

# Wetland Inventory in the Vermillion and North Cannon River Watersheds

**FINAL REPORT**  
December 2007



Metropolitan Environmental Partnership Grant  
(SG2004-122)

## **Project Summary:**

The Wetland Inventory Project for the Vermillion and North Cannon River Watershed began in 2005 through a MEP grant from the Met Council and in conjunction with a Wetland and Watercourse Inventory and Assessment Project in the Vermillion River Watershed.

The original goals of this project included inventorying existing and historical wetlands, convening a task force to develop watershed-based wetland assessment methods, assessing existing wetlands for functions and values, and drafting model ordinances for cities and townships.

## **Objectives and Results:**

### **1. Inventory wetland basins using the Minnesota Land Cover Classification System (MLCCS)**

Before beginning this task, the methods for inventory and assessment were developed. The Technical Advisory Group (TAG) for the Vermillion River Watershed Joint Powers Organization (VRWJPO) served as the technical steering committee for development of these methods. The TAG consists of a long list of technical staff including representatives from the following organizations:

Dakota County Soil and Water Conservation District (DSWCD)  
Scott County Soil and Water Conservation District (SSWCD)  
Vermillion River Watershed Joint Powers Organization  
Dakota County  
Scott County  
Local Units of Government – city staff and township officials  
Minnesota Board of Water and Soil Resources  
Minnesota Department of Natural Resources  
Minnesota Pollution Control Agency  
Metropolitan Council  
Friends of the Mississippi River  
Various Consultants

The TAG provided input to the smaller project technical steering committee consisting of staff from Dakota and Scott County SWCDs. Inventory and assessment methods were discussed with local units of government to determine and outline comparisons and differences with existing Local Wetland Management Plans (Attachment A). A project fact sheet (Attachment B) was also disseminated and available on the DSWCD website.

The Minnesota Land Cover Classification System (MLCCS) was incorporated into the data collection sheet to understand the quality of the vegetative communities present within each basin. During past efforts, the SWCD developed a countywide MLCCS GIS data layer to inventory land cover with a minimum mapping unit of 1 acre. This data layer was adapted and formed the basis of the GIS data layer for the wetland basin inventory and assessment. The MLCCS based wetland community types were dissolved to the outer boundaries of each basin and wetland edges were updated where needed. The dominant MLCCS community type in each basin was then recorded in the *Watershed Characteristics* category of the database (Figure 1). Any wetland basins not already included in the MLCCS base data layer that were between ¼ acre in size and 1 acre in size were digitized into the basin GIS data layer and a dominant MLCCS community type was recorded in the database.

