0 acre Type 4 wetland within the Vermillion River watershed. It drains locally to EVR-53 toward the East Vermillion River and into the Vermillion River. The wetland subwatershed is 21 acres with 15 acres of direct drainage. The subwatershed is 35 percent impervious. It has two inlets along the southern border and one equalizer pipe along the eastern border.

The wetland is a privately owned residential property enclosed by private homes and dense lines of deciduous trees such as oaks, boxelders, and ash. A steep slope extends down to the wetland. Dense stands of cattails, Reed Canary Grass, and willows line much of the wetland edge. This wetland is included in the City of Apple Valley's stormwater management plan; however, the city does not have a wetland management plan at this time. The Rosemount team conducted a spot check on this wetland in 2008, and FCI conducted a QC check as well. This is the tenth year that this site has been surveyed.

Wetland Health

Site Observations: The Rosemount team noted filamentous algae within the pond. FCI estimated to 50-75% cover for filamentous algae within the staked plot.

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

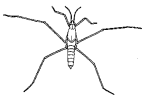
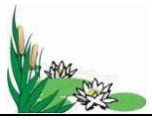
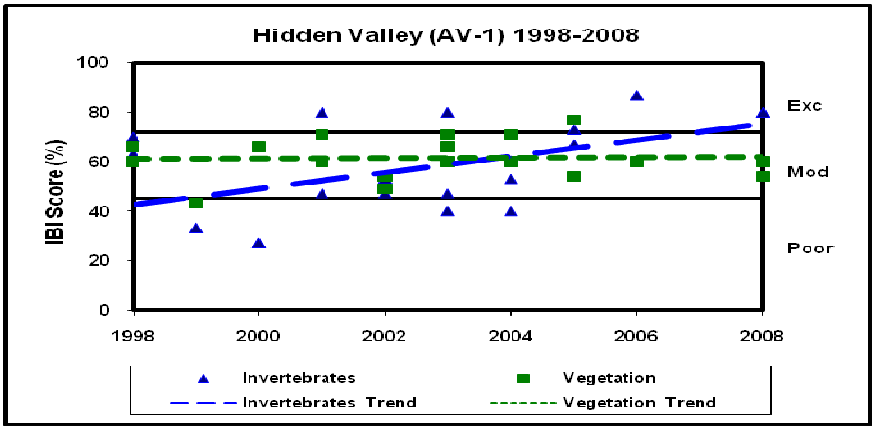
2008 Data (AV-1)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Excellent (24)	Moderate (21)
Spot Check Rating (IBI score)	Excellent (24)	Moderate (21)
Trend 1998-2008	Improving	Stable

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



Site Summary: Hidden Valley was found to have moderate to excellent wetland health in 2008. The invertebrate data has fluctuated between poor to excellent over the years, but overall appears to be improving. The extreme fluctuations may be due to a factor such as changes in water level. The vegetation has remained in the moderate category for most of the samples. Based on the ten years of monitoring, the data indicates stable to improving wetland health. It should be noted that the City team and spot check team found identical IBI scores.

4.1.2 EVR-P12 (AV-12)

EVR-P12 (AV-12) is also known as DNR public water wetland 19-225W. It is a 5.7 acre type 5 wetland located within the Vermillion River Watershed. The wetland subwatershed is 571 acres with 61 acres of direct drainage. The subwatershed area is 25 percent impervious. The wetland has two inlets and two outlets. The surrounding area is primarily residential with about 50 percent of the shoreline having a wooded buffer area and the rest mowed lawn. This wetland is located within the Farquar and Long Lake TMDL area. As part of the TMDL plan implementation, it is likely that sediment removal and biomanipulation will occur within the next 10 years. This is a significant source of phosphorus (68 percent of the total external load) to Long Lake. The City wanted to monitor this wetland to collect baseline data and track changes as the TMDL projects are implemented.

Wetland Health

Site Observations: The monitoring site is located adjacent to the inlets. The wetland is surrounded by trees with residential lawns sloping down to the wetland.

Table 4.1.2 Wetland EVR-P12 (AV-12) Wetland Health based on Index of Biotic Integrity

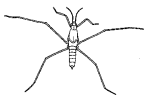
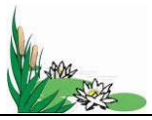
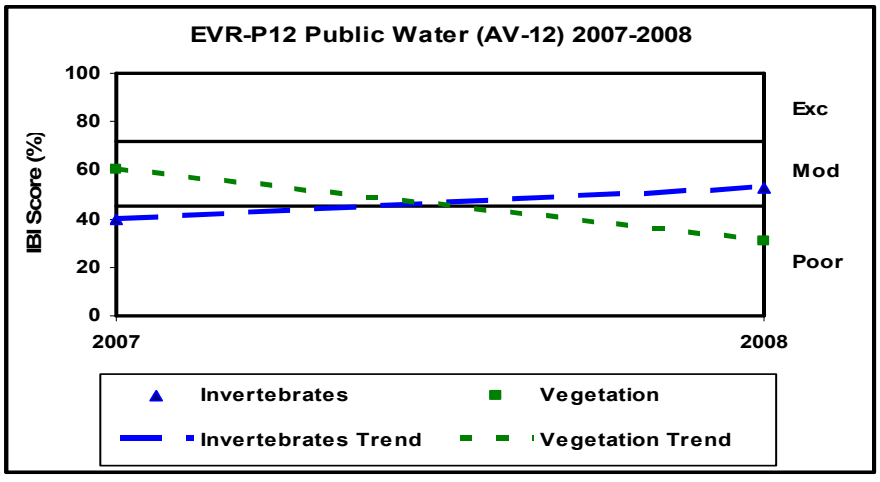
2008 Data (AV-12)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Moderate (16)	Poor (11)
Trend 2007-2008	Not enough data	Not enough data

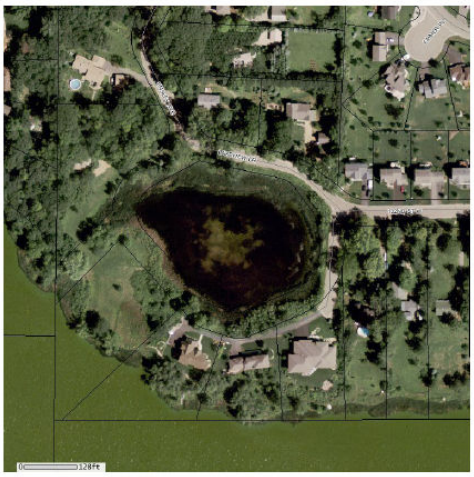
Figure 4.1.2 Invertebrate and vegetation trends for EVR-P12 (AV-12)



Site summary: This is the second year in a row of monitoring for EVR-P12. The two indexes are not consistent for this site. It is in an area that is almost built out and receives a lot of stormwater runoff as

well as contributes phosphorus to Farquar Lake. It has a large watershed with high imperviousness. The high imperviousness is not conducive to maintaining good wetland health. Since this wetland catches water prior to entering Farquar Lake, it is being considered as a potential source of treatment for the lake. The City plans to continue monitoring the wetland over time to determine changes as the TMDL plan is implemented. It is too early to assess trends for this site.

4.1.3 EVR-P14 (AV-13)

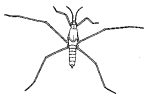
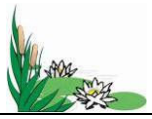


EVR-P14 (AV-13) is a 3.6 acre type 5 wetland located within the Vermillion River Watershed. The wetland subwatershed is 26 acres with 26 acres of direct drainage. The subwatershed area is 25 percent impervious. The wetland has two inlets along the eastern border, two inlets along the northern border, and an equalizer pipe along the southern border. The surrounding area is primarily residential. It is within the Farquar and Long Lakes TMDL area. As part of the TMDL plan implementation, it is likely that biomanipulation will occur within the next 10 years. Approximately 0.13% of the external phosphorus load entering Long Lake comes from this pond. This wetland is part of the City of Apple Valley's storm water management plan; however, the city does not have a wetland management plan. As this pond and surrounding watershed will be affected by the TMDL and Implementation Plan, Apple Valley would like to obtain some baseline IBI data to track changes in scores in relation to associated projects.

Wetland Health

Site Observations: The Apple Valley team observed a gaggle of geese and a couple of Red-winged Blackbirds.

Table 4.1.3 Wetland Long Lake North (AV-13) Wetland Health based on Index of Biotic Integrity

2008 Data (AV-13)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Moderate (22)	Poor (13)
Trend 2008	Not enough data	Not enough data

Site summary: This is the first year of monitoring for EVR-P13. The two indexes are not consistent for this site, with a substantially lower vegetation score. It is in an area that is almost built out and receives a lot of stormwater runoff as well as contributes phosphorus to Farquar Lake. It has a small watershed with high imperviousness. The high imperviousness is not conducive to maintaining good wetland health. Since this wetland catches water prior to entering Farquar Lake, it is being considered as a potential source of treatment for the lake. The City plans to continue monitoring the wetland over time to determine changes as the TMDL plan is implemented.

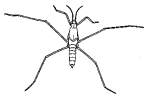
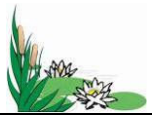
4.1.4 Apple Valley East Park (AV-14)

Apple Valley East Park (AV-14), also known as EVR-P43, is a 0.8 acre Type 3 wetland located within the Vermillion River Watershed. The wetland subwatershed is 2,738 acres with 103 acres of direct drainage and 35 percent impervious. There are two inlets along the north end of the wetland, and one inlet along the south end. There is one outlet along the south end of the wetland as well. The surrounding area includes residential neighborhoods and park areas. There is a baseball diamond adjacent to the wetland. This wetland is included within the Cobblestone Lake Management Plan study area. It is likely that sediment will be removed within the next 10 years to maintain the water quality within Cobblestone Lake. Approximately 25-33% of the City of Apple Valley drains to this pond before entering Cobblestone Lake. Discharge from Farquar and Long TMDL study area contributes to this watershed as well. The City wanted to monitor this wetland to collect baseline data prior to the project start. The wetland is included in the City of Apple Valley's storm water management plan; however, the city does not have a wetland management plan.

Wetland Health

Site Observations: The site was without standing water and very mucky. It is dense with cattails and has very low vegetation diversity.

Table 4.1.4 Wetland East Park (AV-14) Wetland Health based on Index of Biotic Integrity

2008 Data (AV-14)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Poor (12)	Poor (9)
Trend 2008	Not enough data	Not enough data

Site summary: This is the first year of monitoring for EVR-43 (AV-14). The two indexes both show poor conditions for this site. The lack of water likely contributed to the poor IBI scores. It is in an area that is almost built out and receives a lot of stormwater runoff. It has a very large watershed with high imperviousness. The high imperviousness is not conducive to maintaining good wetland health. The City plans to continue monitoring the wetland over time to determine changes as the Farquar and Long Lake TMDL plan is implemented.

4.2 Burnsville Wetlands

Four wetlands were monitored within the City of Burnsville in 2008. Burnsville has monitored 12 wetlands through WHEP since 1997. Dry conditions prevented monitoring for invertebrates at Cam Ram (B-2) in 2008.

Team Leader: Amy Bruner

Team Members: Emily Bruner, Kristin Bruner, Roger Bruner, Tracy Stewart, and Tom Ward.

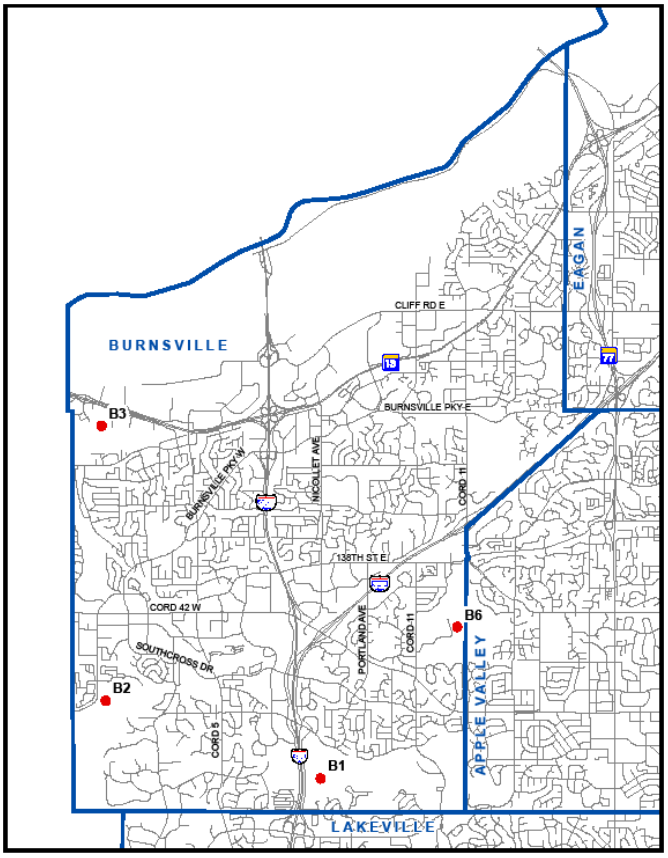
Amy Bruner

This is Amy Bruner's second year as team leader; however, she has been involved in WHEP for several years previous.

Angela Hanson

Angela Hanson is the coordinator for the City of Burnsville. Her role with WHEP is to select the wetlands to monitor. Each year she selects two "long-term monitoring" wetlands and two "snapshot" wetlands in varying parts of the city in order to determine both temporal trends and to obtain baseline wetland health data from the long-term wetlands, and to determine spatial trends and pollution impacts from the snapshot wetlands. Angela is very pleased with the program and believes "it provides citizens with a great opportunity to become involved in and engaged with the health of their community's water resources." She said that there was low volunteer recruitment this year, but hopes that this will change in the future.

Burnsville WHEP Sites Monitored in 2008

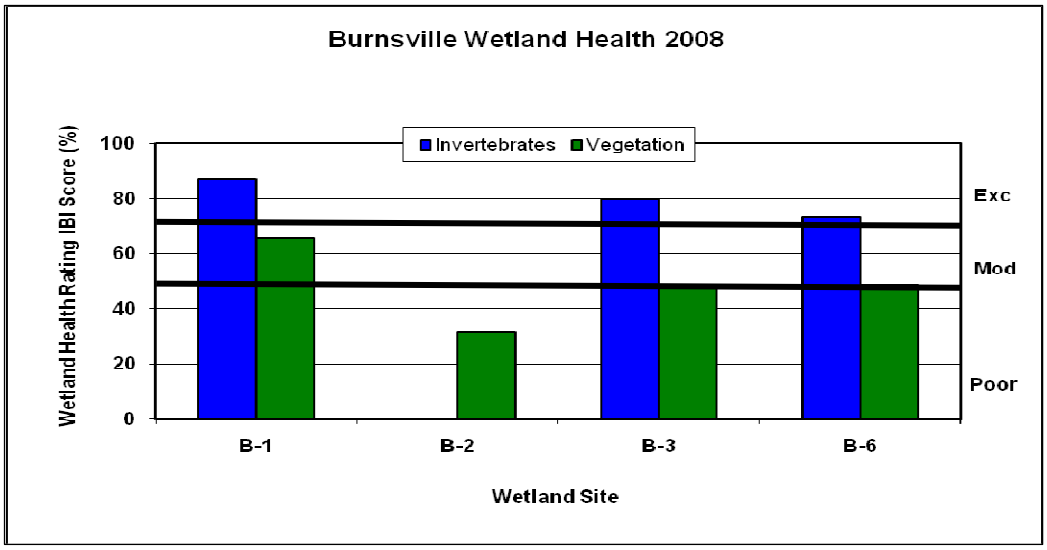


Burnsville General Wetland Health

Figure 4.2 presents an overall view of wetland health for all of the 2008 monitoring sites in Burnsville based on the IBI scores for invertebrates and vegetation presented as a percent. For 2008, the wetlands showed moderate to excellent wetland health, with the exception of B-2 which received a poor rating for vegetation and was not monitored for invertebrates due to dry conditions. All of the vegetation scores were substantially lower than the invertebrate scores, indicating differing impacts on the vegetation than the invertebrates. As expected, the reference wetland, B-1, had the highest IBI scores of all the wetlands tested in 2008. All of the wetlands appear to be more impacted than the reference site (B-1).

Tracy Stewart

Figure 4.2 Burnsville site scores (percent form) for the 2008 sampling season



4.2.1 Crystal Lake West (B-1)

B-1, also known as Crystal West is a 0.9 acre type 3 wetland located in a wooded area within the Black Dog Watershed, adjacent to Crystal Lake. The wetland drainage area is 550 acres, none of which is impervious. A short to tall grass (Reed Canary Grass) buffer and deciduous trees, including Maple and Aspen, surround the wetland. A walking path is located along the west edge behind the trees. The wetland is designated as "improvement" in the City wetland management plan. It serves as a recreation spot, and an area for education and science.

Wetland Health

Site Observations: The monitoring team noted that the bottom of the wetland was mucky and contained only two feet of water. Wildlife observations included Leopard Frogs and dragonflies. The Farmington cross check team noted that the wetland site was almost completely covered with vegetation, including grasses, reeds, Water Lilies, and Iris. The QC team observed a Beaver.

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

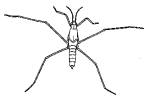
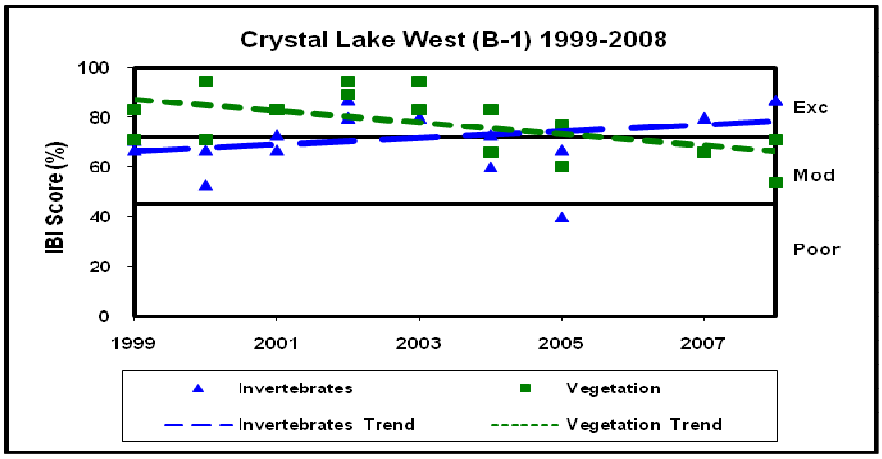
2008 Data (B-1)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Excellent (26)	Moderate (23)
Spot Check Rating (IBI score)	Excellent (26)	Moderate (19)
Trend 1999-2008	Slight improvement	Declining

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



Site summary: Crystal Lake West, a reference wetland, has been monitored nine times through WHEP. It continues to exhibit moderate to excellent wetland health, although, the vegetation analysis indicates a downward trend, moving from the excellent category into the moderate in 2007 and 2008. The City team and spot-check team found identical invertebrate IBI scores.

4.2.2 Cam Ram (B-2)

B-2, also known as Cam Ram is a 0.41 acre type 3 wetland located within a large city park containing trail systems around the north side of the wetland. It is within the Black Dog Watershed. Private residences exist around the park perimeter. The wetland is enclosed by trees and grass, and is inundated with cattails. The wetland was completely dry in 2008. The wetland is designated as "protected" in the City wetland management plan. It serves as a recreation spot, and an area for education and science. The city of Burnsville also has a stormwater management plan.

Wetland Health

Site Observations: There is a deep decline into the wetland. Because the site was dry in 2008, the monitoring team was unable to collect invertebrates.

Table 4.2.2 Cam Ram (B-2) Wetland Health based on Index of Biotic Integrity

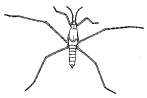
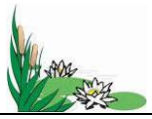
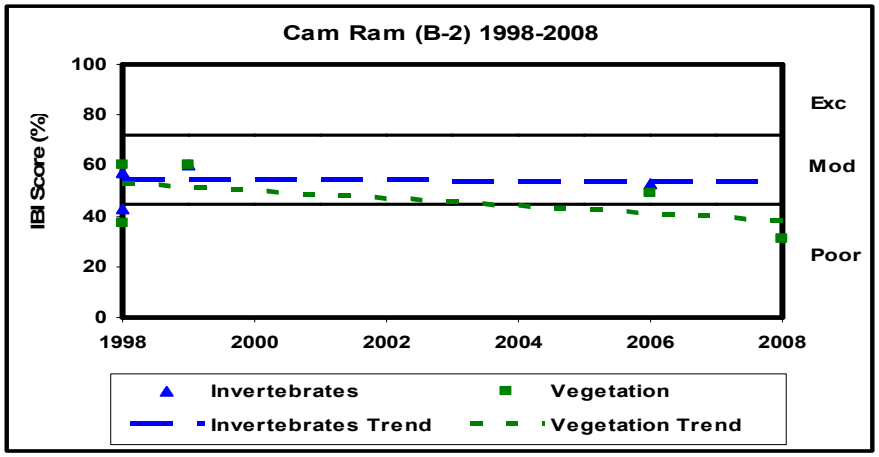
2008 Data (B-2)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Too dry to survey for invertebrates	Poor (11)
Trend 1998-2008	Not enough data	Possible slight decline

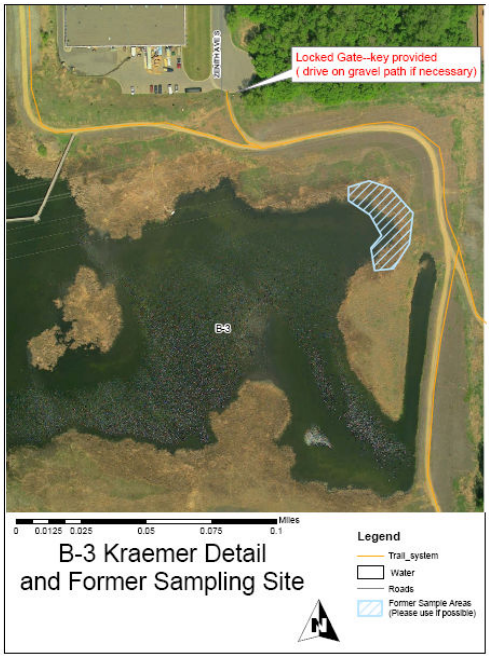
Figure 4.2.2 Invertebrate and vegetation trends for Crystal Lake West (B-2)



Site summary: Cam Ram (B-2) has been monitored four times through WHEP. It exhibits moderate to poor wetland health, although, the vegetation analysis indicates a possible slight downward trend, moving from the moderate category in 1999 into the poor category in 2008. There was a 6 year gap in the monitoring between 1999 and 2006 where no data was collected. The dry conditions in 2008 prevented the sampling for invertebrates and likely contributed to the poor vegetation IBI score. Additional data is recommended to determine if the change in vegetation IBI is a trend or may be related to the dry conditions and to better evaluate the invertebrates.