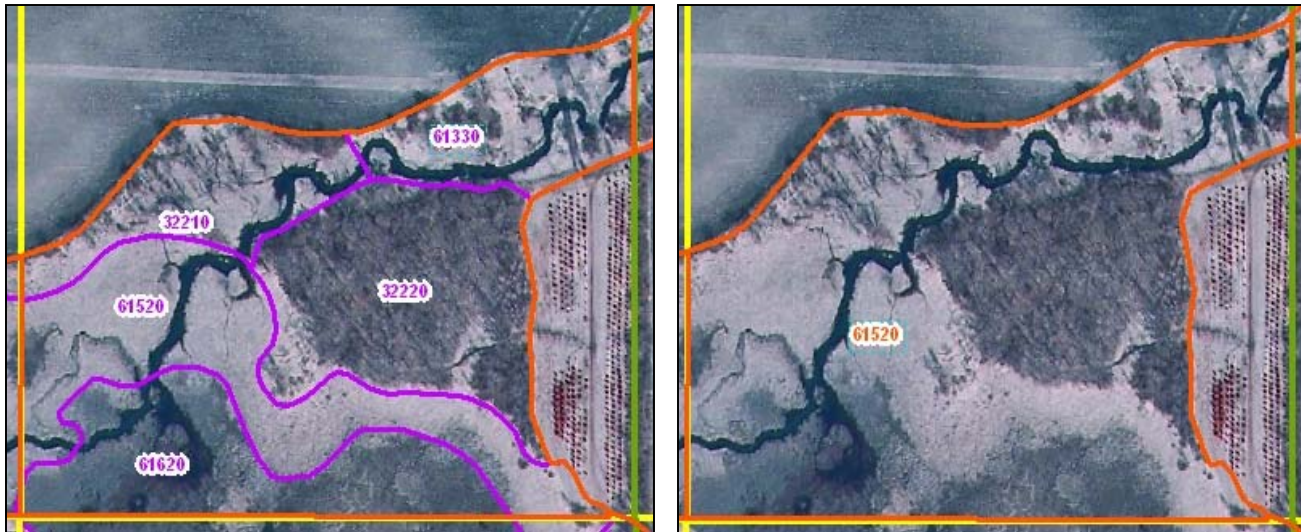


Figure 1. MLCCS data layer (left) forms basis of basin data layer (right) using the dominant cover type.

## 2. Classify vegetative and topographic characteristics of each wetland

Topographic characteristics of each basin were collected under the *General Information* category of the database and were categorized as follows:

- ❑ **Isolated Wetland:** Wetland without well-defined inlets or outlets, including tile systems, ditches, or natural watercourses.
- ❑ **Riverine Wetland:** Wetland contained within the banks of a channel that may contain moving water or that forms a connecting link between two bodies of standing water (lakes).
- ❑ **Floodplain Wetland:** Wetland located in the floodplain of a watercourse, with no defined inlets or outlets, including tile systems, ditches, or natural watercourses. This may include the floodplain itself when it exhibits wetland characteristics.
- ❑ **Flow-Through Wetland:** Wetland with both a well-defined outlet and one or more well-defined inlets, including tile systems, ditches or natural watercourses.
- ❑ **Tributary Wetland:** Wetland with a well-defined outlet, including tile systems, ditches, or natural watercourses, but without a well-defined inlet.

## 3. Provide baseline wetland function and value data and technical information on a sub-watershed basis

Function and value data was captured in the *Watershed Characteristics* category of the database. The following wetland functions were adapted from the MN Routine Assessment Method: existing and potential connectivity to upland buffer vegetation, flood or storm-water storage, groundwater interaction, recreation and education opportunity, shoreline protection, water quality protection, and wildlife habitat. Functions and values were evaluated as follows:

**Shoreline Protection:**

- ❑ High Quality – *Located adjacent to a lake, rivers, perennial streams or open water basins and absorbs erosive energy.*
- ❑ *Medium Quality* – Adjacent to water body but not continual or strategically positioned to effectively absorb erosive energy
- ❑ *Low Quality* – Provide no obvious benefits to an open water area

**Flood Storm Water Storage:**

- ❑ High Quality – *No outlet or outlet above the temporary wetland zone, watershed conditions highly modified by impervious surfaces, no channel present and receives directed storm water and water level managed to maximize flood/storm water retention*
- ❑ *Medium Quality* – Natural outlet at or below the temporary wetland zone, watershed conditions moderated by development, channels present but not connected, receives directed storm water and water level unmanaged for flood/storm water retention.
- ❑ *Low Quality* – Excavated or enlarged outlet, watershed conditions generally unaltered, channels connecting inlet and outlet, receives no directed storm water and water level unmanaged for flood/storm water retention.

**Groundwater Interaction:**

- ❑ High Quality – *Topographic depression or sloped wetland intercepts regional water table, rapid water declines after rainfall events, underlying soils gravel, coarse sand, or sand.*
- ❑ *Medium Quality* – Perched or sloped wetland that has unknown regional water table, gradual water decline after rainfall events, underlying soils are silty sand or silts fibric peats.
- ❑ *Low Quality* – Ground water table at same level as wetland, infrequent or small fluctuations to water level, underlying soil silty clays, clays, or sapric peats.