4.2.3 Kraemer Preserve (B-3)

B-3, also known as Kraemer Preserve, is a restored public water wetland in the City of Burnsville. It is a 30 acre type 3 wetland located within the Lower Minnesota River watershed. The wetland drainage area is 415 acres, and is approximately 30 percent impervious. Land use in the watershed is mainly residential and industrial. The wetland was originally a type 1 or 2 wetland which was mined for peat within the last 30 years. Two 18" stormwater pipes were added in 1995 and the area was converted into a wetland mitigation site in 1997.



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 is a migratory bird habitat. Invasive species are cause for concern. The wetland management goal is to protect the wetland, maintain flood protection, sediment control, and nutrient removal.

Wetland Health

Site Observations: It has been noted that the wetland ranges from open water composed of *Potamogeton* on the southside to moderately dense cattail stands on the northside.

Table 4.2.3 Kraemer Preserve (B-3) Wetland Health based on Index of Biotic Integrity

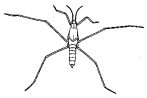
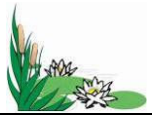
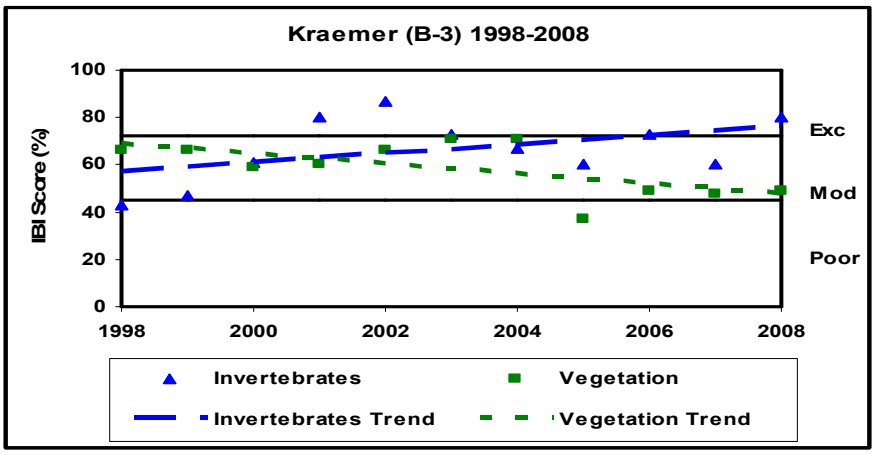
2008 Data (B-3)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Excellent (24)	Moderate (17)
Trend 1998-2008	Improving	Declining

Figure 4.2.3 Invertebrate and vegetation trends for Kraemer Preserve (B-3)



Site summary: This is the eleventh year of sampling for Kraemer Preserve (B-3). The vegetation index indicates moderate conditions, while the invertebrate score was in the excellent range in 2008. The trend analyses show opposite trends. This wetland has maintained moderate conditions over most of the 10 years of sampling with a move into the excellent range for invertebrates in 2008. The vegetation index remained stable until 2005, when it dropped into the poor range and has remained low.

4.2.4 Alimagnet Dog Park (B-6)

B-6, also known as Alimagnet Dog Park, is a 2.5 acre type 3 wetland located within a large city park containing trail systems that circle the wetland. The wetland watershed is 34 acres, and is approximately 15 percent impervious. The wetland is designated by the City as an "Improvement Class" wetland. It is considered a valuable area for its open space and aesthetics. It is used for recreation, education, and science and is located in the Vermillion River Watershed. As indicated by its name, there is a dog park on the west side of the wetland that has been there about five years. The wetland has received stormwater since 1975 when the City Park was developed.

Wetland Health

Site Observations: The monitoring team noted groupings of cattails and lots of duckweeed. It is heavily used by people and dogs which have damaged the shoreline and upland buffer on the west side.

Table 4.2.4 Alimagnet East (B-6) Wetland Health based on Index of Biotic Integrity

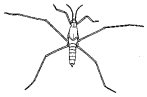
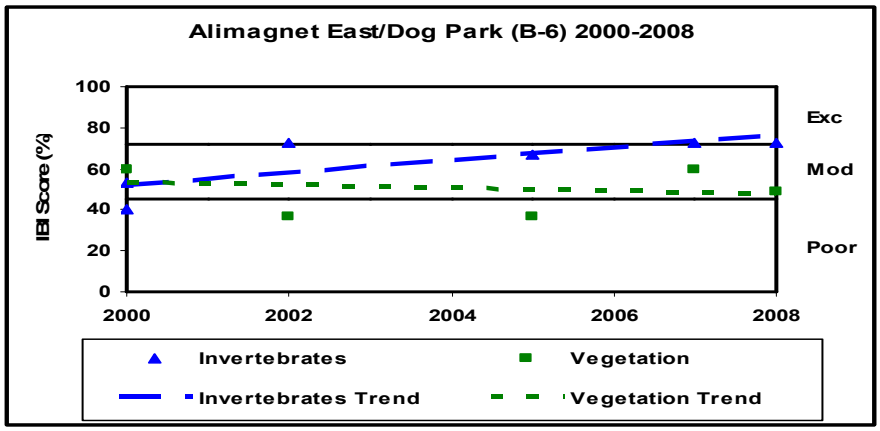
2008 Data (B-6)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Moderate (22)	Moderate (17)
Trend 2000-2008	Improving	Stable

Figure 4.2.4 Invertebrate and vegetation trends for Alimagnet (B-6)



Site summary: Five years of data have been collected for Alimagnet (B-6). Both the invertebrate and vegetation scores indicate moderate wetland health. The vegetation has remained fairly stable while the invertebrate trend analysis indicates improving conditions, with near excellent ratings in 2007 and 2008. Additional monitoring is recommended.

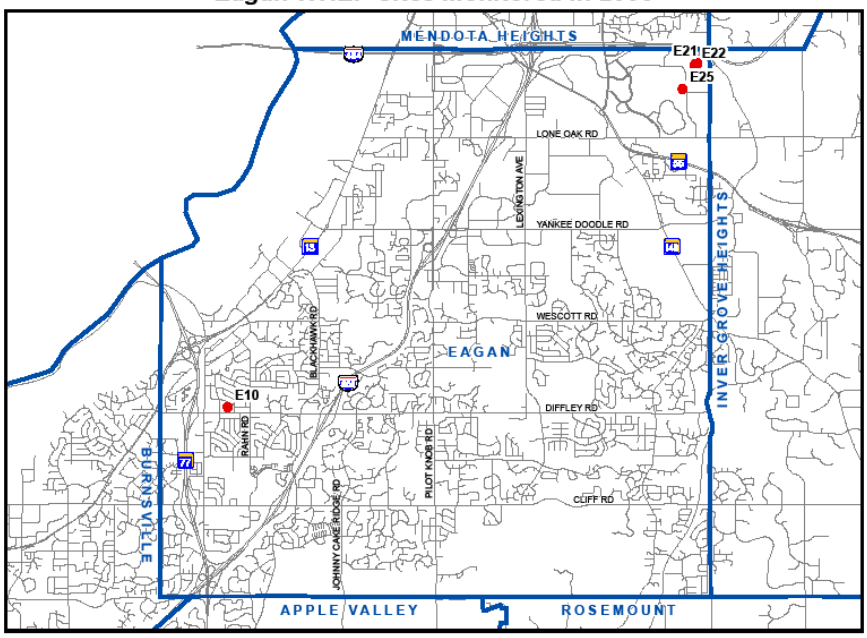
4.3 Eagan Wetlands

The Eagan team monitored four wetlands in 2008. Since WHEP began in 1997, Eagan has monitored 25 wetlands.

Team Leaders: Jane Tunseth and Steve Briggs

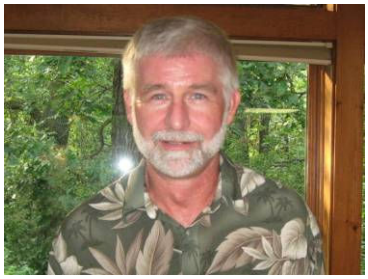
Team Members: Michael Amos, Becky Brouillard, Amy Jo Forslund, Vivianne Hanke, Bill Larson, Rachel Larson, Linda Lee, Anna Munson, Christine Nelson, Anders Olmanson, Leif Olmanson, Bjorn Olmanson, Jeff Rangitsch, David Smith, and Devin Tunseth.

Eagan WHEP Sites Monitored in 2008



The success and growth of the WHEP program is obvious in Eagan. Jane Tunseth, team leader for Eagan, is a teacher at the School of Environmental Studies at the Minnesota Zoo. This is her 12th summer working on WHEP. Jane said, "My work with WHEP has helped me in teaching my students, several of whom have been WHEP volunteers. I have enjoyed seeing many citizens of Eagan open their eyes to the wonders of wetlands. We can only value what we know, and I believe WHEP has helped many people in our community know more and therefore value more about wetlands." Jessie Koehle informed us that Jane gained access into the SES labs to sort the invertebrates, which was GREAT to have a site so close!!

Jane Tunseth



Steve Briggs

Steve Briggs is the Assistant Team Leader for Eagan. He is a part-time WHEP volunteer and also volunteers with another Eagan activity.

Jessie Koehle is the Water Resources Assistant for the City of Eagan. "My supervisor, Eric Macbeth, and I recommend which ponds should be sampled, and I accompany the WHEP team on most of their outings. I have also helped identify invertebrates since I have some of that in my background."

Jessie Koehle

"The program is very valuable because not only does it gather invertebrate and vegetation records of ponds that we would not normally have time to collect, but it also engages citizens in wetland conservation. The more people learn, in general the more they will value the aquatic resources around them. I'm very thankful that we have the WHEP program around as a resource for information and for public education."

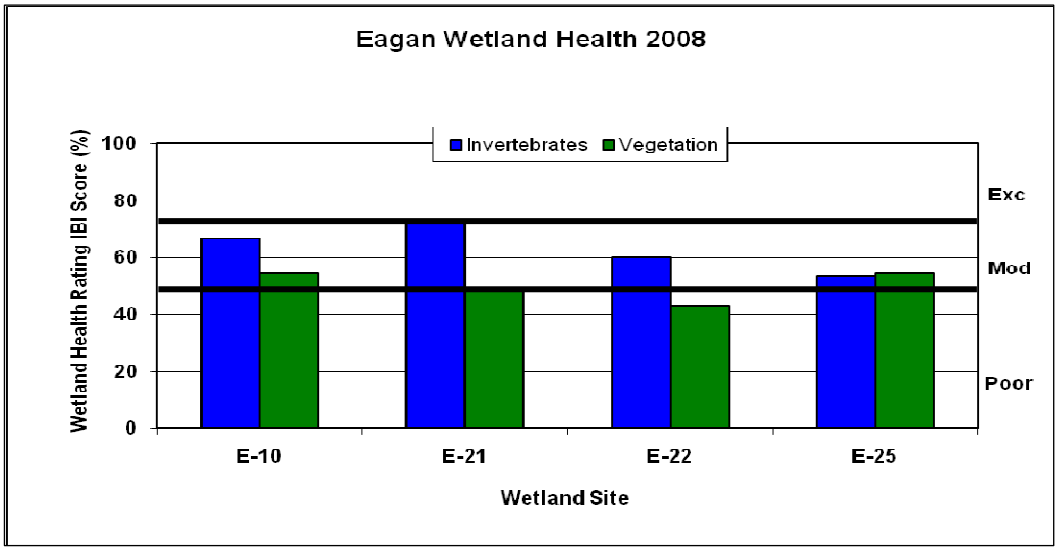
Jessie recalls, "We had our annual informal Eagan WHEP Team Cookout at Steve Briggs' house. Steve encouraged everyone to go to the pond in his backyard to evaluate it, and wine glasses in hand, we all started identifying plants. I love these people!

Team Eagan

Eagan General Wetland Health

Figure 4.3 presents an overall view of wetland health for all of the 2008 monitoring sites in Eagan based on the IBI scores for invertebrates and vegetation presented as a percent. Four wetlands were monitored in the City of Eagan in 2008. Most exhibited moderate to near poor wetland health based on the invertebrate and vegetation indexes. In general, the invertebrate scores were higher than the vegetation scores. Eagan's reference wetland is E-9. It was not monitored in 2008, but in 2007 exhibited moderate to poor conditions. The 2008 wetlands had similar or better scores than the reference wetland in 2007.

Figure 4.3 Eagan site scores (percent form) for the 2008 sampling season



4.3.1 Cedar Pond (E-10)

E-10 (AP-3), also known as Cedar Pond, is a 3.1 acre type 4 wetland located in a park within the Gun Club Lake Watershed. The wetland drainage area is approximately 212 acres, and is approximately 22 percent impervious. The wetland has two inlets and one outlet. Ninety percent of the immediate shoreline has been naturalized. There is a native prairie buffer strip and three rainwater gardens. The wetland is designated as a Class II – Scenic Recreation area. However, it is a stormwater pond, collecting water from the surrounding residential areas. The surrounding area is 98 percent single-family residential and 2 percent open undeveloped land. The wetland management goal is to naturalize the shoreline and improve the water quality. The shoreline was restored in 2001 and has maintained good diversity.

Cedar Pond

Wetland Health

Site Observations: The wetland is surrounded by gentle slopes. Filamentous algae was noted. The monitoring team noted that there was a lot of litter in the pond and the water appeared "dirty". Many ducks and geese were observed. During the June invertebrate sampling date, the team noted that there was a film on the water surface.

Table 4.3.1 Cedar Pond (E-10) Wetland Health based on Index of Biotic Integrity

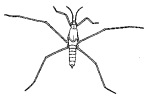
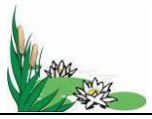
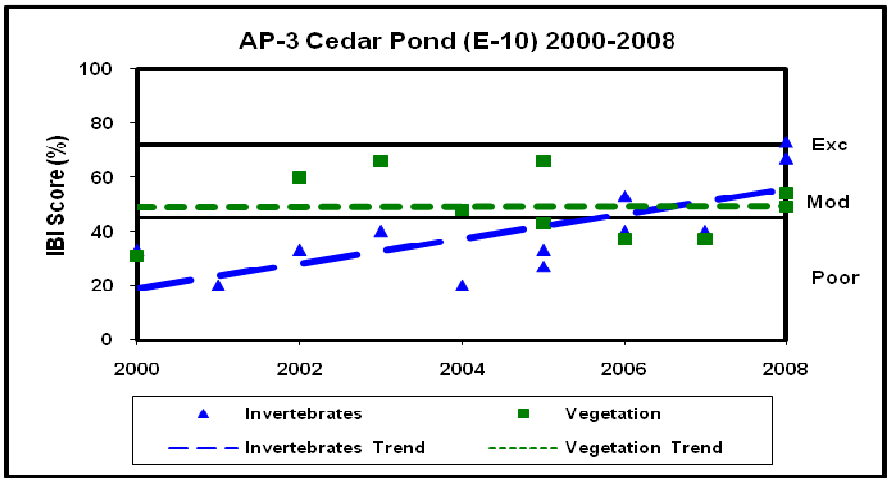
2008 Data (E-10)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Moderate (20)	Moderate (19)
Spot Check Rating (IBI score)	Moderate (22)	Moderate (17)
Trend 2000-2008	Improving	Stable

Figure 4.3.1 Invertebrate and vegetation trends for Cedar Pond (E-10)



Site summary: Nine years of data has been collected for Cedar Pond. The invertebrate index indicates definite improving conditions, while the vegetation index indicates stable conditions. Both indexes place the wetland in the moderate category in 2008. Reed Canary Grass, an invasive species, was found by the monitoring team in 2007. It found again in 2008, but fortunately at a cover class range of only 0 -1%. It should be controlled before it spreads.

4.3.2 FP-11.5 (E-21)

E-21, also known as FP-11.5, is a 0.26 acre type 4 wetland located within the Gun Club Lake Watershed. The wetland watershed is approximately 1.6 acres, none of which is impervious. It is designated as a protected wetland. There is one skimmer inlet midway along the western shore and one inlet incoming from an adjacent manmade wetland. E-21 overflows into an adjacent field or FP-11.6; however, there is no pipe outlet. The surrounding area includes commercial development, schools, roads, and storm drainage. The immediate area includes natural woodland and a grassy buffer area. The wetland management goal is to protect water quality of wetland from development that occurred in 2007.

FP-11.5 (E-21) (northeastern wetland) and FP-11.6 (E-22) (southwestern wetland)

Wetland Health

Site Observations: The monitoring team describes this wetland as a small, natural wetland with a storm drain from Trinity School parking lot. A newer, man-made wetland is adjacent to F-21, but was dry in July. Various birds were observed as well as small toads and algae.

Table 4.3.2 FP-11.5 (E-21) Wetland Health based on Index of Biotic Integrity

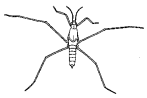
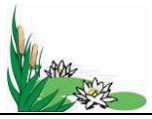
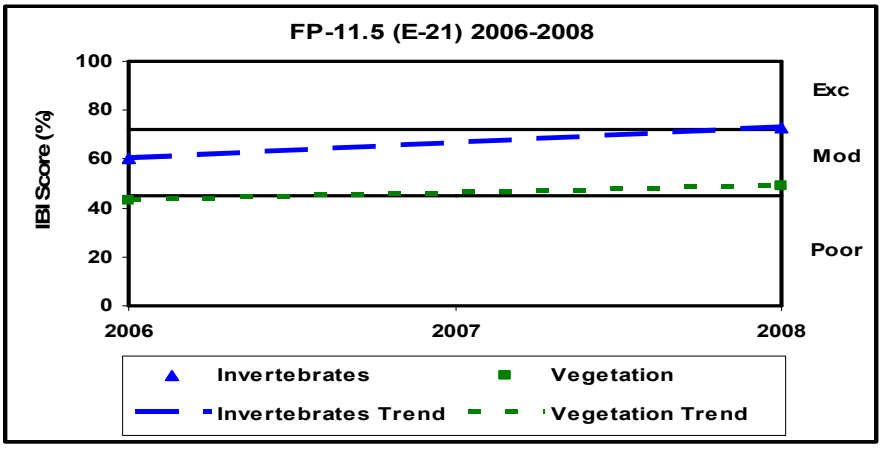
2008 Data (E-21)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Moderate (22)	Moderate (17)
Trend 2006-2008	Not enough data	Not enough data

Figure 4.3.2 Invertebrate and vegetation trends for Cedar Pond (E-21)



Site summary: This site has been monitored only two times. Based on the IBI scores, the wetland health is moderate to near excellent. Additional monitoring is recommended to better assess the wetland health and identify trends.

4.3.3 FP-11.6 (E-22)

E-22, also known as FP-11.6, is a 0.58 acre type 4 wetland (see aerial photo in 4.3.2 above) located within the Gun Club Lake Watershed. The sub-watershed area is approximately 2.7 acres, none of which is impervious. It is designated as a protected wetland. There is one inlet on the northern end of the wetland, and one inlet on the western side of the wetland. Both inlets flow from manmade wetlands. There are no pipe outlets from E-22; however, it does overflow into the adjacent field. The surrounding area includes commercial development, school, roads, and storm drains. The immediate shoreline is buffered by natural woodland and grasses. Until 2007, 30% of the immediate shoreline was hilly woodland and 70% gentle grassland; however, now with construction of the manmade wetlands and a school, the now-smaller immediate watershed is made up of approximately 80% woodland and 20% grassland. The wetland management goal is to protect the water quality of the wetland from the development that occurred in 2007.

Wetland Health

Site Observations: The monitoring team noted dead trees along the wetland edges. This is the first summer after new ponds were constructed nearby; water levels raised a bit.

Table 4.3.3 FP-11.6 (E-22) Wetland Health based on Index of Biotic Integrity

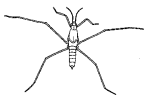
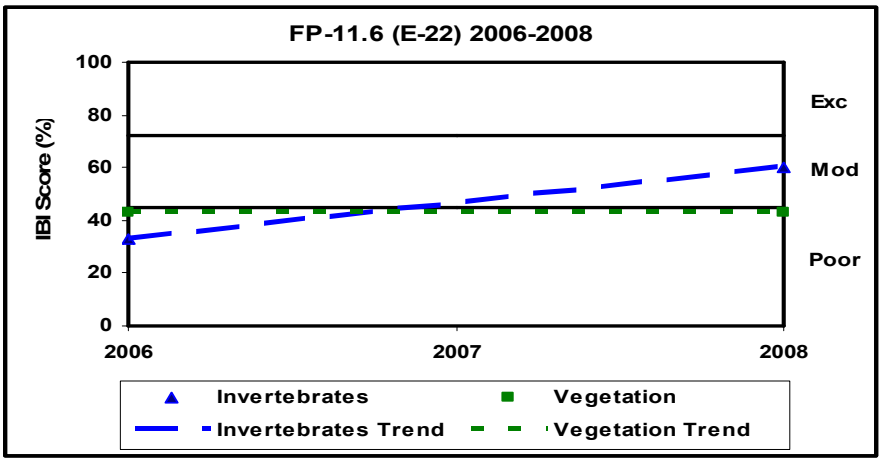
2008 Data (E-22)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Moderate (18)	Poor (15)
Trend 2006-2008	Not enough data	Not enough data

Figure 4.3.3 Invertebrate and vegetation trends for Cedar Pond (E-22)



Site summary: This is the second year of sampling for FP11.6 (E-22). Based on the IBI, the wetland health is moderate to poor. Additional monitoring is recommended to better assess the wetland health and identify trends.

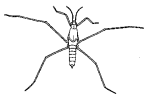
4.3.4 FP-4.5 (E-25)

E-25, also known as FP-4.5, is a 1.0 acre type 5 wetland located within the Gun Club Lake Watershed. The sub-watershed is approximately 35 acres, with approximately 55% impervious surface. It is designated as a protected wetland. There is one inlet on the northern shore, and there are two outlets in the southwestern corner of the wetland. The watershed is 57% industrial development; however, there is no disturbance in the immediate wetland area. The immediate shoreline has a vegetated buffer. If more development should occur in the future, the native buffer will be maintained. This wetland has a large watershed with a lot of impervious surface. It is close to Shanahan pond's development. The wetland management goal is to maintain good water quality, and to obtain baseline data for comparison if future development occurs that may impact the wetland.

Wetland Health

Site Observations: The monitoring team described the wetland as having a very distinct shoreline with tall grass (4-5 feet) up to the water's edge. There was very little vegetation in the water. It is a very open wetland. Wildlife observed: Northern Leopard Frogs, Garter Snakes, Egret. It appeard that work had been done on the northwest outlet. The area above the outlet on the northwest corner of the wetland had been graded and erosion control blanket was in place.

Table 4.3.4 FP-4.5 (E-25) Wetland Health based on Index of Biotic Integrity

2008 Data (E-25)	**Invertebrates** 	**Vegetation** 
Wetland Health Rating (IBI score)	Moderate (16)	Moderate (19)
Trend 2008	Not enough data	Not enough data

Site summary: This is the first year of sampling for FP-4.5 (E-25). Based on the IBI, the wetland health is moderate. Additional monitoring is needed to better assess wetland health and identify trends.

4.4 Farmington Wetlands

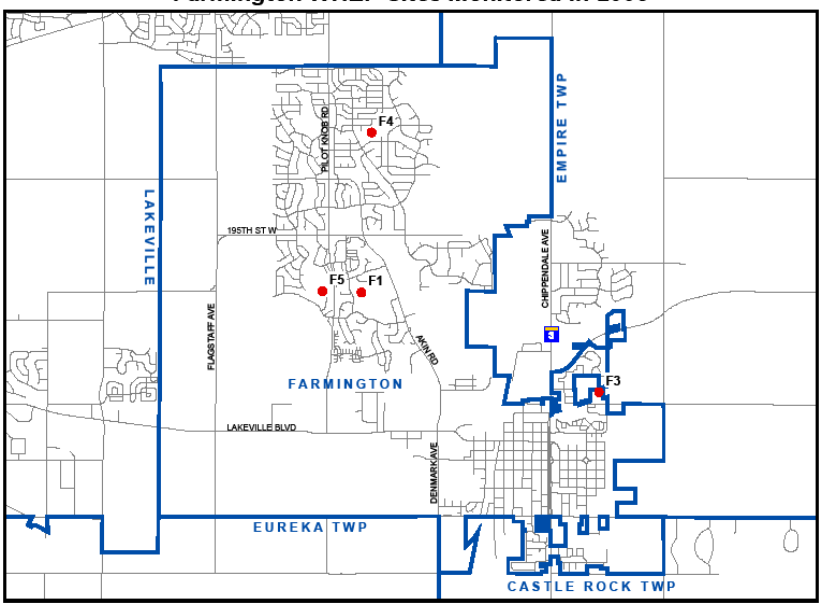
The Farmington team sampled four wetlands in 2008. The City has been monitoring wetlands through the WHEP program since 1997.

Team Leader:
Katie Koch-Laveen

Team Members: John and Julie Mulligan, Richard and Pam Tucker, Rollie Greeno, and Marcia Richter

Team Farmington had another good season. Through the years Team Farmington has identified the strengths of each team member and can meet any challenge.

Farmington WHEP Sites Monitored in 2008



Katie Koch-Laveen

Katie Koch-Laveen got involved with WHEP after a long involvement in 4-H. She enjoys interacting with others and has learned to be an effective team leader. She admits, "I continue to enjoy the training, the science, and the people very much."

Jennifer Collova

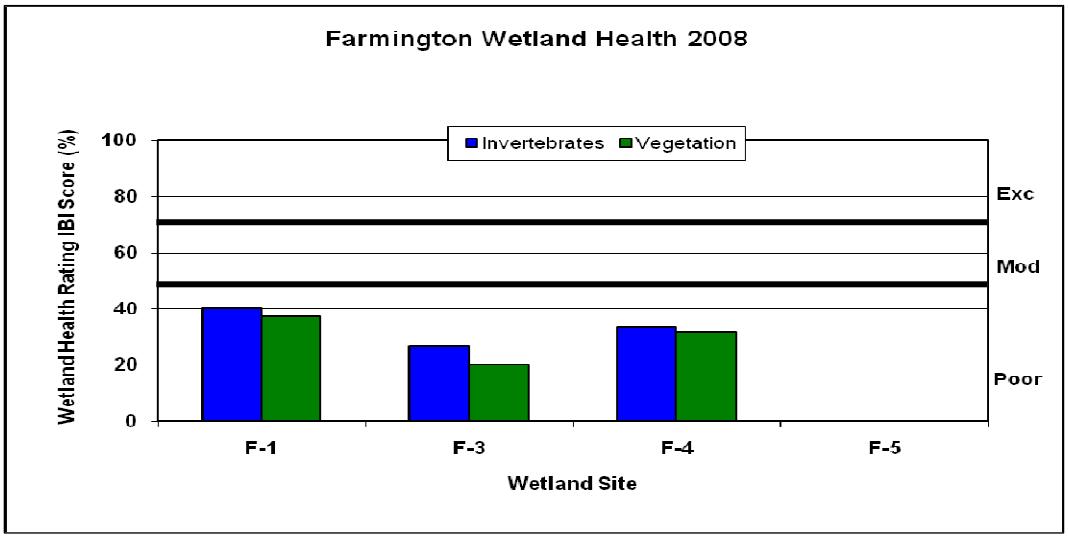
Jennifer Collova administers the WHEP program for the City of Farmington. She determines the wetlands to be monitored each year, provides site maps and any directional needs, and reviews the collected data. She says, "Data is compared to past data to see changes that are occurring within the wetland system as development increases in Farmington. The City has been monitoring the health of wetlands within the City since 1998 and over time, we hope to be able to see trends in the data." Jennifer agrees, "The WHEP program is a great opportunity for residents interested in wetlands, ecology and the environment. Volunteers learn how development affects water quality and quantity. Volunteers will see connectivity between natural and manmade systems and learn to think bigger than their neighborhood."

Marcia Richter with Angela Hanson of Burnsville

Farmington General Wetland Health

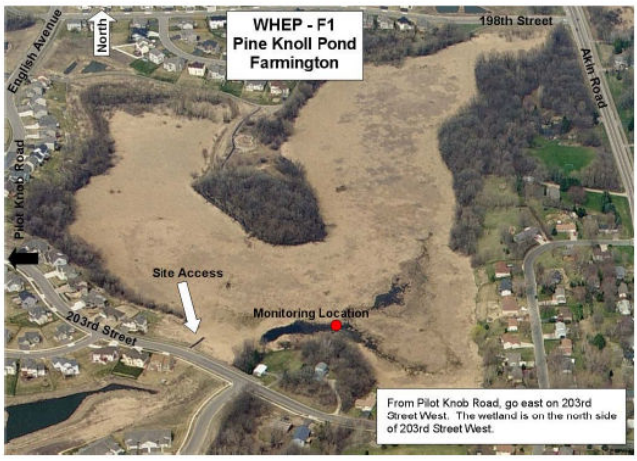
Figure 4.4 presents an overall view of wetland health for all of the 2008 monitoring sites in Farmington based on the IBI scores for invertebrates and vegetation presented as a percent. Site F-5 (Pilot Knob) was dry during part of 2008 a well as 2007, preventing the completion of sampling. All of the wetlands sampled in 2008 were found to be in poor wetland health. This may be in part due to dry conditions experienced in 2007 & 2008. Farmington had the most wetlands in the poor wetland health category of all the wetlands monitored in 2008. Farmington has designated F1, F-3 and F-4 as reference wetlands. None of these wetlands appears to show ideal reference conditions, i.e. minimally impacted. Monitoring results for F-1 and F-3 in the earlier years of WHEP showed better conditions than in recent years. The data indicate these wetlands are likely impacted. All of Farmington is within the Vermillion River Watershed.

Figure 4.4 Farmington site scores (percent form) for the 2008 sampling season



4.4.1 Pine Knoll Pond (F-1)

Pine Knoll Pond (F-1) is a 35 acre wetland with a drainage area of 190 acres. There is development surrounding much of the wetland, and wetland buffers are in place. It is designated as "Protect" in the City's wetland management plan. The wetland management goal is to document the wetland health as development occurs. The monitoring site location was moved in 2004 due to construction activities. This new location has stayed consistent since 2004. The site chosen is within an existing residential area, to the northeast of the previous sampling site. The team noted that this site is more connected to the larger wetland basin.



Wetland Health

Site Observations: The wetland had very little water in 2008. The monitoring team noted that the wetland was dry during the vegetation survey. No submergent or emergent vegetation was noted. The wetland consisted of mostly grasses. The spot check team also noted dry conditions, and did not sample for invertebraes.

Table 4.4.1 Pine Knoll Pond (F-1) Wetland Health based on Index of Biotic Integrity

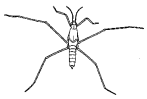
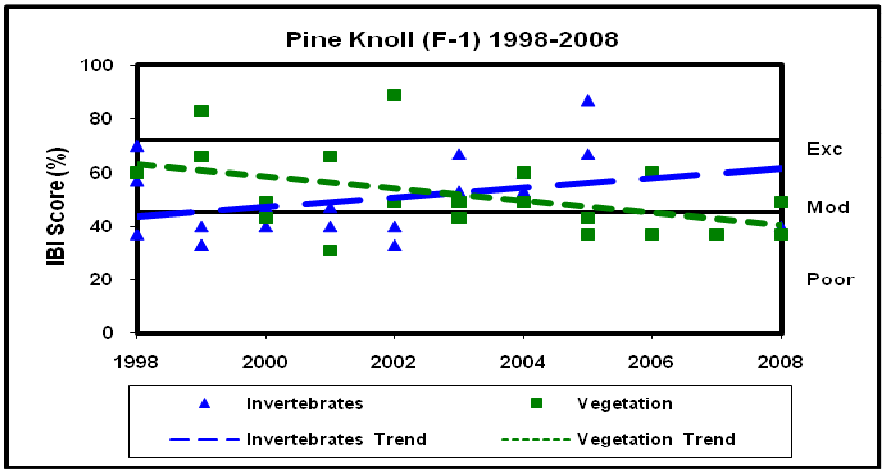
2008 Data (F-1)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Poor (12)	Poor (13)
Spot Check Rating (IBI score)	Not sampled due to dry conditions	Moderate (17)
Trend 1998-2008	Improving	Declining

Figure 4.4.1 Invertebrate and vegetation trends for Pine Knoll (F-1)



Site summary: This is the eleventh year of sampling Pine Knoll Pond, although invertebrates were not sampled due to dry conditions. The vegetation index showed poor to moderate health in 2008. It is difficult to assess the wetland based on invertebrates since they have not been sampled since 2005 due to dry conditions. The long term IBI trends are not consistent. The invertebrate data indicates improving wetland health, while the vegetation data indicates declining wetland health. However, there is a lot of variability in the data and no recent invertebrate data. Changes in the watershed may have impacted the water levels which appear to be consistently low in mid-summer over the past several years.

4.4.2 Kral Pond (F-3)

F-3, also known as Kral Pond, is a 10 acre wetland with a drainage area of 1,000 acres with about 30 percent impervious surface. It is a Type 4 wetland located within the Vermillion River Watershed. There are inlets in the southwest and northeast corners 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 "Manage 2" in the City wetland management plan. 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 manmade wetlands.

Wetland Health

Site Observations: The monitoring team noted that the cattail stands are significant in coverage near the collection site areas. Some reed grasses are of relative abundance as well. There is a fairly steep slope into the wetland which has a fairly firm bottom (not sandy). The water was low in 2008.

Table 4.4.2 Kral Pond (F-3) Wetland Health based on Index of Biotic Integrity

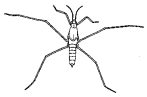
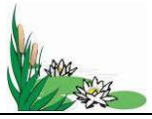
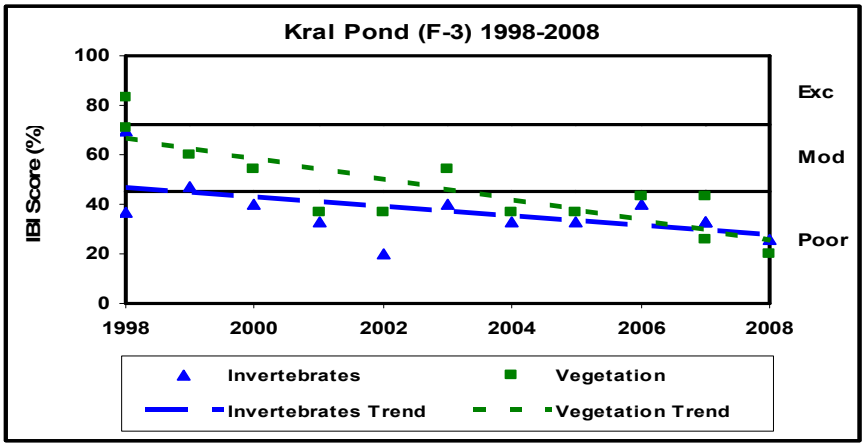
2008 Data (F-3)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Poor (8)	Poor (7)
Trend 1997-2008	Declining	Declining

Figure 4.4.2 Invertebrate and vegetation trends for Kral Pond (F-3)



Site summary: Kral Pond has been monitored 11 years. Recent monitoring indicates poor wetland health. The long term trend shows a continuing and significant decline in wetland health based on both indexes. The two indexes have been consistent with each other for most of the past 9 years. The City's goal for this site was to monitor the impacts of development. It appears that the wetland is being impacted from changes in the watershed, including the development that has occurred.

4.4.3 Lake Julia (F-4)

F-4, also known as Lake Julia, is a ten acre open water wetland within the Vermillion River Watershed. The wetland drainage area is 440 acres. It is designated as "Manage 1" in the City wetland management plan. This is a man-made lake constructed to help stormwater runoff and relieve down stream flows to the Vermillion River. There is development to the north and west, and Lake Julia Park to the south and east. The immediate area is mowed turf up to a natural grass buffer along the lake edge. The wetland management goal is to document wetland health as development occurs, and to monitor long term effects of development on manmade lakes.

Wetland Health

Site Observations: Water levels receeded to approximately one-foot deep in 2008. There was very little vegetation in the water area.

Table 4.4.3 Wetland (F-4) Wetland Health based on Index of Biotic Integrity

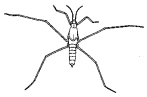
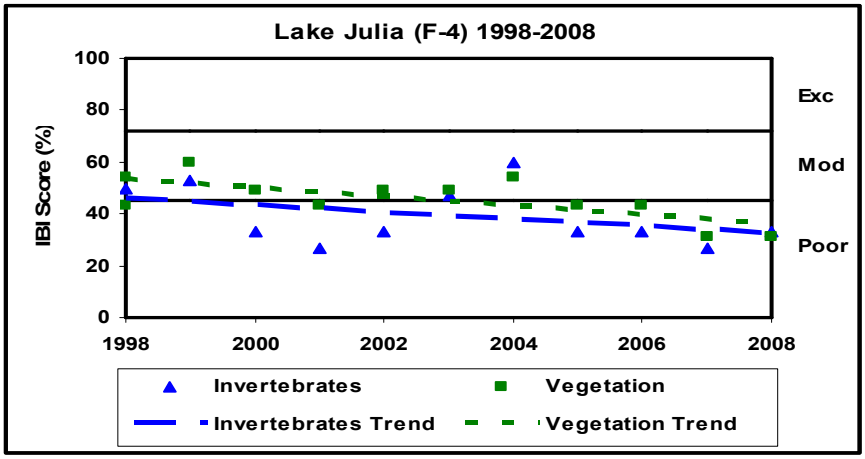
2008 Data (F-4)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Poor (10)	Poor (11)
Trend 1997-2008	Possibly declining	Declining

Table 4.4.3 Invertebrate and vegetation trends for Lake Julia (F-4)



Site Summary: Lake Julia has 11 years of data. The invertebrate and vegetation data indicate declining wetland health, from moderate down to poor. Low water levels in the wetland the past few years may have influenced the IBI scores. The trend analysis for both vegetation and invertebrates shows a gradual decline. The invertebrate scores have been more variable. Future monitoring will help confirm if there is a declining trend in wetland health based on the invertebrate population.

4.4.4 Pilot Knob Pond (F-5)

F-5, also known as Pilot Knob Pond, is a 15.5 acre wetland located within the Vermillion River watershed. The wetland drainage area is 3,000 acres. It is a Type 3 wetland. There is one inlet at the northwest corner of the pond, and no outlets. There is development to the south and west, and wetland buffers are in place. There is cropland surrounding the wetland to the east and west. Pilot Knob Pond is designated as "Manage 2" in the City wetland management plan. The wetland management goal is to document wetland health as development occurs, prior to and after Pilot Knob Road was extended to Highway 50.

Wetland Health

Site Observations: The monitoring team was unable to sample invertebrates in Pilot Knob Pond in 2008 because there was no water in the wetland. Pilot Knob Pond has been dry for many years. They also did not conduct the vegetation monitoring because they were not able to identify the border of the wetland. The data presented in the graph below is from previous years monitoring.

Table 4.4.4 Pilot Knob Pond (F-5) Wetland Health based on Index of Biotic Integrity

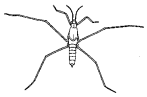
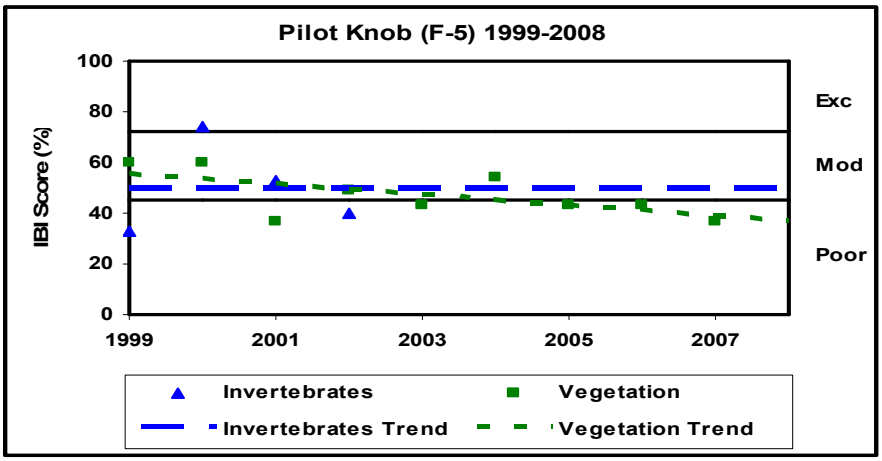
2008 Data (F-5)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Not sampled due to dry conditions	Not sampled due to dry conditions
Trend 1999-2008	Not enough data	Declining

Figure 4.4.4 Invertebrate and vegetation trends for Pilot Knob Pond (F-5)



Site summary: No additional data was obtained for Pilot Knob Pond in 2008 due to dry conditions. This would have been the tenth year of sampling for Pilot Knob Pond. However, invertebrates were only sampled up until 2002 due to dry conditions. The trend line for invertebrates is skewed due to the lack of data in later years. The vegetation data indicate a downward trend, changing from moderate to poor wetland health. Both of these indexes could be affected by water levels. Assistance from the MPCA or other professionals is recommended to help identify the wetland border if the City wishes to continue monitoring this site.