**Wildlife Habitat:**

- ❑ High Quality – *Relatively native and undisturbed, connection to other habitat areas, diverse vegetation layers or stratum.*
- ❑ *Medium Quality* – Some evidence of disturbance or degradation such as invasive or monocultures, limited connection to other habitat areas, moderately diverse vegetation layers or stratum.
- ❑ *Low Quality* – Degraded or altered wetland, no connection to other habitat areas, no diversity among vegetation layers or stratum.

### **Water Quality Protection:**

- ❑ High Quality – *Dense vegetation, directly contributes to a recreational water body or watercourse, landscape position holds runoff and filters water before entering downstream surface water.*
- ❑ *Medium Quality* – Moderate vegetation density, indirectly contributes to a recreational water body or watercourse, landscape position provides minimal runoff storage and water filtering before entering downstream surface water.
- ❑ *Low Quality* – Slight or no vegetation density, does not contribute to a recreational water body, landscape position provides undetectable runoff storage and water filtering before entering downstream surface water.

### **Greenway Connectivity (Existing):**

- ❑ High Quality – *Part of a corridor of land connecting to other natural, cultural and recreational resources*
- ❑ *Medium Quality* – Within 500 feet of land that connects to other natural, cultural or recreational resources
- ❑ *Low Quality* – Not part of an existing linear connection or in proximity of any natural, cultural and recreational resources

### **Greenway Connectivity (Potential):**

- ❑ High Quality – *Part of an historic corridor of land connecting to other natural, cultural and recreational resources that would involve minimal changes to surrounding landscape to restore connection.*
- ❑ *Medium Quality* – Part of an historic corridor of land connecting to other natural, cultural and recreational resources but requires more significant modifications to surrounding landscape to restore connection.
- ❑ *Low Quality* – Not part of a corridor that connects to other natural, cultural and recreational resources, or that would require significant modifications to surrounding landscape to restore connection.

### **Recreation/Education:**

- ❑ High Quality – *Accessible by the public or used for recreation or educational activities.*
- ❑ *Medium Quality* – Visible from roads, waterways, trails, or public land and has limited recreation and education activities.
- ❑ *Low Quality* - Private ownership with no known education or educational activities.

Technical information was recorded in the Watershed Characteristics category of the database and included: conservation practices present and types if applicable, an open comment box, and identified basins that were created or restored.

#### **4. Obtain community and agency input regarding watershed based wetland management**

As described in the first objective above, communities and agencies were consulted and included on the development of this inventory throughout the process. The entities were then presented with the results from the Vermillion River Watershed portion of the project. Input regarding wetland management in Vermillion River watershed was garnered through the Watershed Standards development process for the VRWJPO. The Standards were developed through input and discussion within and among the Technical Advisory Committee, the Watershed Planning Commission, and the Joint Powers Board. The VRWJPO Standards include required buffers, replacement and mitigation location regulations, limited use for stormwater treatment, and other provisions. (Attachment C).

Wetland management provisions in the North Cannon River Watershed will be discussed and developed with the North Cannon River Watershed Management Organization once the wetland inventory is complete in early 2008.

#### **5. Create a database for wetlands that can be used by County staff, communities, agencies, residents, and watersheds**

An important function of the project was to create a new GIS database that can be continuously updated over time to track future fieldwork and watershed projects. The databases primary functions were to both collect information concerning the wetland basins inventoried, and yield an assessment rating for each basin. The database was designed to collect three categories of information concerning wetland basins: *General Information* such as location, topographic setting, sub-watershed, National Wetland Inventory type, and a unique identification number; *Individual Characteristics* such as current Cowardin and Circular 39 community types, extent of open water, alteration and drainage impacts; and *Watershed Characteristics* such as contributing water sources, adjacent land use practices, buffer vegetation, greenway corridor quality, and wetland functions (Figure 2).