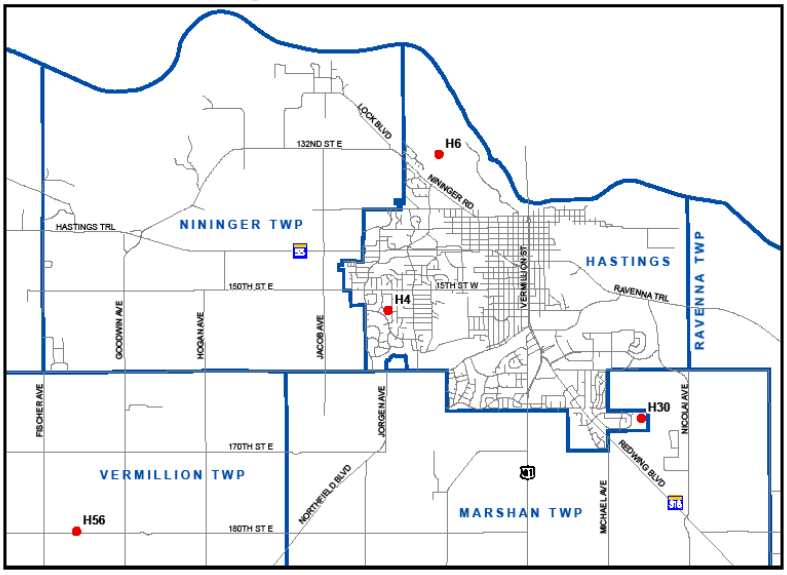
4.5 Hastings Wetlands

Four wetlands were monitored in Hastings in 2008. Eight wetlands have been sampled in the City of Hastings through the WHEP program since 1999.

Team Leader: Joe Beattie

Team Members: Alicia Beattie, Michael Enzenauer, Summer Hendrickson, Brian Huberty, Mark Jahnz, Jerry Klebs, Nicole Lehman, Matt Loyas, Maggie Lundell, Kim Lynch, Jen Oknich, Kelly Pechous, Kevin Smith, and Phil Vieth.

Hastings WHEP Sites Monitored in 2008



Joe Beattie

Joe Beattie became a WHEP team leader to enrich his knowledge of wetlands. He says, "I love doing WHEP. It's a great chance to get outside, stay current on bug and plant ID, and interact with great people."

Kelly Pechous, Alicia Beattie, Kim Lynch, and Joe Beattie

Team Hastings' wetland sites are unique. They include stormwater detention ponds, a farmland pond, and a wetland adjacent to a backwater lake. Team Hastings has just as diverse of a group of volunteers ranging from high school students to professional biologists. "We had another enjoyable season. We have a great group of volunteers that are passionate about their work with wetlands", states team leader Joe Beattie.

Kevin Smith

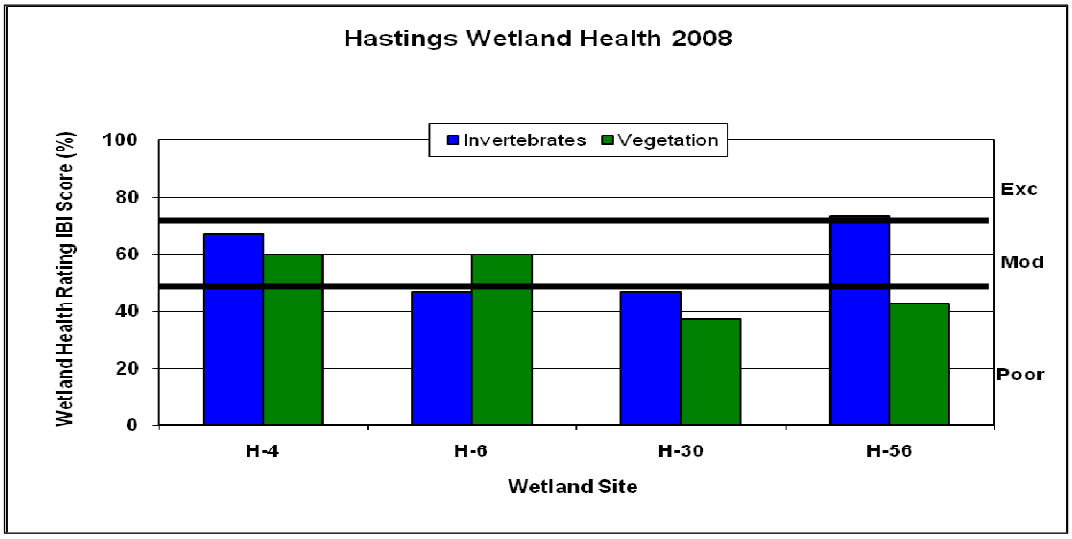
Kevin Smith administers WHEP for the City of Hastings. He believes that WHEP is a very valuable program. So much so that he dedicates as much of his own time as possible to volunteering. He says, "I've seen the team really grow, and the team leader is top-notch and really motivates the team. They collect good data that we can use at the city." Kevin noted that the Hastings site selection was not changed in 2008 because these sites represent a cross section of types found in the community, and the results can relate to other like wetlands in Hastings.

Kevin acknowledged, "The WHEP Program in Hastings continued to be strongly supported by City Staff & Council. The team has made the extra effort to present the results annually at local committee meetings and assumes an active role in outreach to the community.

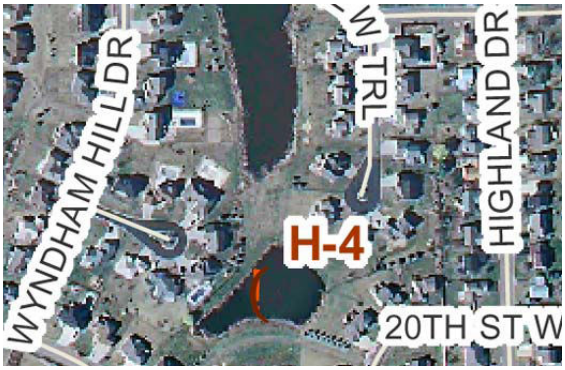
Hastings General Wetland Health

Figure 4.5 presents an overall view of wetland health for all of the 2008 monitoring sites in Hastings based on the IBI scores for invertebrates and vegetation presented as a percent. All of the wetlands showed poor to moderate wetland health in 2008, with H-56 having an invertebrate score near excellent. The reference wetland for Hastings is Lake Rebecca (H-6). The invertebrate scores for all the sites were at or above the reference site. However, the vegetation score for H-30 and H-56 were significantly lower than the reference condition. The scores for H-56 were not consistent between the invertebrates and vegetation.

Figure 4.5 Hastings site scores (percent form) for the 2008 sampling season



4.5.1 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 acre type 4 wetland located within the Vermillion River watershed. The wetland drainage area is 9 to 10 acres, and is 30-40 percent impervious. The wetland has one inlet in the southeast corner and one outlet on the north end. The watershed is primarily residential with private property on three sides and a public trail along the south side of the wetland. The residents maintain a vegetated buffer along the south shore and at least one lot on the north side. Native plant restoration was conducted in 2003-2004 through the Neighborhood Wilds program. Several homeowners still mow 100 percent of the shoreline by their property. The wetland management goal is for storm water management, to enhance the water quality before the waters reach the Vermillion River.

Wetland Health

Site Observations: This is a restoration area with sedges, willows, dogwood, and cattails. The wetland bottom is sandy beneath muck.

Table 4.5.1 Stonegate Treated (H-4) Health based on Index of Biotic Integrity

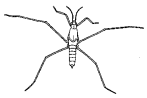
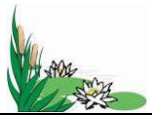
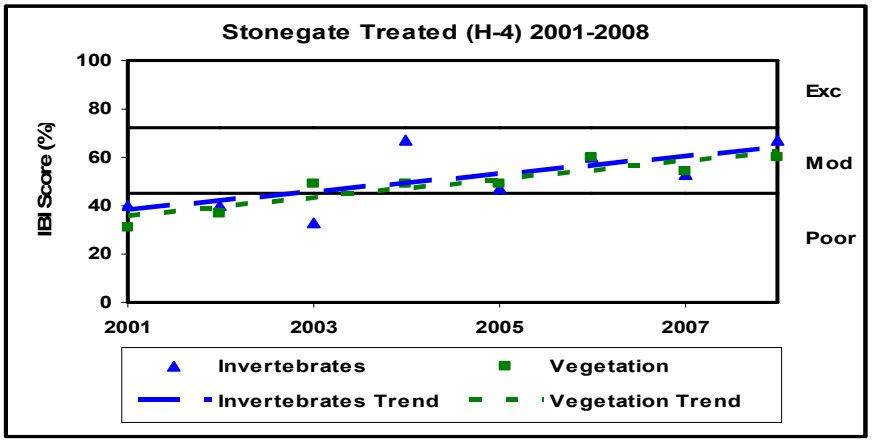
2008 Data (H-4)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Moderate (20)	Moderate (21)
Trend 2001-2008	Improving	Improving

Figure 4.5.1 Invertebrate and vegetation trends for Stonegate Treated (H-4)



Site summary: Both the invertebrate and vegetation IBI scores indicated moderate wetland health. A trend analysis, on the eight years of data, indicates that wetland health is gradually improving. Scores moved from the poor range in 2001 through 2003 up to the moderate range. Both indexes have tracked each other well. Restoring native vegetation around the pond may have helped improve wetland health.

4.5.2 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 4 wetland located in the Mississippi River Watershed. The wetland drainage area is 56 acres, and is 1 percent impervious. The wetland has two storm water inlets and one controlled outlet. The Mississippi River Flats Natural Resource Management & Restoration Plan was adopted in December 2002.

The wetland is an emergent marsh and shoreline/floodplain forest. Diversion of storm water into the lake from development and invasive species including purple loosestrife are of growing concern. The wetland is being monitored to better maintain a shoreline buffer along most of the lake, and to manage for wildlife habitat and recreation.

Wetland Health

Site Observations: Lake Rebecca wetland (H-6) is adjacent to Spring Lake and the Mississippi River. A tall levy with walking/biking trail is located on the north side of the wetland. It is a large open water wetland surrounded by trees. There are several snags in the water which provide good habitat for invertebrates. There is very little emergent vegetation. The cross-check team described the bottom of the wetland as sandy near the shore, and mucky beyond. Wildlife observed: Cliff Swallow, Barn Swallow, Grackles, Red-winged Blackbirds, Marsh Wren, common Yellow Throated Warblar, Yellow Warbler, American Redstart, Killdeer, Baltimore Oriole, Canada Geese, and Buzzards. Purple loosestrife was observed just outside the releve.

Table 4.5.2 Lake Rebecca (H-6) Wetland Health based on Index of Biotic Integrity

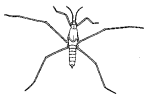
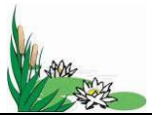
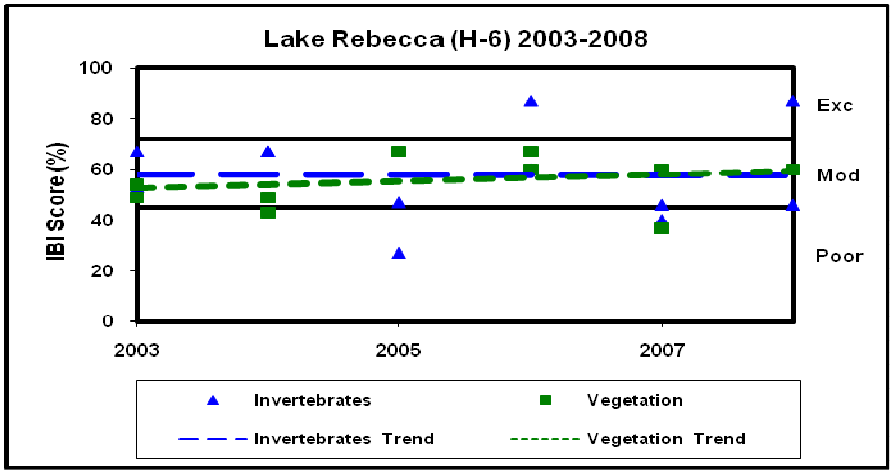
2008 Data (H-6)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Poor (14)	Moderate (21)
Spot Check Rating (IBI score)	Excellent (26)	Moderate (21)
Trend 2003-2008	Stable	Stable

Figure 4.5.2 Invertebrate and vegetation trends for Lake Rebecca (H-6)



Site summary: This is the sixth year of monitoring for Lake Rebecca. Although there is a lot of variation in the data, overall, the wetland has maintained moderate health with both invertebrates and vegetation. There was a significant difference in the data between the cross-check team and City team for the invertebrate scores with the City team score at the upper end of poor while the cross-check team found an excellent score. The spot-check team collected a larger diversity of invertebrates, including Caddisflies, which Joe Beattie stated have not been observed in this wetland before. This resulted in a higher score (excellent) by the spot-check team. However, vegetation scores were identical.

4.5.3 Sand Coulee Pond (H-30)

H-30, also known as Sand Coulee Pond is a 0.92 acre storm water detention pond located in the Vermillion River Watershed. The wetland drainage area is 100 to 114 acres. The watershed area is 20 to 30 percent impervious. The wetland has one inlet and one outlet. The pond is within a valuable and significant dry sand prairie remnant. There is increased development within the watershed. Invasive species such as Spotted Knapweed and changing water levels threaten plant restoration plans and/or efforts. Some shoreline restoration efforts are underway at this site. The wetland management goal is for this wetland to function as a sediment pond, and then enhance water quality and wildlife habitat.

Wetland Health

Site Observations: The monitoring team noted the perimeter of the wetland is restored with plantain, arrowhead, bulrush. The water level was very low (one-foot lower than normal). Wildlife observed: spider, dragonfly, tadpoles, minnows, and a tree frog.

Table 4.5.3 Sand Coulee Pond (H-30) Health based on Index of Biotic Integrity

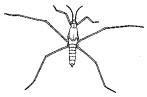
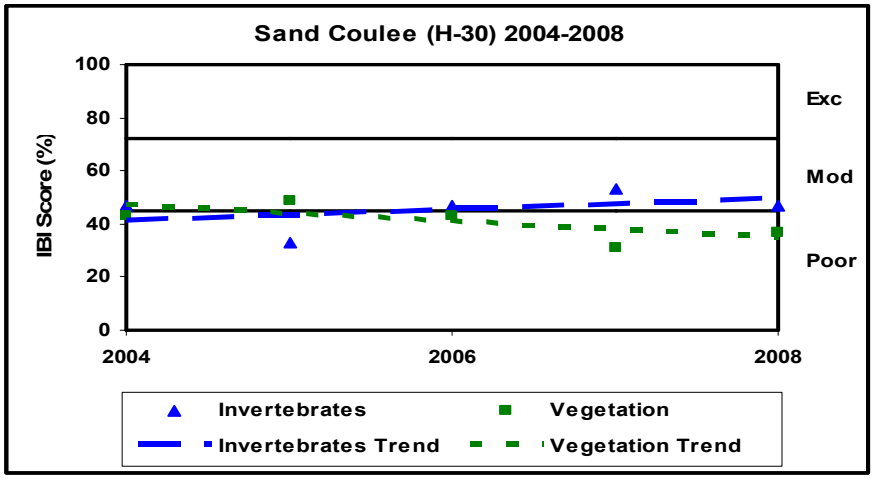
2008 Data (H-30)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Poor (14)	Poor (13)
Trend 2004-2008	Stable	Stable

Figure 4.5.3 Invertebrate and vegetation trends for Sand Coulee Pond (H-30)



Site summary: Sand Coulee wetland has been monitored each year for the past five years. Both the vegetation and invertebrate indexes have remained on the boundary between poor and moderate health. Both ratings were in the poor range in 2008, with the invertebrate score at the high end of the poor range. Overall, the wetland conditions have remained stable.

4.5.4 180th Street Marsh (H-56)

H-56, also known as 180th Street Marsh, is a 20 acre wetland located in the Vermillion River watershed. The wetland drainage area is 340 acres, and less than 1 percent impervious. The wetland has one inlet on the west side. It also has one outlet that runs south to the Vermillion River from a culvert under 180th Street. The pond is a part of several natural ponds in the immediate area. There is agricultural use on the surrounding land which is expected to continue. There is growing concern of the ponds going dry and being taken over by agriculture which is already occurring. The wetland management goal is for agriculture to continue on the surrounding land, and wildlife habitat management to be practiced in the wetland areas. The landowner has expressed interest in enhancing wildlife and its habitat. Kevin Smith added that this site is, "expected to take on increased significance as the land owner makes application for the wetland to become a part of the County Farmland & Natural Area Program."

Wetland Health

Site Observations: The near shore area is dominated by River Bulrush and Reed Canary Grass. In 2007, the team noted the presence of several invasive species in the upland area, including Honeysuckle, Spotted Knapweed and Buckthorn. The bottom was described as having "much litter and very mucky". Wildlife observed: toads, Red-winged Blackbirds. The team also noted that the wetland may be impacted by fertilizer runoff from row crops in the watershed.

Table 4.5.4 180th Street Marsh (H-56) Wetland Health based on Index of Biotic Integrity

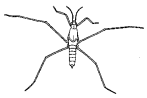
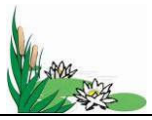
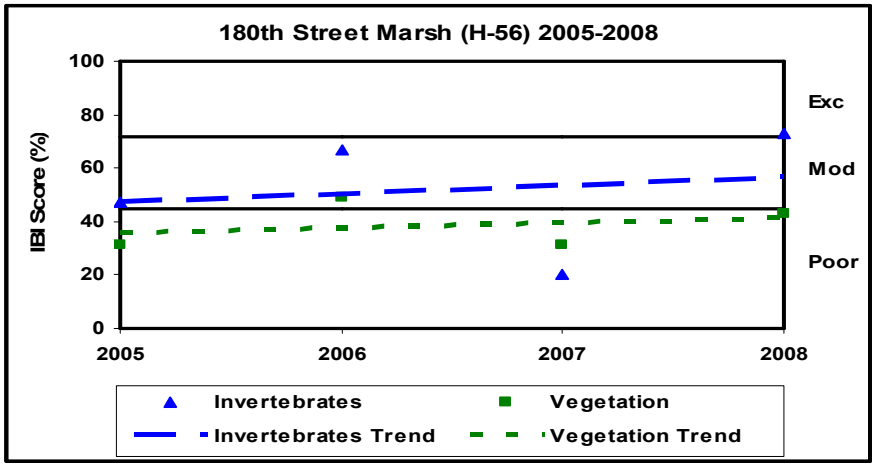
2008 Data (H-56)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Moderate (22)	Poor (15)
Trend 2005-2008	Possibly improving	Possibly improving

Figure 4.5.4 Invertebrate and vegetation trends for 180th Street Marsh (H-56)



Site summary: Four consecutive years of data have been collected for the 180th Street Marsh. The data indicate moderate to poor wetland health. The 2008 scores were substantially higher than those found in 2007. The data for both indexes is quite variable, ranging from poor to near excellent. It appears there may be a positive trend in the indexes. However, additional monitoring is recommended to verify trends and conditions.

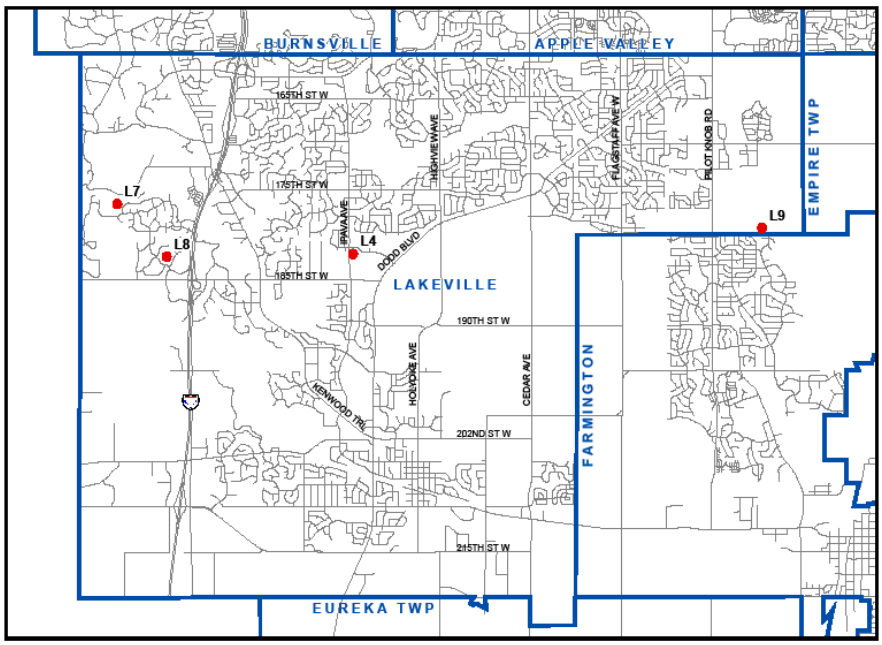
4.6 Lakeville Wetlands

Four wetlands were monitored in 2008 within the City of Lakeville. A total of nine wetlands have been monitored since the inception of WHEP.

Team Leader:
Steve Weston

Team Members: Donald Anderson, Bob Broberg, Kathleen Carrier, Lucy Carrier, Jessica Carrier, Maddy Friedman, Jean Kent, David Smith, Dan Stinnett, and Kristina, Frederick and William von Hohenberg.

Lakeville WHEP Sites Monitored in 2008




Steve Weston

Steve Weston describes himself as a naturalist. "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 was asked by the director of WHEP to give a talk on wetland birds. After the talk, I asked about WHEP, and said, 'That sounds neat. Can I do it?' I have been having fun ever since."