Finally, an assessment tool was built into the database to rank important factors relating to each basin's functions and values and other key elements. The following factors contributed to each basins assessment rating: identification as a DNR Public Water, a topographic setting of floodplain or riverine, an unaltered hydrologic regime, quality of vegetative communities present. Additionally, wetland functions as adapted from the MN Routine Assessment Method were added to the database including: existing and potential connectivity to upland buffer vegetation, flood or storm-water storage, groundwater interaction, recreation and education opportunity, shoreline protection, water quality protection, and wildlife habitat (Figure 3).

The database was developed in Microsoft Access version 2000 due to its stability, performance, ability to set data relationships, and robust design capabilities. Related tables were used to store various elements of the information collected to allow originally collected data to exist along with continuously updated data. This feature of the database was achieved by separating the information collected in the category, *General Information*, from the *Individual Characteristics*, and *Watershed Characteristics* data allowing it to be stored in a separate but related table within the database. The effect is that a basin's general information such as its unique identification number and location will remain static but factors relating to its individual and watershed characteristics can be updated if they change over time. In this way, SWCD and County staff can update a basin's record with new information when needed but also track what changes in the basins over time (Figure 4).

The final element of the database is its inclusion in a Geographic Information System (GIS). At the same time each basin's information is collected in the database, a polygon shape representing the extent of the basin is digitized within a GIS data layer of wetland basins. All basins at least ¼ acre in size were digitized and included within both the Access database and GIS data layer. A quarter-quarter section was

adopted as the work unit for conducting the inventory to create a manageable area for digitizing work and formed the basis for the unique identification process for individual basins. To maintain database integrity, each individual basin needed its own unique identification code. This was accomplished by describing a basins location within the PLS Township and Range system as follows: Township-Range-Section-Quarter Section-Quarter Quarter Section-Record. An example would be basin 114-19-15-1-4-01 where it is the first basin located in Township 114, range 19, section 15 and is in the fourth quarter-quarter of the first quarter (Figure 5). For isolated basins larger than a quarter-quarter in area, the identifier was chosen based on which one contained most of the basin's area. All riparian basins and basins with waterways present were split on quarter-quarter section boundaries.

Once all basins were recorded in the database and digitized in the data layer, the information from the database was imported into the data layer. The end result is a comprehensive GIS data layer containing all the information collected in the database for each wetland basin that can be easily overlaid and compared with other information in a GIS by SWCD and County staff or disseminated to other agencies, and local communities and residents within the watersheds (Figure 6).

**WETLAND INVENTORY AND ASSESSMENT**

**GENERAL INFORMATION:**

Inventory ID# [114-19-15-3-1-01] LGU [EMPIRE TWP] Source Collected [DAVID HOLMEN] Date Collected [2/22/2007]

DNR Minor Watershed [38027] DNR Protected  DNR # [ ] Topographic Setting [Tributary]

Original Wetland Size [ ] Acres NWI Mapping [PEMAAd, PEMCd, PFO/SS1Cd, PFO1Cd]

WetAutoNo [1457]

**WETLAND CHARACTERISTICS:**

Existing Wetland Size [ ] Acres Open Water [0] %

Part of a Larger Complex (ID#s) [Y]

Cowardin (Current) [PEMAAd, PEMCd, PFO/SS1Cd] Circular 39 [Type 1/3/6/7]

Veg Altered  If Yes: Type of Alteration [CULTIVATION] % Impacted [0-25%] Restoration Potential [HIGH]

Artificial Drainage  If Yes: Type of Artificial Drainage [DITCH]

WetAutoNo2 [1457]

Source Updated [ ] Date Updated [ ] Site Field Checked

**WATERSHED CHARACTERISTICS: (Within 500 FT)**

**Water Sources (Check all that apply):** Vegetation in Basin [32420] MLCCS

Ground Water  Created Wetland

Surface Water  Restored Wetland

Flood Water  Mapped Hydric Soil

Storm Water  Soil Type [255, 318] Dakota

Other Water  Soil Symbol [ ] Scott

Adjacent Impervious Surface [0-25%]