S. Weston, F., K., W. von Hohenberg

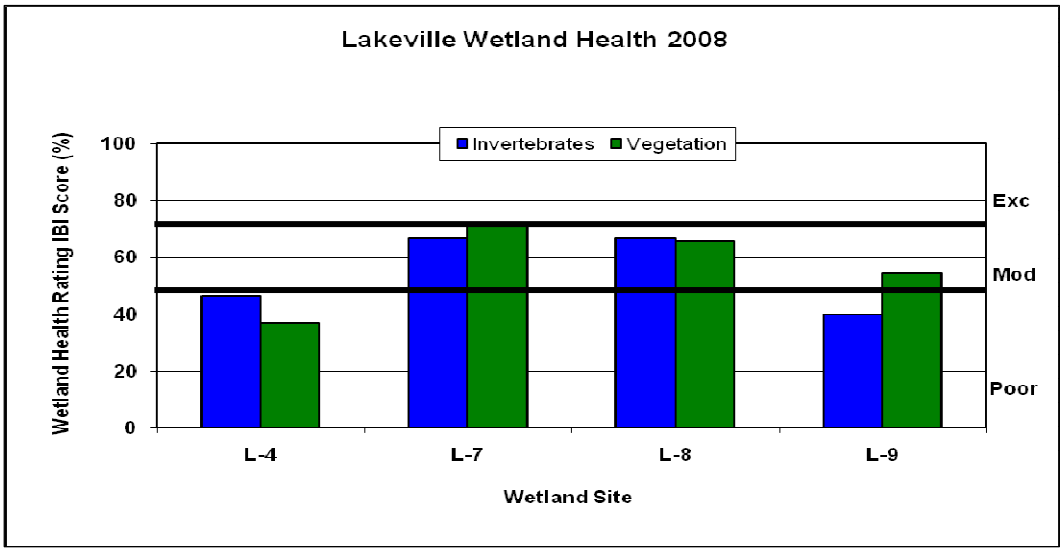

Ann Messerschmidt

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 4.6 presents an overall view of wetland health for all the 2008 monitoring sites in Lakeville based on the IBI scores for invertebrates and vegetation presented as a percent. Figure 4.6 also illustrates the consistency of the wetland site scores. The reference wetland, L-7, as well as L-8 had very consistent vegetation and invertebrate scores. The invertebrate and vegetation data for the four wetlands sampled ranged from poor to moderate wetland health. When compared to the reference wetland, L-4 and L-9 appear to be more impacted, while L-8 had a similar invertebrate score, but the vegetation score was slightly lower than reference conditions.

Figure 4.6 Lakeville site scores (percent form) for the 2008 sampling season



4.6.1 Water Treatment Wetland Bank (L-4)

L-4, also known as Water Treatment Wetland Bank, is a 22.85 acre type 3 wetland located within the Vermillion River Watershed. There are two inlets and one outlet. The wetland is publicly owned, and has a designation of "restore". The wetland management goal is to undertake projects/actions that will restore the wetland. The city will provide incentives to developers to promote restoration. Less water may be making its way to this site due to ponding in an unfinished development to the west of the site. Once the development is finished, water levels should not be affected by the constructed pond.

L-4 Water Treatment Wetland Bank

Wetland Health

Site Observations: The wetland was mostly dried up with less than one-foot of water. Wildlife observed: Eastern Kingbird, Red-winged Blackbird, Barn Swallow, Common Yellowthroat, Warbling Vireo, Robin, Blue-winged Teal, Mallard, Green Heron, Bank Swallow, Pheasant, and Killdeer

Table 4.6.1 Water Treatment Wetland (L-4) Health based on Index of Biotic Integrity

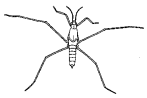
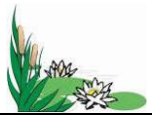
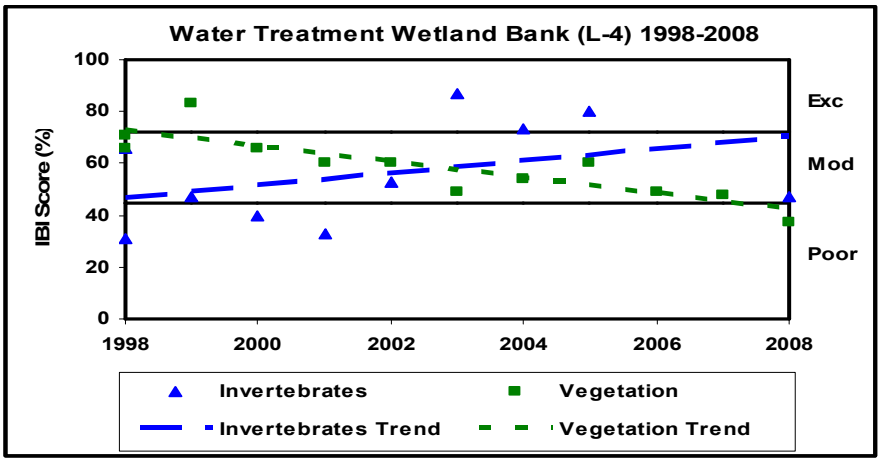
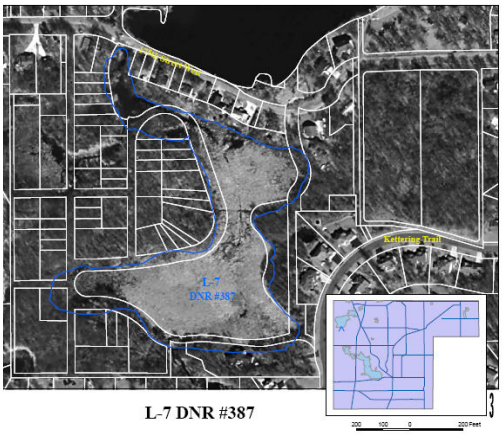
2008 Data (L-4)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Poor (14)	Poor (13)
Trend 1999-2008	Improving, but need additional data to verify recent conditions	Declining

Figure 4.6.1 Invertebrate and vegetation trends for Water Treatment Plant Wetland (L-4)



Site summary: There are eleven years of data for this wetland. Both the vegetation and invertebrate data indicate poor to borderline moderate wetland health in 2008. The trend analysis shows trends in the opposite direction for each index, with vegetation health declining and invertebrate health improving. However, invertebrate data is missing for 2006 and 2007 and there is a lot of variability in the data, with scores ranging from poor to excellent. Even though the trend is positive, the 2008 invertebrate index indicates poor conditions, although borderline moderate. The score was substantially lower than found in 2002-2005. This is a mitigation wetland. Dry conditions in the past few years have likely impacted this wetland. Extensive stands of Reed Canary Grass were observed. Invasive species will lower the vegetation diversity in a wetland. Future invertebrate monitoring will help identify if the trend is reversing.

4.6.2 DNR Wetland #387 (L-7)



L-7 DNR #387

L-7, also known as DNR #387, is a 10 acre type 4 wetland located in the Black Dog Watershed. The wetland drainage area is 2,087 acres. It is 21 percent impervious. It is mostly privately owned. It has one inlet and two outlets. The wetland has a designation of "preserve". The wetland management goal is to actively protect and preserve the functions and values of the wetland as much as possible. A road was constructed for a new subdivision north of the pond. The pond is surrounded by suburban development.

Wetland Health

Site Observations: The cross-check team observed the nest of a common yellow throat. Other areas of the wetland are dominated by cattail and reed canary grass. Other wildlife observed: Red-winged Blackbird, Mallard, Warbling Vireo, Cardinal, Mudskipper, and Bluegill.

Table 4.6.2 DNR 387 (L-7) Health based on Index of Biotic Integrity

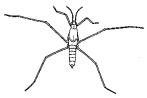
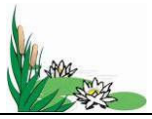
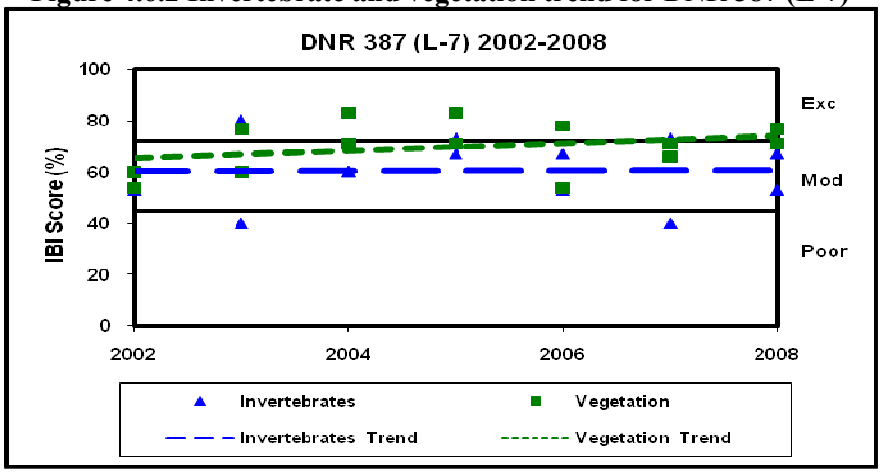
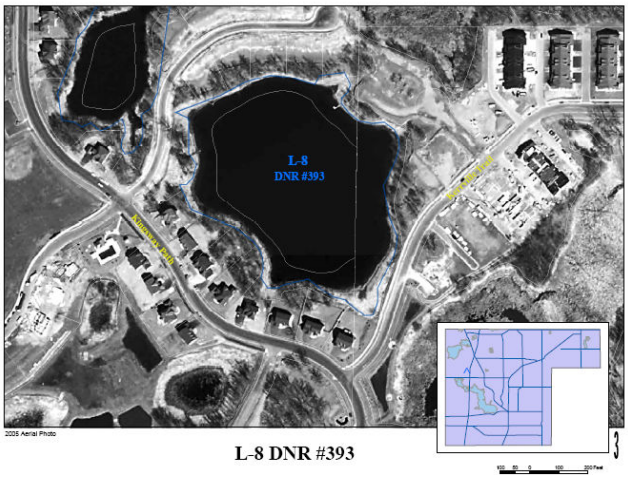
2008 Data (L-7)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Moderate (20)	Excellent (25)
Spot Check Rating (IBI score)	Moderate (16)	Excellent (27)
Trend 2002-2008	Stable	Improving slightly

Figure 4.6.2 Invertebrate and vegetation trend for DNR 387 (L-7)



Site summary: Seven years of data is available for DNR 387 (L-7). Dry conditions may have altered the invertebrate scores for this site in the past. The 2008 scores indicate moderate to excellent conditions for this reference wetland. There has been a lot of variation in the invertebrate scores. A trend analysis indicates slight improvement in the vegetation community health over time with overall variable, but stable conditions for the invertebrates.

4.6.3 DNR #393 (L-8)



L-8 DNR #393

L-8, also known as DNR #393, is a 9.6 acre type 5 wetland located in the Vermillion River Watershed. The wetland drainage area is 4,987 acres. It is 17 percent impervious. It is a publicly owned wetland with no inlets or outlets to date. The wetland has a designation of "preserve". The wetland management plan is to actively protect and preserve the function and values of the wetland as much as possible.
The surrounding land use is residential. The development around the lake is about three years old. A conservation easement of varying size exists along all sides of this wetland. The buffer includes trees and shrubs.

Wetland Health

Site Observations: The monitoring team noted that the willow trees are starting to take over. The *Sagittaria* population that had been observed in previous years was not found in 2008. This wetland is well buffered by natural vegetation against the recent suburban development, except along Karrville Trail. Wildlife observed: Green Frog, Chorus Frog, Red-winged Blackbird, Barn Swallow, Robin,Orioles, Tree Swallow, and Killdeer.

Table 4.6.3 DNR Wetland 393 (L-8) Health based on Index of Biotic Integrity

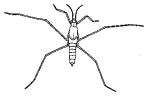
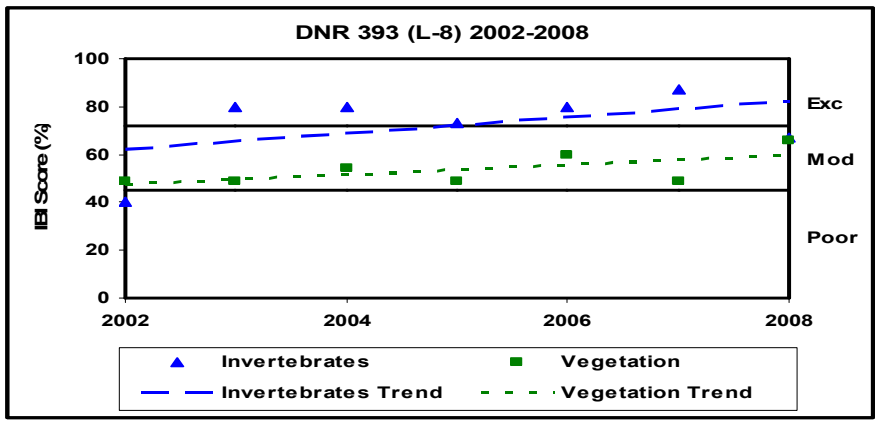
2008 Data (L-8)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Moderate (20)	Moderate (23)
Trend 2002-2008	Improving	Improving

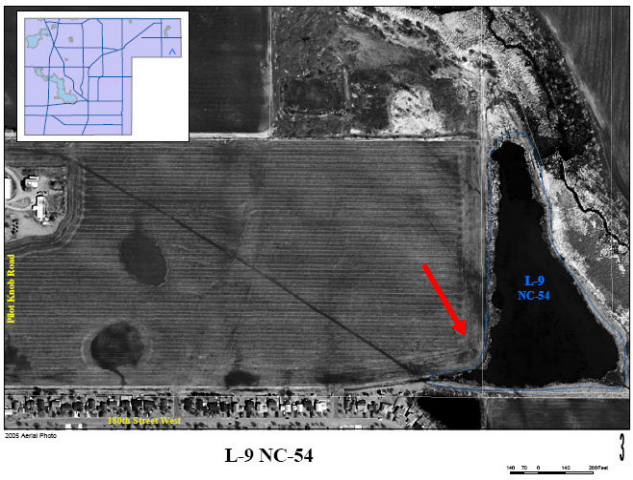
Figure 4.6.3 Invertebrate and vegetation trends for DNR 393 (L-8)



Site summary: DNR wetland 393 (L-8) has seven years of monitoring data. The trend analysis indicates improving wetland health based on both invertebrates and vegetation. There are some factors, such as shoreline development, that are influencing the two areas differently. The 2008 vegetation score was the highest found. The buffer surrounding this wetland and lack of inlets is likely helping preserve and improve this wetland.

4.6.4 NC-54 Mitigation Wetland (L-9)

L-9, also known as NC-54 P.K. Wetland Mitigation, is a 13.84 acre type 4 wetland located in the City of Lakeville. The wetland drainage area is 183 acres with 12% impervious surface. It is located in the Vermillion River watershed and is on land owned by Dakota County. There is one inlet and no outlet. The wetland has a designation of "manage 1" with a goal to maintain the existing wetland functions and values.



L-9 NC-54

Wetland Health

Site Observations: This site, L-9, (also known as NC54) is a mitigation wetland. There is agriculture to the west of the wetland which is slated for future development. The area to the northeast is marshy/wooded area. There is a tree-linked berm to the south with seperates the wetland from another pond. The wetland is surrounded by a willow-thicket. In 2007, the Lakeville team noted that the wetland was eutrophic (nutrient rich), with considerable fish die-off. Wildlife observed: Green Frog, Barn Swallow, Cliff Swallow, Bank Swallow, Marsh Wren, Green Heron, Blue-winged Teal, Black-billed Cuckoo, Red-winged Blackbird, Yellow Warbler, Willow Flycatcher, Mourning Dove, Vireo, and Killdeer.

Table 4.6.4 NC54 Mitigation (L-9) Wetland Health based on Index of Biotic Integrity

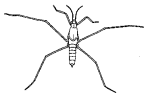
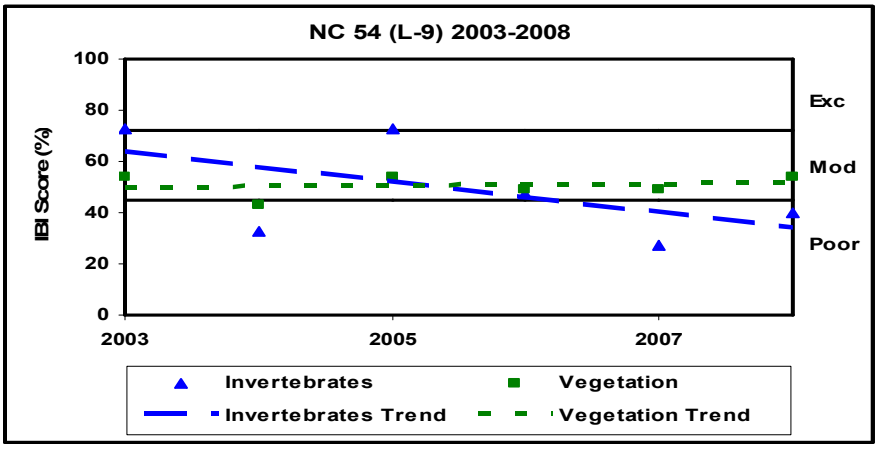
2008 Data (L-9)	**Invertebrates** 	**Vegetation** 
Wetland Health Rating (IBI score)	Poor (12)	Moderate (19)
Trend 2003-2008	Declining	Stable

Figure 4.6.4 Invertebrate and vegetation trends for NC-54 (L-9)

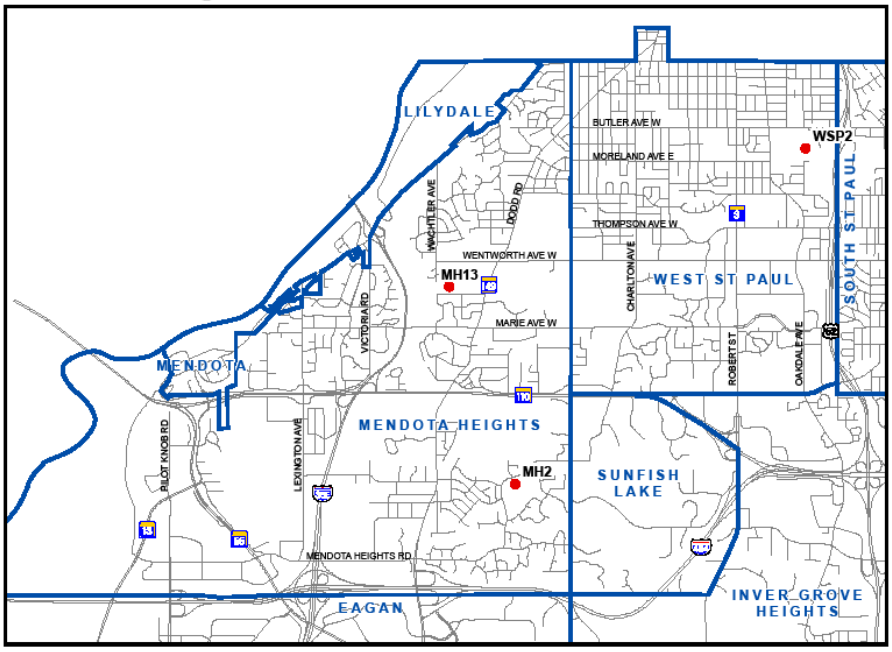


Site summary: Six years of data exists for NC54 (L-9). The vegetation score for 2008 indicated moderate conditions, while the invertebrate scores showed poor conditions. A trend analysis indicates that vegetation scores have remained fairly stable over time, while the invertebrate scores have been declining. The trend observed in 2007 continued through 2008. This is a mitigation wetland that appears to be exhibit declining invertebrate conditions and moderate vegetation health.

4.7 Mendota Heights and West St. Paul Wetlands

Two wetlands were monitored in Mendota Heights and one in West St. Paul in 2008 by the Mendota Heights team. The West St. Paul site is located in a Dakota County Park. Eleven wetlands have been monitored in Mendota Heights and eight in West St. Paul since the start of the WHEP program.

Mendota Heights and West St Paul WHEP Sites Monitored in 2008



Team Leader:
Darcy Tatham

Team Members:
Brian Ashman, Rhett Buttleman, Ross Buttleman, Jess Buttleman, Terri Buttleman, Jim Chastek, Elizabeth Ekholm, Peter Ekholm, Dennis Forsberg, Jeff Gretsfeld, Michelle Larson, Melissa Mohs, Jim Neuharth, John Patterson, Donna Patterson, Donna Portner, Heidi Schreiner, Ann Schwichtenburg, Mary Stade, Anneliese Tatham, Brian Walter, and Ella Wassweiler.

Darcy Tatham

Mendota Height's team leader, Darcy Tatham, has been part of the program for eight years. She believes, "when you have the opportunity to get close up to a wetland and discover how unique they all are, even in the same area, and how they can be beautiful in their own way, that is when you start to understand the value and importance they play in our lives. It is exposing people to this in their own neighborhoods and continually learning about our inter-dependence with nature that has brought me back year after year."

Darcy felt that 2008 went well. "Our team has lots of great dedicated volunteers, some new and some 'old-timers' who keep coming back with their knowledge and experience and helping out. This job couldn't be done without all of my volunteers. This year we had the fun of monitoring a wetland on a golf course during open hours. Having the kids fish out golf balls from the pond and Jim with his hard hat on, are a couple of the pictures I fondly remember. The discussions and debates in the field and in the lab can get lively, but they are all in fun and hopefully it shows the newcomers that we don't always have an instant answer to everything. We try to capitalize on everyone's strengths, because all are important and we don't have just one expert. As much as we try to predict and categorize our wetlands, they are all unique and so is each situation. I appreciate my volunteers very much and I hope they are enjoying themselves and learning along the way as much as I enjoy them and the Program as well."

J. Chastek, D. Tatham, M. Larson, J. Gretsfield

Sue McDermott began the WHEP season of 2008 before John Mazzitello became the new Mendota Heights contact. She helped the Mendota Heights team coordinate wetlands for monitoring. In the past she and Ryan Ruzek have been involved with sampling and the identification process of the sampling. She understands that WHEP is a valuable program for community involvement and wetland health evaluation.


John Mazzitello

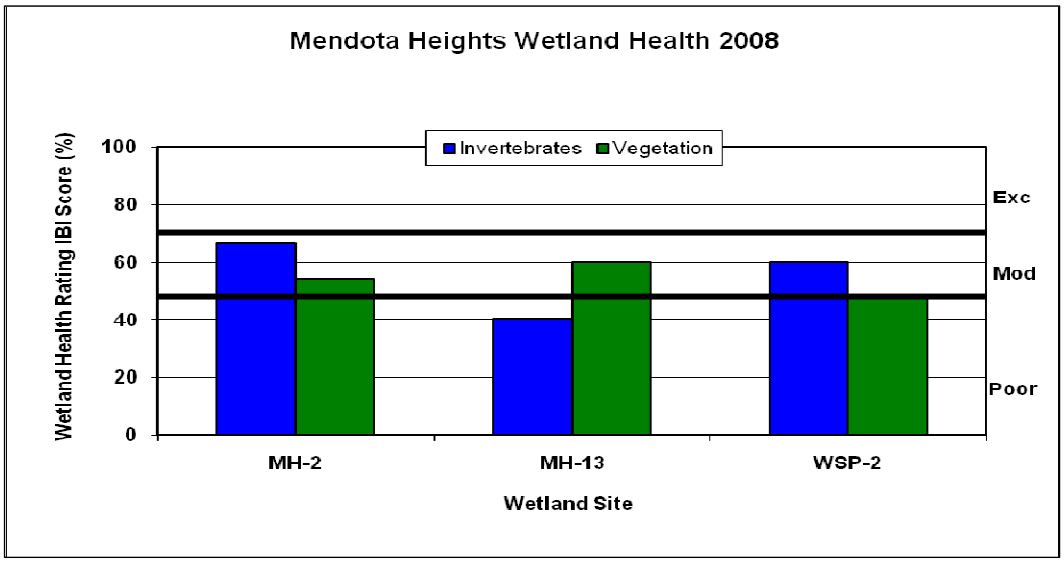
John Mazzitello is the new WHEP contact for the City of Mendota Heights. He was hired as the Mendota Heights Public Works Director/City Engineer in August of 2008. In his new role, he already has helped the Mendota Heights team coordinate wetlands for monitoring in 2008. He says, "The City of Mendota Heights is committed to the preservation, maintenance, and improvement of our wetland habitat areas. I am very excited to be a part of a community that has preservation of its natural amenities as such a high priority."

Ryan Ruzak is a civil engineer for the City of Mendota Heights. He has assisted WHEP volunteers in the data collection and analysis of the data and gained valuable knowledge from my involvement. Ryan was a WHEP volunteer in the past.

Mendota Heights and West St. Paul General Wetland Health

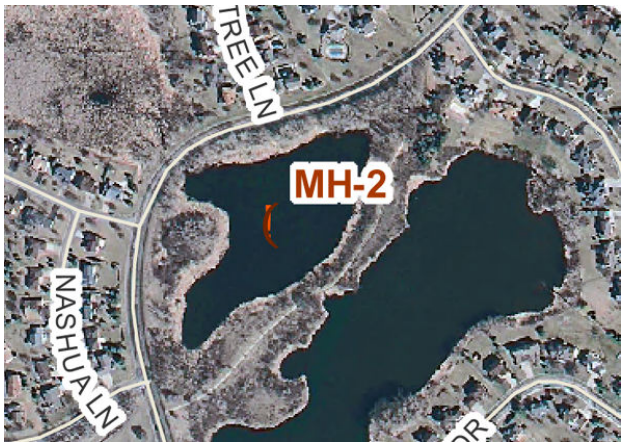
Figure 4.5 presents an overall view of wetland health for all of the 2008 monitoring sites in Mendota Heights and West St. Paul based on the IBI scores for invertebrates and vegetation presented as a percent. Two sites were monitored in Mendota Heights and one in West St. Paul. The reference wetland, MH-2, ranked as moderate for invertebrates and vegetation. Overall, the reference wetland exhibited the best conditions. The other sites ranked poor to moderate for invertebrates and vegetation. The scores were inconsistent between vegetation and invertebrates for all three sites.

Figure 4.7 Mendota Heights & West St. Paul site scores (percent form) for the 2008 sampling season



Both Mendota Heights and West St. Paul have wetland management plans. In West St. Paul, wetlands are classified into categories I – V, consistent with the Lower Mississippi River Watershed Plan. With the exception of Marthaler Pond, which is a Category II wetlands, all wetlands in Mendota Heights are Category III wetlands. Wetland protection is dependent upon wetland type.

4.7.1 Copperfield (MH-2)



Copperfield (MH-2) is a 6-acre Type 4 basin surrounded by grasslands and trees within a residential neighborhood in Mendota Heights. The drainage area for this basin is relatively large (700+ acres) due to its location downstream from many ponds. 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 and wetland management plan. The wetland is managed for aesthetics, natural park area and buffer strips. Copperfield is designated as a reference site. Team Eagan cross-checked this site. MH-2 is a reference wetland for the City.

Wetland Health

Site Observations: The Mendota Heights monitoring team noted Purple Loosestrife and Reed Canary Grass around the wetland. During 2007 the site was relatively dry with very little open water. In the spring of 2008, there was approximately 10" of water, but the site was drier later in the summer. The bottom is mucky. A sediment bar had formed in the middle of the releve. This created a dry area through the middle of the plot. Several bird species and frogs were observed.

Table 4.7.1 Copperfield (MH-2) Wetland Health based on Index of Biotic Integrity

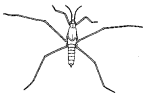
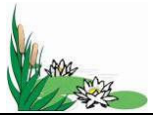
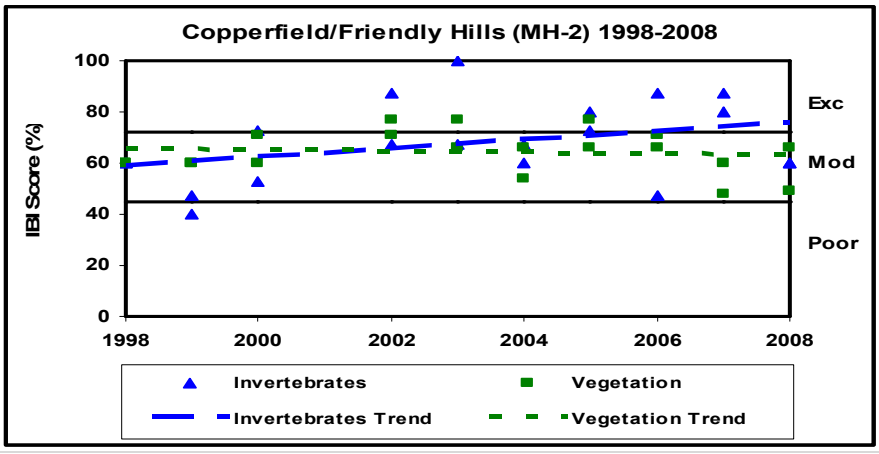
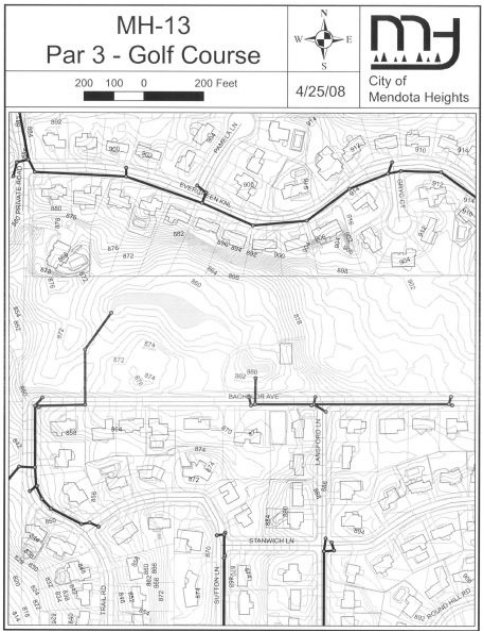
2008 Data (MH-2)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Moderate (18)	Moderate (19)
Spot Check Rating (IBI score)	Moderate (18)	Moderate (17)
Trend 1998-2008	Improving	Stable

Figure 4.7.1 Invertebrate and vegetation trends for Copperfield (MH-2)



Site Summary: Copperfield (MH-2) showed moderate invertebrate health and vegetation health in 2008. The invertebrate scores dropped substantially from the 2007 scores. The long-term trend based on ten years of data shows improving invertebrate health and stable vegetation health, although there is a lot of variability in the invertebrate data, with the 2008 score well below the trend line. Additional monitoring will help identify if a positive trend in invertebrate scores will continue. This is a reference wetland for the City of Mendota Heights. The Eagan team conducted a spot check. Scores from both teams were within two points and provided consistent rankings.

4.7.2 MH Par 3 (MH-13)

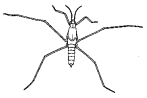
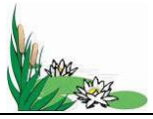


Par 3, also known as MH-13 is a 0.5 acre wetland. The subwatershed is 36 acres with 3% impervious surface. The wetland has one inlet in the south east corner, and one outlet at the western edge of the wetland. MH-11 is included in both the City wetland and stormwater management plans. The wetland is designated as "PUBFx" and is managed for aesthetics and water quality. The wetland is located on a golf course which is now managed by the city. Rain gardens and buffer strips are planned for the area.

Wetland Health

Site Observations: There is a gentle slope to the wetland which is shallow with a fine silt floor. There was a buffer strip along the water's edge and many golf balls in the water. Wildlife observed: Red-winged Blackbirds, Crows, Blue Jays, Gold Finch.

Table 4.7.2 MH Par 3 (MH-13) Wetland Health based on Index of Biotic Integrity

2008 Data (MH-13)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Poor (12)	Moderate (21)
Trend 2008	Not enough data	Not enough data

Site summary: This is the first year of monitoring the MH Par 3 (MH-13) site. Monitoring results for invertebrates places the wetland in the upper end of the poor category while the vegetation results place the wetland in the moderate health category. There is not enough data to identify any trends.

4.7.3 Thompson Lake (WSP-2)

Thompson Lake (WSP-2) is an eight to ten acre "Kettle" lake about eight feet deep surrounded by glacial moraine hills and silty soils. The drainage area for this basin is about 14 square miles of Simon's Ravine watershed in West St. Paul which is part of the Lower Minnesota River Watershed. The percent impervious surface in the watershed is approximately 50 percent. It is located within a Dakota County Park. An inlet

enters the lake on the north end and an outlet is located on the south end. The City has a stormwater management plan and wetland management plan. The goals are to improve fisheries, water quality and to stabilize the shoreline. The lake has a naturalized shoreline with rain gardens and has a winter aeration system. The recent expansion of school facilities, construction of a new lodge and removal of old lodge building has created disturbances to this lake. Also, a current plan is being evaluated to provide a water quality pond at the lake inlet. This is the sixth year of evaluation for this wetland.

Wetland Health

Site Observations: Lily Lake is located north of the pond across Butler Avenue. The team reported that it flows into Thompson Lake when full. A resident used to, and maybe still, pumps water into Thompson from Lily. There have been some changes in the watershed in the past few years, including construction of the lodge, playing fields at a nearby school and construction of a rain garden. The shoreline is dense in vegetation including cattail, *Scirpus*, arrowhead, and *Sparganium*. The monitoring team reported that there was almost too much vegetation to get a good invertebrate sample. The monitoring team stated that this wetland changes drastically from year to year. Several trees have been removed because of Oak wilt. Wildlife observed: Painted Turtle

Table 4.7.3 Thompson Lake (WSP-2) Wetland Health based on Index of Biotic Integrity

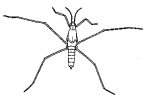
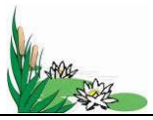
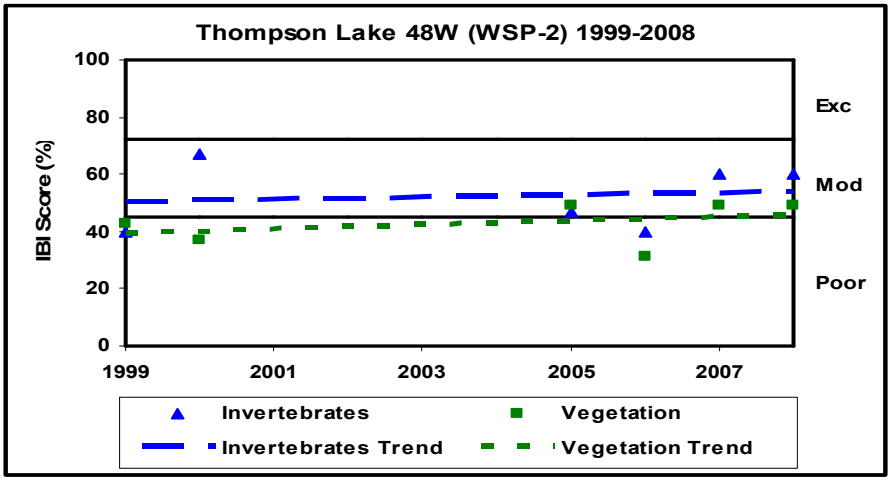
2008 Data (WSP-2)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Moderate (18)	Moderate (17)
Trend 1999-2008	Stable	Stable

Figure 4.7.3 Invertebrate and vegetation trends for Thompson Lake (WSP-2)

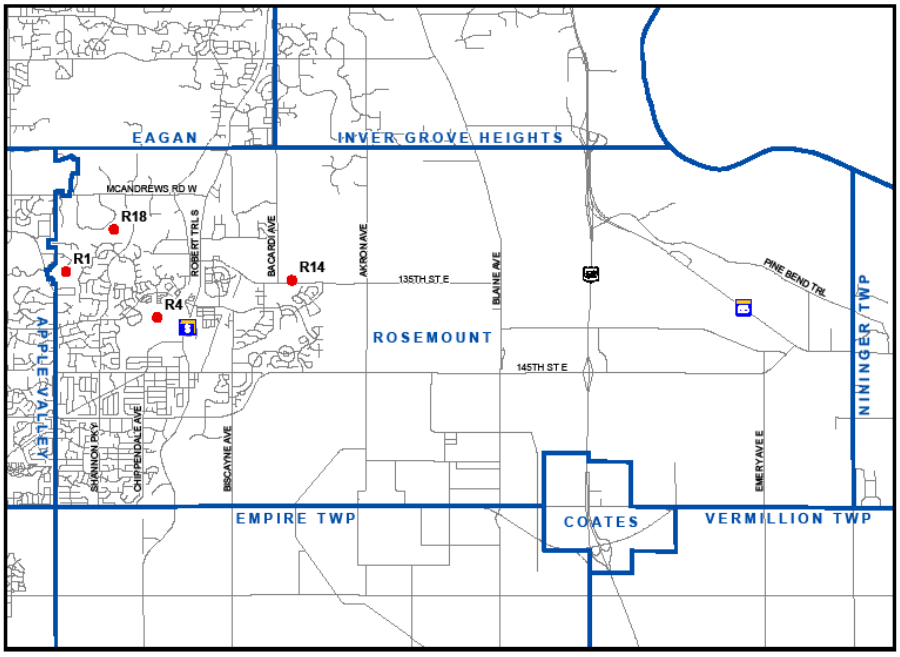


Site summary: WSP-2 has been sampled six times since 1999, but there was a four year period between samples in 2000 to 2005. The data indicate that the wetland conditions have remained fairly stable with ratings in the poor to low moderate wetland health categories. The 2008 data for both invertebrates and vegetation placed the wetland in the moderate category. Although this wetland is located in a park, it has a large watershed with a high percentage of impervious area contributing water and pollutants.

4.8 Rosemount Wetlands

Four wetlands were monitored in the City of Rosemount in 2008. Sixteen wetlands have been monitored in Rosemount since the start of WHEP.

Rosemount WHEP Sites Monitored in 2008



Team Leaders: Jane Porterfield, Terry Pearson

Team Members: Brian Berggren, Barbara Berggren, Lauren Michelsen, Janell Miersch, Cody Osegard, Jillian Pearson, Kate Pearson, Greg Porterfield, Emily Rekstad, Tony Schmitt, Denise Wilkens, and Paul Wright.

Since joining the WHEP program, Jane and Terry have seen involvement among the community increase and healthy stewardship of surrounding wetlands become a high priority. They both agree that their team is fun to work with and keep them motivated to continue in the program. They enjoy experiencing the changes of the wetlands each season and hope the program remains active so they can continue to volunteer in the future. Jane Porterfield was happy to study wetlands with standing water in 2008. She says, "We are always discovering something new and this is a fascinating study to be a part of. As a team leader I enjoy the challenges and pleasures involved in being out in a natural environment." Terry also commented on the higher water levels in 2008. The team found *Utricularia* (bladderwort) this year. Terry says that the main reason he is involved in WHEP is "because healthy wetlands are vital to healthy drinking water. Healthy drinking water is vital to a healthy life for all of us."

Jane Porterfield and Terry Pearson

Jane Porterfield with the late Paul Wright

Team members remember long-time volunteer Paul Wright who passed away this year. Paul was an avid spokesperson for the environment. Not only was he busy with WHEP, but he had also led a project with Koch refinery that restored an Oak savannah on their property along the river bluffs. Terry recognizes that "monitoring wetlands was obviously important to Paul. We are very thankful for his support and those of us who knew Paul will miss him."

Christine Watson of the City of Rosemount helped select the wetlands to be monitored, recruit, coordinate and support the team, and occasionally volunteer. They believe that the WHEP program will provide

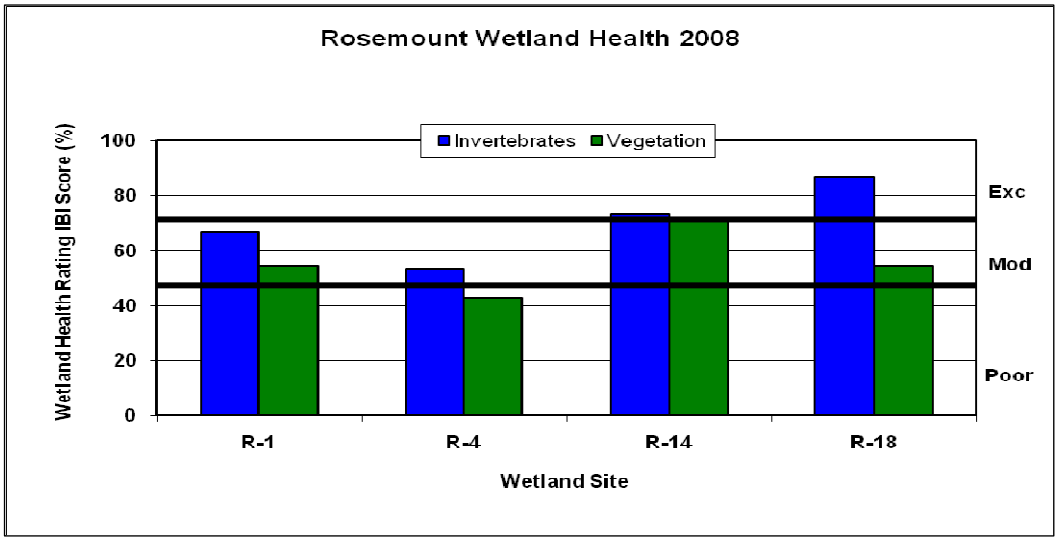
valuable insight about the health of the area wetlands, and will provide helpful documentation for keeping the waters protected.

Rosemount General Wetland Health

Terry Pearson

Figure 4.8.2 presents an overall view of wetland health for all the 2008 monitoring sites in Rosemount based on the scores for invertebrates and vegetation presented as a percent. Figure 4.8.2 also illustrates the consistency of the wetland site scores. Scores that differ by less than 10 percent are considered consistent. The R-14 wetland has consistent vegetation and invertebrate scores. However, R-1, R-4 and R-18 show inconsistent scores between the vegetation and invertebrates. The invertebrate data indicate moderate to excellent wetland health for all wetlands, while the vegetation data indicate poor to moderate wetland health. The scores for R-14 and R-18 indicate better conditions than the reference wetland, R-1.

Figure 4.8 Rosemount site scores (percent form) for 2008



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

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

4.8.1 Kelly Marsh/Derryglen Court (R-1)

Kelly Marsh (R-1) is a one-acre type 4/5 wetland within a 12.5 acre watershed that drains to the Vermillion River. The City stormwater management plan and wetland management plan designate R-1 (a.k.a. WMP#362) as "protect". The City's goals are to protect the functionality of the wetland and to avoid impacts. The wetland has steep slopes and a naturalized buffer. The wetland is surrounded by past development and the concern for this wetland is the impacts of development. There is an inlet on the north side of the wetland and an overflow swale outlet in the southeast. This is the fifth year of sampling. The first year's sampling included amphibians.

Wetland Health

Site Observations: The monitoring team relocated the releve to a different area of the wetland along the east side in 2008. It maintained a Moderate rating assessment. The water level was higher than in previous years. Derry Glenn Homes is to the west of the wetland. It was noted that trees were cut, a buffer sign was knocked down, and the edge of the turf area is eroding. The team indicated a concern that the development is intruding on the buffer. There is heavy cover of water lilies in the south end and 1- 5% cover of Reed Canary Grass. The team noted higher than normal water levels in June.