**Adjacent Land Use:** Upland Buffer  If Yes: Protected

% Residential [ ] % Agriculture [ ] Buffer Width (Feet) [ ] Feet

% Wooded [ ] % Grassland [ ] Type [ ]

% Industry [ ] % Other [100] Upland Buffer % Cover [ ]

Greenway Corridor  If Yes: Quality [ ]

**Wetland Functions:**

Connectivity (Existing) [Low] Recreation/Education [Low]

Connectivity (Potential) [Low] Shoreline Protection [Medium]

Flood/Strmwat Storage [Low] Water Quality Protection [High]

Groundwat Interaction [Low] Wildlife Habitat [High]

Conservation Practice (s)  If Yes: Type (s) [ ]

Comments [ ]

Record: 1 of 1

Record: 71 of 274

Figure 2. Microsoft Access Database Form used for recording basin information in the database.

Microsoft Access - [f\_VR\_Wet\_Gen]

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### WETLAND INVENTORY AND ASSESSMENT

WetAutoNo 1457

**GENERAL INFORMATION:**

Inventory ID# 114-19-15-3-1-01 LGU EMPIRE TWP Source Collected DAVID HOLMEN Date Collected 2/22/2007

DNR Minor Watershed 38027 DNR Protected  DNR # Topographic Setting Tributary

Original Wetland Size Acres NWI Mapping PEMAd, PEMCd, PFO/SS1Cd, PFO1Cd

Data Rating

**ASSESSMENT RATING:**

These fields are automatically populated - Do Not Click:

1 DNR Water = 1 Point

2 MLCCS = 3 Points for High Quality, 2 Points for Medium Quality, 1 Point for Low Quality

0 Topographic Setting = 1 Point for Floodplain or Riverine Wetland

1 Unaltered Hydrologic Regime = 1 Point

Functions and Values: 1 Point for Each High Quality Rating (Max of 3 Points)

<input type="checkbox"/> 0 Rate_ConnEx	<input type="checkbox"/> 0 Rate_RecEd	
<input type="checkbox"/> 0 Rate_ConnP	<input type="checkbox"/> 0 Rate_ShP	
<input type="checkbox"/> 0 Rate_FS	<input type="checkbox"/> 1 Rate_WQP	Total:
<input type="checkbox"/> 0 Rate_GW	<input type="checkbox"/> 1 Rate_WH	<input type="text" value="2"/> Rate_Func_Tot2

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You must click inside all yellow fields to calculate final totals:

Rate Function Total

Rate Function Value

TotalAssessment Rating

**Rating Guid**

High Quality = 7-9 Points

Medium Quality = 4-6 Points

Low Quality = 1-3 Points

Record: 1 of 1

Record: 71 of 274

Figure 3. Microsoft Access Database assessment tool used for ranking basin information in the database.

Microsoft Access - [f\_VR\_Wet\_Gen]

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### WETLAND INVENTORY AND ASSESSMENT

WetAutoNo 14

**GENERAL INFORMATION:**

Inventory ID# 114-19-15-3-1-01 LGU EMPIRE TWP Source Collected DAVID HOLMEN Date Collected 2/22/20

DNR Minor Watershed 38027 DNR Protected  DNR # Topographic Setting Tributary

Original Wetland Size Acres NWI Mapping PEMAd, PEMCd, PFD/SS1Cd, PFD1Cd

← Static Data

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Data Rating

**WETLAND CHARACTERISTICS:**

Existing Wetland Size Acres Open Water 0 %

Part of a Larger Complex (ID#s)