Table 4.8.1 Wetland Health based on Index of Biotic Integrity

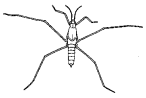
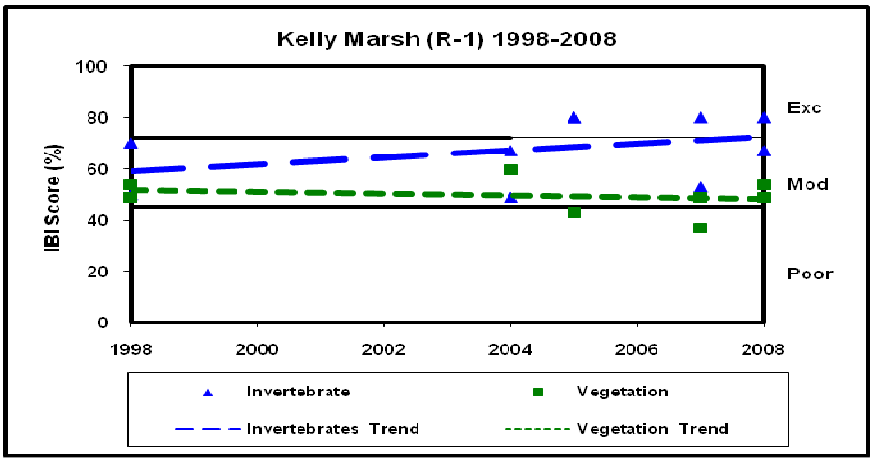
2008 Data (R-1)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Moderate (20)	Moderate (19)
Spot Check Rating (IBI score)	Excellent (24)	Moderate (17)
Trend 1998-2008	Improving	Stable

Figure 4.8.1 Invertebrate and vegetation trends for Kelly Marsh (R-1) 1998 to 2008.



Site Summary: Kelly Marsh (R-1), a reference wetland, has been sampled five times since 1998. The invertebrate IBI score showed moderate to excellent wetland health, while the vegetation score led to a moderate rating. The invertebrate trend analysis indicates improved wetland health since it was first tested in 1998. The vegetation analyses for this wetland provided fairly consistent ratings, in the moderate or high poor range, although a slight downward trend may be indicated. The 2008 ratings were higher than those found in 2007. Continued monitoring is recommended to determine if the trends continue. The spot check by the Apple Valley team was considered consistent with those of the Rosemount team. However, the Rosemount team found moderate invertebrate conditions, while the spot check indicated excellent conditions.

4.8.2 Schwartz Pond (R-4)

Schwartz Pond, also known as WMP #431 and DNR 344, is a 10.855 acre Type 5 wetland. It has a drainage area of 144.54 acres with 20% impervious surface. There is one inlet in the south east corner of the wetland, and two outlets. The wetland is on School District 19 property. It is situated in a basin with heavily wooded area to the west and north, and manicured lawns and ballfields to the east and south. There is a 75 foot buffer around most of the wetland. A walking path runs along the east side within the buffer zone, and the school building sits near the south side of the wetland. The wetland basin may be affected by stormwater runoff from nearby development and Rosemount High School. Schwartz Pond is included in both the City wetland and stormwater management plans. The wetland is designated as a preservation area, and is managed as a maintained wetland without any loss of function or value. Because of its proximity to a school, the city would like to maximize its potential for educational purposes.

Site Observations: The wetland is heavily wooded on the north and west sides. Turf areas to the east of the wetland are used for sporting events, but buffers are in place around the wetland. A new prairie restoration project was installed at Schwartz Park this year. Reed canary grass grows at the edge of the pond along with a good population of mosquitos. The team noted that the bottom was mucky in some areas and firmer gravel, almost like a path, about 20 feet out. Water rose about one foot after the traps

were set out. This wetland is mostly open water. The team noted that there didn't appear to be any emergent, submergent or floating-leaved aquatic plants.

Table 4.8.2 Schwartz (R-4) Wetland Health based on Index of Biotic Integrity

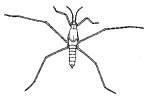
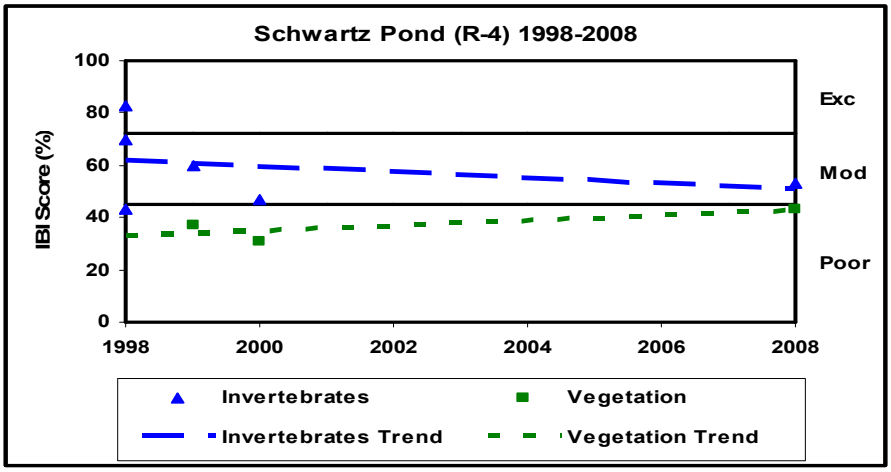
2008 Data (R-4)	Invertebrates 	Vegetation 
Wetland Health Rating (IBI score)	Moderate (16)	Poor (15)
Trend 1999-2008	Not enough data	Not enough data

Figure 4.8.2 Invertebrate and vegetation trends for Schwartz Pond (R-4)



Site summary: Schwartz Pond (R-4) has been monitored four times. Prior to the 2008 monitoring, it was last monitored in 2000. The invertebrate index shows moderate health for 2008, while the vegetation index shows poor to borderline moderate wetland health. Additional data is needed to determine if any trend in wetland health is occurring.

4.8.3 WMP #379 (R-14)

Mare Pond (R-14), also known as WMP #379 and DNR012W, is a 4.8 acre Type 5 wetland. The subwatershed is 80.92 acres of which 20% is impervious. The wetland does not have any inlets or outlets. Mare Pond is included in the City of Rosemount's Storm Water and Wetland Management Plans. It is designated as a Preservation area and is managed to maintain the wetland without any loss of its functions or values. The wetland is affected by runoff from the adjacent road, and there is potential for impact from future development in the area. The city requires that any new development will have a 75 foot buffer. The immediate area is surrounded by grassland with sparse trees and shrubs.

Site Observations: The Rosemount monitoring team noticed that the water level in Mare Pond was much higher than the last time it was monitored. Reed Canary Grass was noted. Wildlife observed: abundant leopard frog population, dragonflies, damselflies. The monitoring team expressed concern about possible changes in hydrlogy due to development. The pond on the south of the road used to have more water than observed in recent years.

Table 4.8.3 WMP #379 (R-14) Wetland Health based on Index of Biotic Integrity

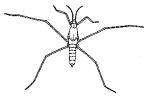
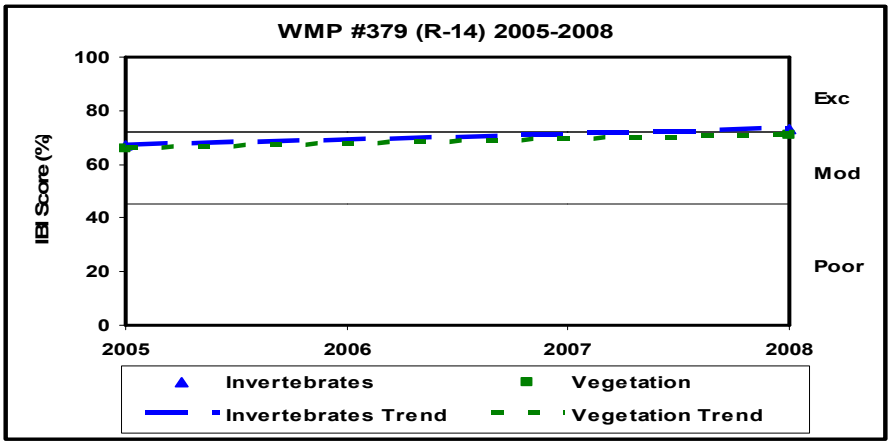
2008 Data (R-14)	**Invertebrates** 	**Vegetation** 
Wetland Health Rating (IBI score)	Moderate (22)	Moderate (25)
Trend 2005-2008	Not enough data	Not enough data

Figure 4.8.3 Invertebrate and vegetation trends for WMP #379 (R-14)



Site summary: The WMP #379 site (R-14) has been sampled only twice through the WHEP program, although the indexes show moderate to borderline excellent wetland health. Additional data is needed to better assess wetland health and trends.

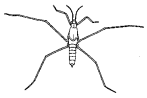
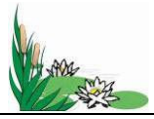
4.8.4 WMP #279 (R-18)

R-18, also known as WMP #279 and DNR 223W is a 4.469 acre Type 4 wetland. The subwatershed is 33.71 acres of which 30% is impervious surface. It is privately owned property. This wetland is included in the City of Rosemount's Storm Water and Wetland Management Plans. It is designated as a Preserve area with a management goal to maintain the wetland without any loss of its functions or values. A previous survey noted high diversity within this wetland. The city would like to continue monitoring the wetland, and to keep any potential impacts minimized to ensure this diversity is maintained. There is potential for receiving storm water from a new development to the south and from mowed turf to the east. The immediate area is surrounded by wooded hillsides. There is a 75 foot buffer in place around the wetland.

Wetland Health

Site Observations: The Rosemount monitoring team noted a large amount of persistentwas litter in the wetland and conditons made it difficult to conduct the monitoring. The water level was low and water was warm. The submergent plants were decomposing in July. The pond had a foul smell. A small amount of Reed Canary Grass was observed within the releve. Wildlife observed: Red-winged Blackbird. A neighbor reports Coyotes.

Table 4.8.4 WMP #279 (R-18) Wetland Health based on Index of Biotic Integrity

2008 Data (R-18)	**Invertebrates** 	**Vegetation** 
Wetland Health Rating (IBI score)	Excellent (26)	Moderate (19)
Trend 2008	Not enough data	Not enough data

Site summary: This is the first year of monitoring for R-18. The invertebrate scores were very high (excellent), while the vegetation indicated moderate wetland health. Additional monitoring will be needed to establish adequate baseline data for this site. The surrounding buffers and large undeveloped wooded area help to keep this wetland in good condition.

Appendix A

2008 Vegetation IBI Data Sheets

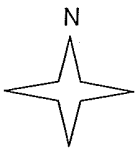
MN WHEP VEGETATION SURVEY FIELD SHEET: SITE INFORMATION

Site Name:_____	Date/Time:_____
Team Leader/Observer:_____	Team Name:_____
Local Sponsor:	County:

Location Information (UTM coordinates from GPS unit, Township Range Section coordinates, or street directions):

Site Description (Include vegetation, water pathway, and immediate land use descriptions. Note any unique plants or plant communities within the wetland but occurring outside of the releve. Did you observe any wildlife while at this site?):

Site Sketch (Include vegetation zones, water inlets and outlets, point source pollution inputs such as stormwater pipes, immediate land use practices, any landmarks, and the location of the releve in the wetland):



MN WHEP VEGETATION SURVEY FIELD SHEET: RELEVE DATA

Site Name:_____	Date/Time:_____
Team Leader/Observer:_____	Team Name:_____
Local Sponsor:	County:

Releve Dimensions (circle one): **10 m x 10 m** or **5 m x 20 m** = 100 m^2
Is the releve typical of the wetland plant community ? (circle one): **Yes** or **No** (explain below)
Water depth in the plot (meters): Shallowest:_____m Deepest:_____m
Substrate/bottom description:

Comments:

Note: *Numbers in ( ) refer to the metrics where the data are used*

Pres	CC	NONVASCULAR (2, 6)
		Chara (Muskgrass)
		Lichen
		Moss
		Riccia fluitans (Slender Riccia)
		Ricciocarpus natans (Purple-Fringed Riccia)

Pres	CC	LOW VASCULAR (1)
		Equisetum (Horsetail)
		Onoclea sensibilis (Sensitive Fern)
		Osmunda (Osmunda)
		Thelypteris palustris (Marsh-Fern)

Pres	CC	WOODY (1)
		Vines
		Parthenocissus (Virginia Creeper)
		Vitis riparia (Grape)
		Shrubs or Trees with Opposite Leaves
		Acer (Maple, Box Elder)
		Cornus (Dogwood)
		Fraxinus (Ash)
		Rhamnus cathartica (Common Buckthorn)
		Shrubs or Trees with Alternate Leaves
		Alnus (Alder)
		Frangula alnus (Alder-Buckthorn)
		Populus (Aspen, Cottonwood)
		Quercus (Oak)
		Rubus (Raspberry, Dewberry, Blackberry)
		Salix (Willow)
		Spiraea alba (Meadowsweet)
		Ulmus (Elm)

Pres	CC	GRASSLIKE (1, 3, 4, 7)
		Sedges, Bulrushes, Rushes
		Carex (Sedge)
		Cyperus (Flatsedge)
		Dulichium arundinaceum (Three-Way Sedge)
		Eleocharis (Spike-Rush)
		Juncus (Rush)
		Scirpus (Bulrush)
		True Grasses
		Agrostis (Bent Grass)
		Alopecurus (Foxtail)
		Calamagrostis (Reed Grass)
		Echinochloa (Barnyard-Grass)
		Glyceria (Manna-Grass)
		Leersia (Cut Grass)
		Phalaris arundinacea (Reed Canary-Grass)
		Phragmites australis (Giant Reed)
		Poa (Blue Grass)
		Spartina pectinata (Prairie Cord-Grass)
		Zizania aquatica (Wild Rice)

Cover Class (CC)	Percent Cover Range
6	75-100%
5	50-75%
4	25-50%
3	5-25%
2	1-5%
1	0-1%

Fres CC FORBS (1, 5, 6, 7)

Submergent Aquatic Forbs		
		Ceratophyllum (Coontail)
		Elodea (Waterweed)
		Megalodonta beckii (Water Beggar-Ticks)
		Myriophyllum (Water-Milfoil)
		Najas (Water-Nymph)
		Potamogeton (Pondweed)
		Ranunculus (Water-Crowfoot)
		Utricularia (Bladderwort)
		Vallisneria americana (Water-Celery)
		Zannichellia palustris (Horned Pondweed)
Floating Leaved Aquatic Forbs		
		Brasenia schreberi (Water-Shield)
		Lemna (Duckweed)
		Nuphar (Yellow Water-Lily)
		Nymphaea (White Water-Lily)
		Polygonum amphibium (Water-Smartweed)
		Potamogeton (Pondweed)
		Spirodela polyrhiza (Greater Duckweed)
		Wolfia (Water-Meal)
Emergent Forbs with Basal Leaves		
		Acorus (Sweet Flag)
		Alisma (Water-Plantain)
		Calla palustris (Water-Arum)
		Caltha palustris (Marsh-Marigold)
		Iris (Iris, Flag)
		Pontedaria cordata (Pickerelweed)
		Rumex (Dock)
		Sagittaria (Arrowhead)
		Sparganium (Bur-Reed)
		Typha (Cat-Tail)

Additional/Unknown Forbs		

Fres CC FORBS (1, 5, 6, 7)

Emergent Forbs from a Distinct Stem		
		Asclepias incarnata (Swamp-Milkweed)
		Aster (Aster)
		Bidens (Beggar-Ticks)
		Campanula aparinoides (Marsh-Bellflower)
		Cicuta (Water-Hemlock)
		Cirsium (Thistle)
		Epilobium (Willow-Herb)
		Eupatorium (Joe-Pye Weed, Boneset)
		Euthamia (Grass-Leaved Goldenrod)
		Galium (Bedstraw)
		Hypericum (St. John's-Wort)
		Impatiens (Jewelweed)
		Lathyrus (Wild Pea)
		Lycopus (Bugle Weed)
		Lysimachia (Loosestrife)
		Lythrum (Loosestrife)
		Mentha arvensis (Field-Mint)
		Pilea (Clearweed)
		Polygonum (Smartweed)
		Potentilla palustris (Marsh-Cinquefoil)
		Scutellaria (Skullcap)
		Sium suave (Water-Parsnip)
		Solanum dulcamara (Nightshade)
		Solidago (Goldenrod)
		Stachys (Hedge-Nettle
		Triadenum fraseri (Marsh St. John's-Wort)
		Urtica dioica (Stinging Nettle)
		Verbena hastata (Blue Vervain)

Additional Comments:

MN WHEP VEGETATION SURVEY METRIC SCORING SHEET

Site Name:_____ Date Sampled:_____
Team Leader/Observer:_____ Date Scored:_____
Team Name:_____ County:_____
Local Sponsor:

1) Vascular Genera

-Count the number of different genera of low vascular plants (Ferns & Horsetails), woody plants, grasslikes, & forbs observed within the sample plot. Be careful not to count the same genus twice.

a. Number of **Low Vasculars**: _____

b. Number of **Woody Plants**: _____

c. Number of **Grasslikes**: _____

d. Number of **Forbs**: _____

e. **Plot Tally** (sum of a - d): _____

f. **Metric #1 Score**: _____

Scoring criteria for Vascular Genera	
Plot Tally	Score
≥ 20	5
9 - 19	3
0 - 8	1

Comments:

2) Nonvascular Taxa

-Count the number of different kinds of nonvascular taxa observed within the sample plot. Do not count slimy filamentous algae, but note in the comments section.

a. **Plot Tally**: _____

b. **Metric #2 Score**: _____

Scoring criteria for Nonvascular Taxa	
Plot Tally	Score
≥ 2	5
1	3
0	1

Comments:

MN WHEP VEGETATION SURVEY METRIC SCORING SHEET

Site Name:_____ Team Name:_____ Date Sampled:_____

3) Grasslike Genera

-Count the number of different kinds of grasslike genera observed within the sample plot (refer to metric #1, part c).

a. Plot Tally: _____

b. Metric #3 Score: _____

Comments:

Scoring criteria for Grasslike Genera

Plot Tally	Score
≥ 5	5
2 - 4	3
0 - 1	1

4) *Carex* Cover

-Estimate the percent cover of *Carex* within the sample plot.

a. *Carex* Cover Class Value: _____

b. Metric #4 Score: _____

Comments:

Scoring criteria for *Carex* Cover

CC Value	Percent	Score
3 - 6	≥ 5%	5
2	1 - 5%	3
0 - 1	0 - 1%	1

5) *Utricularia* Presence

a. Was *Utricularia* present in the plot? Yes No

b. Metric #5 Score: _____

Comments:

Scoring criteria for *Utricularia* Presence

Presence/Absence	Score
Present	5
Absent	1

6) Aquatic Guild

-Count the number of different Aquatic Guild genera. This includes the submergent aquatic forbs and floating leaved aquatic forbs listed on the releve data sheet ***and*** *Chara, Riccia fluitans,* and *Ricciocarpus natans*

a. Plot Tally: _____

b. Metric #6 Score: _____

Comments:

Scoring criteria for Aquatic Guild

Plot Tally	Score
≥ 6	5
3 - 5	3
0 - 2	1

MN WHEP VEGETATION SURVEY METRIC SCORING SHEET

Site Name:_____ Team Name:_____ Date Sampled:_____

7) Persistent Litter

-Record the cover class (CC) of each plant taxa listed below that was found in your plot. Determine the midpoint % cover and sum all of the values to score this metric. The midpoint % cover is the middle percentage of the range that a CC represents. Data must be converted from CC to midpoint % before being added together, because the ranges that CC's represent are not equal.

a. Sum of midpoint percent cover:

Plant	CC	Midpoint %
Typha (Cat Tail)	___	_____
Sparganium (Bur-Reed)	___	_____
Lythrum (Loosestrife)	___	_____
Phragmites australis (Giant Reed)	___	_____
Scirpus (Bulrush)	___	_____
Polygonum (Smartweed)	___	_____

Total Midpoint %: _____ (%)

CC	Percent Cover Range	Midpoint %
6	75-100	87
5	50-75	63
4	25-50	38
3	5-25	15
2	1-5	3
1	0-1	0.5

b. Metric #7 Score: _____

Comments:

Scoring criteria for Persistent Litter

Total Midpoint %	Score
≤ 27%	5
28 - 54%	3
≥ 54%	1

IBI Summary

-Tally your results from the seven metrics and add them together to arrive at a wetland vegetation IBI score and condition assessment for the site.

Metric	Score
1) Vascular Genera	_____
2) Nonvascular Taxa	_____
3) Grasslike Genera	_____
4) *Carex* Cover	_____
5) *Utricularia* Presence	_____
6) Aquatic Guild	_____
7) Persistent Litter	_____
Total:	_____

Site Score Interpretation

IBI Score	Wetland assessment
26 - 35	Excellent
16 -25	Moderate
7 - 15	Poor

Wetland Condition Assessment:_____

MN WHEP VEGETATION SURVEY METRIC SCORING SHEET

Site Name:_____ Team Name:_____ Date Sampled:_____

Additional Site Remarks

-Please provide any additional information about this site and/or the vegetation survey. Do you think the methods for evaluating the vegetation are adequate for this site? Does the condition assessment reflect your impressions of the site? Are there any potential threats to the site (e.g. new developments, stormwater inputs, roads, etc)?

Appendix B

2008 Invertebrate IBI Data Sheets

Field Data Sheet Wetland Invertebrate Sampling. Site data and site sketch.

Site Name **Town** **County**

Sample name (if coded differently from site name)

Location description: DO SKETCH OF SITE ON BACK OF PAGE, show roads, compass directions. Write out road names/#'s, directions, name of park, private owner name, whatever is necessary to tell a stranger how to get to your wetland.

Date dipnet samples were collected: **Water temperature:**

Samples collected by: Collector's name/Phone #
Team Name:

Near shore area: describe vegetation (or lack of it) where you sampled (e.g. little or no veg, choked with cattails, lots of submerged vegetation, lots of duckweed).

Slope into wetland in the water near edge: gentle or steep?

Describe bottom of wetland: (e.g. solid or very mucky?)

BOTTLETRAPS (BT). You will collect 3 pairs of BTs, 6 total traps (see protocol sheet).

1 Sample codes if different from site name:

2 Date/Time BTs were set out:

3 Number of BTs deployed:

4 BTs set out by (name, phone #)

5 Locations where BTs set out (indicate on site sketch on back)

6 Date/Time BTs were collected

7 Number of BTs collected successfully

8 Number of jars which contain the BT samples:

9 Indicate if the following were present in bottletraps:

	Tadpoles	Salamander adults	Fish
	Frog adults	Salamander larvae	Other

DIPNETTING (DN). One sample consists of **two dipnetting efforts** (see protocol sheet).

1 Sample code if different from site name:

2 Date/Time DN sample was taken:

3 Locations where the 2 DN efforts were done (indicate on site sketch on back)

4 Were 2 dipnetting efforts done? (see protocol)

5 Describe approximate water depths where you sampled:

NOTES:

INVERTEBRATE LAB DATA SHEET PAGE 1 ENTER DATA HERE FIRST

Site Name	Site Number	# of DN samples taken:			
Date analyzed	Date sampled	# of BT traps set:		# BT sample jars:	
LEECH TAXA METRIC		Put 1 where the taxon was seen in any sample			
NOTE: each row represents a **DIFFERENT taxon** or kind		DN	BT 1	BT 2	BT 3	Taxon Presence (put 1)
Glossiphonidae (describe or name the different taxa)						
Large, mottled leeches						
Macrobdella decora						
Other kinds(describe or name them)						
Record total leech taxa at far right (add the Taxon Presence column)				**Total # of Leech Taxa:**		

CORIXID PROPORTION METRIC (BOTTLETRAPS ONLY)		**Record counts of individuals here** BT 1	BT 2	BT 3	Total Count by row for all BTs
a. Corixid bugs (count juveniles and adults)					
b. Bugs that are not corixids					
c. Beetle larvae					
d. Adult beetles					
e. Record total count of bugs and beetles at far right		**Sum Total Count (add a, b, c, d):**			
f. Compute the ratio of Corixid bugs (a.) to the Total Count (e.) at far right			**Corixid Ratio (a/e):**		

INVERTEBRATE LAB DATA SHEET PAGE 2 ENTER DATA HERE FIRST

Site Name	Site Number	# of DN samples taken:			
Date analyzed	Date sampled	# of BT traps set:		# BT sample jars:	

DRAGONFLY-DAMSELFLY TAXA METRIC (Odonata Taxa)	Put 1 where the taxon was seen in any sample				
NOTE: **each row** represents a **DIFFERENT taxon** or kind	DN	BT 1	BT 2	BT 3	Taxon Presence (put 1)
Dragonflies Aeshnidae family (list different types you see)					
Dragonflies Corduliidae family					
Dragonflies Gomphidae					
Dragonflies Libellulidae family (list different types you see)					
Damselflies Lestidae					
Damselflies Coenagrionidae					
Damselflies Other					
Record total # of dragonfly and damselfly at far right (add Presence column)			**Total # of Odonata Taxa:**		

MAYFLY-CADDISFLY TAXA FOR ETSD METRIC	Put 1 where the taxon was seen in any sample				
Mayflies (describe each different type you see, or give names)	DN	BT 1	BT 2	BT 3	Taxon Presence (put 1)
Caddisflies (describe each type you see, or give names)					
Record total # of mayfly and caddisfly taxa at far right (add Presence)		**Total # of Mayfly and Caddisfly Taxa:**			

INVERTEBRATE LAB DATA SHEET PAGE 3 — ENTER DATA HERE FIRST

Site Name	Site Number	# of DN samples taken:	
Date analyzed	Date sampled	# of BT traps set:	# BT sample jars:

SNAIL TAXA METRIC		Put 1 where the taxon was seen in any sample				
NOTE: **each row** represents a **DIFFERENT taxon** or kind		DN	BT 1	BT 2	BT 3	Taxon Presence (put 1)
Planar snail	Helisoma (do you see one or two types?)					
Planar snail	Gyraulus					
Planar snail	Planorbula					
Planar snail	Promenetus					
Planar snail	Other					
Spired snail	Aplexa					
Spired snail	Acella					
Spired snail	Fossaria					
Spired snail	Lymnaea stagnalis					
Spired snail	Stagnicola elodes					
Spired snail	Stagnicola reflexa					
Spired snail	Physa					
Spired snail	Other					
Record total # of snail taxa at far right (add Presence column)				**Total # of Snail Taxa:**		

OTHER TAXA TO INCLUDE IN THE TOTAL TAXA METRIC	DN	BT 1	BT 2	BT 3	Taxon Presence (put 1)
FINGERNAIL CLAMS (used also in the ETSD metric)					
Dipterans: Chaoborus					
Dipterans: Mosquito larvae					
Dipterans: Ceratopogonidae (biting midges)					
Dipterans: Chironomidae (midges)					
Dipterans: Odontomyia					
Dipterans: Other					
Crustaceans: Amphipods					
Crustaceans: Clam shrimp					
Crustaceans: Crayfish					
Crustaceans: Fairy shrimp					
Crustaceans: Isopods (Asellus)					
Crustaceans: Other (don't count ostracods, Daphnia)					
Total up these taxa to add to total for total taxa metric. Add up Presence column.			**Total of other taxa for taxa metric:**		

Appendix C. Site Identification Form

Dakota County Wetland Health Evaluation Program

2008 Site Identification Form
please use a different form for each wetland

City: Contact:

Email: Phone:

Wetland number: Wetland name:

Please initials of city + 1, 2, 3, or 4, i.e., AV-1. #1 should be your best/reference site. Use a name that means something locally, like a street, subdivision, park, etc. Do not change numbers from one year to the next. Just add a new number for a new wetland, i.e., AV-6 without using numbers from earlier years. Do not change name from year to year.

Size of wetland: _____ acres Longitude: _____ Latitude: _____

Wetland type (3, 4, or 5): _____ Reference site: _____ yes _____ no

Monitored before: ____ no ____ yes in: ____1997 ____1998 ____1999 ____2000
____2001 ____2002 ____2003 ____2004
____2005 ____2006

Watershed size: _____ Percent impervious surface in watershed: _____

Ownership: _____: _____ private _____ public

Inlet locations: _____

Outlet locations:
_____

Is wetland included in the city's storm water management plan? _____ yes _____ no

Does the city have a wetland management plan? ? _____ yes _____ no

If yes, how is this wetland designated: _____

Wetland management goal:

Types of disturbance (current or future land use impacts):

Physical characteristics (landscape, habitat, significant features, etc.):

BMPs in place:

Concerns of note:

Please return this form, aerial map, and directions to the site by May 1 to:

Paula Liepold, Dakota County Water Resources Office
14955 Galaxie Avenue, Apple Valley, MN 55124
phone: 952-891-7117
paula.liepold@co.dakota.mn.us

Appendix D. Dakota County Wetland Sites

Invertebrate Sampling History

"na" indicates no data available

KEY:	Poor	Moderate	Excellent
Range:	6 - 14	15 - 22	23 - 30
Percent:	< 50%	50 - 76%	> 76%

Multiple Scores listed in following order:
Team Score/Cross-check Score as of 2007
QC Score is listed in bold font

Site ID	Site Name	1997	1998*	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
AV-1	Hidden Valley		19/21	10	8/8	24/14	14/16	14/12/24	16/12	22/20	26		20/24/**24**
AV-2	Kelley Property		17/19	16/16	10/8	16	16						
AV-3	Palomino		25/21	12									
AV-4	Elderberry Court		9/7	8	12	6							
AV-5	Cedar Knolls				16	16	18	12					
AV-6	Belmont Pond						18	18	14	18	12		
AV-7	Podojil							8	6				
AV-8	Chaparral Pond								12	14	18		
AV-9	Watrud Pond									26	22/14	18/16	
AV-10	Alimagnet Park											12	
AV-11	Farquar Lift Station											24	
AV-12	EVR-P12 Public Water											12	16
AV-13	EVR-P14 (Long Lake North)												22
AV-14	EVR-P43 (East Park)												12
B-0	Terrace Oaks	17/15/19	13/21/23							26			
B-1	Crystal Lake West			20/22	16/20	20/22	24/26	24/24	18/22	20/12		24	26/26/**26**
B-2	Cam Ram		17/13/17	18							16		na
B-3	Kraemer		15/13/19	14	18	24	26	22	20	18	22	18	24
B-4	Alimagnet		19/21/13	20									
B-5	Judicial Park North				16								
B-6	Alimagnet East/Dog Park				16/12		22			20		22	22
B-7	Terrace Oaks North					20							
B-8	Red Oak					26							
B-9	Crosstown West						6						
B-10	Rosemount Aerospace Pond							26	18		24		
B-11	Valley View							14	20	16	24/14		

Site ID	Site Name	1997	1998*	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
E-1	Thompson Lake Park		21/17/19										
E-2	Rahn Park		25/21										
E-3	BP- 25 Diffley Pond		15/23		16/16		14						
E-4	Town Center		21/13										
E-6	DP-13 Northwoods			18									
E-7	DP-11 Opus			28								26/26/**18**	
E-8	AP 52.1 Trapp Farm			18									
E-9	LP-5- Wilderness Run			20/22					14/16			16	
E-10	AP-3 Cedar Pond				10	6	10	12	6	8/10	12/16	12	22/22/**20**
E-11	CP-4 Lockheed				24	18/16		10					
E-12	FP 7.5 Lone Oak Drive				18/14								
E-13	FP 7.6 Lone Oak Drive					22							
E14	LP-27 Highway 3					16			18				
E-15	JP-11.2 Wescott						10						
E-16	EP - 3 Faithful Sheperd						26/14	18					
E-17	EP 3.2 Aldrin Rd							14/14/24	16				
E-18	DP 14 Moonshine Park							10					
E-19	FP-4.1									14			
E-20	Shanahan Lake									18			
E-21	FP-11.5										18		22
E-22	FP-11.6										10		18
E-23	FP-4.2										16		
E-24	JP-42											16	
E-25	FP-4.5												16
LH-1	Lilypad Knoll, Lebanon Hills				22								
F-1	Pine Knoll		11/21/17	10/10/12	14/12	14/12	10/12	20/16	18/16	20/26			12/ na
F-2	Muskrat		25/17										
F-3	Kral Pond		21/11	14	12	10	6	12	10	10	12	10/10	8
F-4	Lake Julia		15	16	10	8	10	14	18	10	10	8	10
F-5	Pilot Knob			20	20/26	16	12						na
H-1	Louis Lane			10/10	6/16	8							
H-2	Bullfrog Pond			14	10								
H-3	Stonegate Untreated					8	14						
H-4	Stonegate Treated					12	12	10	20	14	18	16	20
H-5	Lower Vets						18/18						

Site ID	Site Name	1997	1998*	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
H-6	Lake Rebecca							20/16	20/20	14/8	18/26	12/14/14	16/26/14
H-30	Sand Coulee								14	10	14	16	14
H-56	180th Street Marsh									14	20	6	22
T-1	Lake Byllesby				10	16							
T-2	Northfield				18								
IGH-1	KP-9		23/27/23	16/16/26		18/14	24/18						
IGH-2	CP-13			16									
IGH-3	BP-21		23/17	18									
IGH-4	EP-18		23/15	20									
IGH-5	CP-6		19/19										
IGH-6	MP-67				10								
IGH-7	LP-2				18								
IGH-8	HP-1				12								
IGH-9	QP-1				22	18							
IGH-10	NP-15					26	20						
IGH-11	NP-12					20							
IGH-12	NP-13						12						
IGH-13	NP-10						12						
IGH-14	DC 2 or Ordway							12					
L-1	Ritter Farm Park		19/23/29	20/20/22									
L-2	Orchard		19/23										
L-3	Raven Lake		19/13	20	14	18	14/16						
L-4	Water Treatment Wetland Bank		11/23	14	12	10	16	26	22	24			14
L-5	Country View Marsh			14	10	6							
L-6	Kingsley Lake				20	18/26							
L-7	DNR 387						16	24/12	18/18	20/22	20/16	22/12	22/16/20
L-8	DNR 393						12	24	24	22	24	26	20
L-9	NC 54							22	10	22	14	8	12
MH-1	Valley Park		29/27/23	12									
MH-2	Copperfield/Friendly Hills		21/21	12/14	16/22		26/20	30/20	20/18	24/22	26/14	24/26	22/18/18
MH-3	Visitation		19/23	24									
MH-4	Industrial Park		27/19	16	18	18							
MH-5	Pagel Pond				12	22							
MH-6	City Hall				10	14							
MH-7	Copperfield II					22/24/22							
MH-9	Hagstrom-King						22	24	18				
MH-10	Wentworth Park										18		

Site ID	Site Name	1997	1998*	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
MH-11	Lockwood Pond									18			
MH-12	MH City Hall Pond											14	
MH-13	MH Par 3												12
R-1	Kelly Marsh - Derryglen Ct in 2004		15/21						20/14	24/24		24/16/**20**	22/24/**20**
R-2	White Lake		15/17								22		
R-3	O'Leary					16	10				6		
R-4	Schwartz Pond		21/13/25	18	14								16
R-5	Wilde Lake					24/28	18						
R-6	Keegan					16	10/18				22/24		
R-7	Marcotte Pond					12					26		
R-8	Wachter Lake						6						
R-10	Deepwoods Court							20	16			16	
R-11	Bicardi Avenue							12	16				
R-12	Avalon							22/16	12	12			
R-13	130th Way							20					
R-14	WMP #379									20			22
R-15	Birger Pond									20		20	
R-17	Unnamed											18	
R-18	WMP #279												26
SSP-1	Anderson Pond					6							
SSP-2	Seidl's Lake						10/10	10					
WSP-1	Mud Lake			12/10/20	10/10								
WSP-2	Thompson Lake 48W			12	20					14	12	18	18
WSP-3	Duck Pond			18	12								
WSP-4	Weshke Pond				12	20							
WSP-5	Lilly Lake					16	24						
WSP-6	Marthaler Park					26	24	20					
WSP-7	Vivian Pond					24/24							
WSP-8	DNC Prairie Pond							24					

Appendix E. Dakota County Wetland Sites

Vegetation Sampling History

"na" indicates no data available

KEY:	Poor	Moderate	Excellent
Range:	7 - 15	16 - 25	26 - 35
Percent:	< 46%	46- 71%	> 71%

Multiple Scores listed in following order:

Team Score/Cross-check Score as of 2007

QC Score is listed in bold font

Site ID	Site Name	1997	1998*	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
AV-1	Hidden Valley		21/23	15	23/23	21/25	19/17	23/25/21	25/21	27/19	21		19/21/**21**
AV-2	Kelley Property		17/27	23/27	23/17	25	23						
AV-3	Palomino		29/25	na									
AV-4	Elderberry Court		17/17	13	17	15							
AV-5	Cedar Knolls				17	19	15	21					
AV-6	Belmont Pond						21	17	25	23	15		
AV-7	Podojil							13	13				
AV-8	Chaparral Pond								19	21	19		
AV-9	Watrud Pond									25	19/21	17/15	
AV-10	Alimagnet											11	
AV-11	Farquar Lift Station											9	
AV-12	EVR-P12 Public Water											21	11
AV-13	EVR-P14 Long Lake North												13
AV-14	EVR-P43 East Park												9
B-0	Terrace Oaks												
B-1	Crystal Lake West			29/25	33/25	29/29	31/33	29/33	29/23	27/21		23	25/19/**23**
B-2	Cam Ram	na	21/13	21							17		11
B-3	Kraemer		23/21	23	21	21	23	25	25	13	17	17	17
B-4	Alimagnet												
B-5	Judicial Park North				23								
B-6	Alimagnet East/Dog Park				21/21		13			13		21	17
B-7	Terrace Oaks North					17							
B-8	Red Oak					17							
B-9	Crosstown West						13						
B-10	Rosemount Aerospace Pond							15	13		13		
B-11	Valley View							27	25	21	17/19		

Site ID	Site Name	1997	1998*	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
E-1	Thompson Lake Park	na	17/21/23										
E-2	Rahn Park		17/15/15										
E-3	BP- 25 Diffley Pond		15/25/23		17/25		13						
E-4	Town Center		21/15										
E-6	DP-13 Northwoods			15									
E-7	DP-11 Opus			19								19/11/**17**	
E-8	AP 52.1 Trapp Farm			21									
E-9	LP-5- Wilderness Run			29/27					27/19			17	
E-10	AP-3 Cedar Pond				11		21	23	17	23/15	13	13	19/17
E-11	CP-4 Lockheed				19	21/15		15					
E-12	FP 7.5 Lone Oak Drive				21/19								
E-13	FP 7.6 Lone Oak Drive					21							
E14	LP-27 Highway 3					23			23				
E-15	JP-11.2 Wescott						23						
E-16	EP - 3 Faithful Sheperd						17/15	21					
E-17	EP 3.2 Aldrin Rd							21/21/17	19				
E-18	DP 14 Moonshine Park							23					
E-19	FP-4.1									21			
E-20	Shanahan Lake									25			
E-21	FP-11.5										15		17
E-22	FP-11.6										15		15
E-23	FP-4.2										11		
E-24	JP-42											21	
E-25	FP-4.5												19
LH-1	Lilypad Knoll, Lebanon Hills				31		31						
F-1	Pine Knoll		21/21	23/29	17/15	11/23	17/31	17/15	17/21	13/15	13/21	13	13/17
F-2	Muskrat		15/15										
F-3	Kral Pond	na	25/29	21	19	13	13	19	13	13	15	9/15	7
F-4	Lake Julia		19/15	21	17	15	17	17	19	15	15	11	11
F-5	Pilot Knob			21	19/21	13	17	15	19	15	15	13	na
H-1	Louis Lane			15/15	11/11	11							
H-2	Bullfrog Pond			17	9								
H-3	Stonegate Untreated					9	15						
H-4	Stonegate Treated					11	13	17	17	17	21	19	21
H-5	Lower Vets						11/23						

Site ID	Site Name	1997	1998*	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
H-6	Lake Rebecca							19/17	15/17	21/23	23/21	21/13/**21**	21/21
H-30	Sand Coulee								15	17	15	11	13
H-56	180th Street Marsh									11	17	11	15
T-1	Lake Byllesby				13	13							
T-2	Northfield				15								
IGH-1	KP-9		25/29/27	29/23/23		23/33	15/19						
IGH-2	CP-13			23									
IGH-3	BP-21		17/15	19									
IGH-4	EP-18		15/19	21									
IGH-5	CP-6		13/11										
IGH-6	MP-67				25								
IGH-7	LP-2				15								
IGH-8	HP-1				15/15								
IGH-9	QP-1				29	25							
IGH-10	NP-15					15	15						
IGH-11	NP-12					13							
IGH-12	NP-13						15						
IGH-13	NP-10						23/25						
IGH-14	DC 2 or Ordway							23					
L-1	Ritter Farm Park		23/21/17	23/23/21									
L-2	Orchard		29/21										
L-3	Raven Lake		23/21	29	17	25	27/15						
L-4	Water Treatment Wetland Bank		23/25	29	23	21	21	17	19	21	17	17	13
L-5	Country View Marsh			17	15	23							
L-6	Kingsley Lake				27	31							
L-7	DNR 387						19/21	27/21	25/29	29/25	27/19	25/23	25/27
L-8	DNR 393						17	17	19	17	21	17	23
L-9	NC 54							19	15	19	17	17	19
MH-1	Valley Park		19/17/23										
MH-2	Copperfield/Friendly Hills		21/21	21/21	21/25		27/25	27/23	23/19	27/23	23/25	21/17	23/17/19
MH-3	Visitation		15/17	13									
MH-4	Industrial Park		17/15	17	17	17							
MH-5	Pagel Pond			15	17	15							
MH-6	City Hall				11	15							
MH-7	Copperfield II					23/25/25							
MH-9	Hagstrom-King						23	21	25				

Site ID	Site Name	1997	1998*	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
MH-10	Wentworth Park										17		
MH-11	Lockwood Pond									19			
MH-12	MH City Hall Pond											19	
MH-13	MH Par 3												21
R-1	Kelly Marsh-Derryglen Ct in 2004		17/19/17						21/21	15/15		17/13/19	19/17
R-2	White Lake		13/23								15		
R-3	O'Leary		17/11			19	15				11		
R-4	Schwartz Pond			13	11								15
R-5	Wilde Lake					15/15	19						
R-6	Keegan						15/7				17/19		
R-7	Marcotte Pond					19					17		
R-8	Wachter Lake						11						
R-10	Deepwoods Court							17	19			19	
R-11	Bicardi Avenue							27	15				
R-12	Avalon							15/11	17	11			
R-13	130th Way							15					
R-14	WMP #379									23			25
R-15	Birger Pond									17		13	
R-16	Unnamed											13	
R-17	Unnamed											17	
R-18	WMP #279												19
SSP-1	Anderson Pond					11							
SSP-2	Seidl's Lake						13/13	11					
WSP-1	Mud Lake			15/13/13	17/13								
WSP-2	Thompson Lake 48W			15	13					17	11	17	17
WSP-3	Duck Pond			17	21								
WSP-4	Weshke Pond (aka Pond 1)				21	23							
WSP-5	Lilly Lake					17	17						
WSP-6	Marthaler Park					21	21	23					
WSP-7	Vivian Pond					19/19							
WSP-8	DNC Prairie Pond							15					

* Note 1998 spot checks conducted by URS, some with more than one sample

*1998 totals include amphibian metric