Cowardin (Current) PEMAd, PEMCd, PFD/SS1Cd Circular 39 Type 1/3/6/7

Veg Altered  If Yes: Type of Alteration CULTIVATION % Impacted 0-25% Restoration Potential HIGH

Artificial Drainage  If Yes: Type of Artificial Drainage DITCH

WetAutoNo2 1457

Source Updated Date Updated Site Field Checked

**WATERSHED CHARACTERISTICS: (Within 500 FT)**

**Water Sources (Check all that apply):**

Ground Water  Surface Water  Flood Water  Storm Water  Other Water

Vegetation in Basin 32420 MLCCS

Created Wetland  Restored Wetland  Mapped Hydric Soil

Soil Type 255, 318 Dakota Soil Symbol Scott

**Adjacent Land Use:**

% Residential % Agriculture Upland Buffer  If Yes: Protected

% Wooded % Grassland Buffer Width (Feet) Feet

% Industry % Other 100 Upland Buffer % Cover

Adjacent Impervious Surface 0-25% Greenway Corridor  If Yes: Quality

**Wetland Functions:**

Connectivity (Existing) Low Recreation/Education Low

Connectivity (Potential) Low Shoreline Protection Medium

Flood/Strmwat Storage Low Water Quality Protection High

Groundwat Interaction Low Wildlife Habitat High

Conservation Practice (s)  If Yes: Type (s)

Comments

← Changing Data

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Record: 1 of 1

Record: 71 of 274

← Sub-records for updated characteristics remain separate from original information collected

Figure 4. Tracking change by maintaining updated records over time in the database.

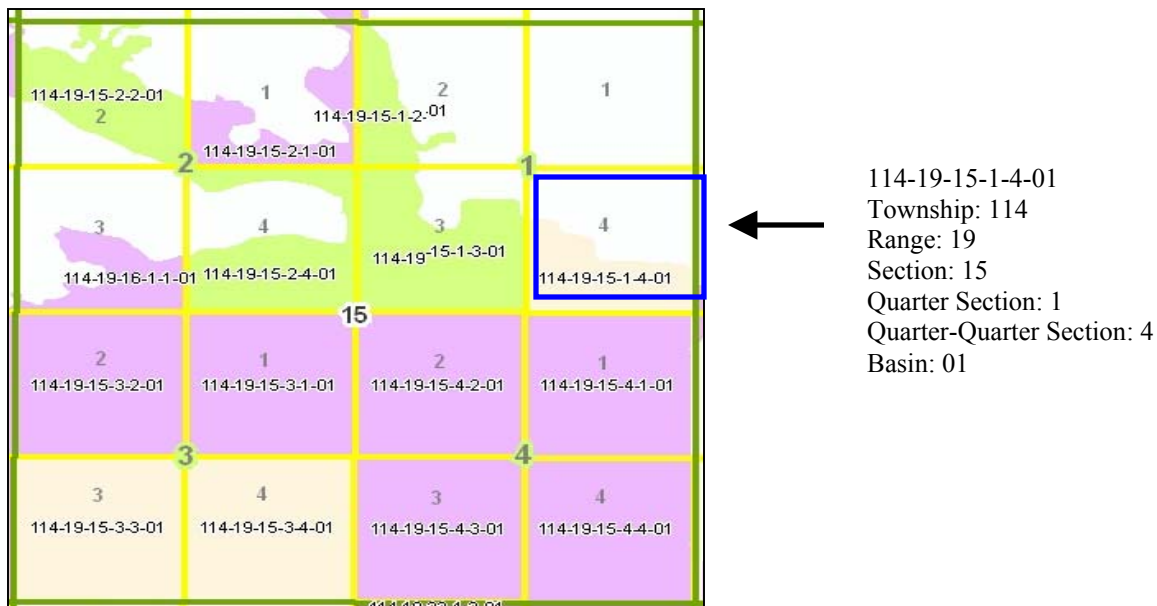


Figure 5. Location based classification of a basins unique identifier.

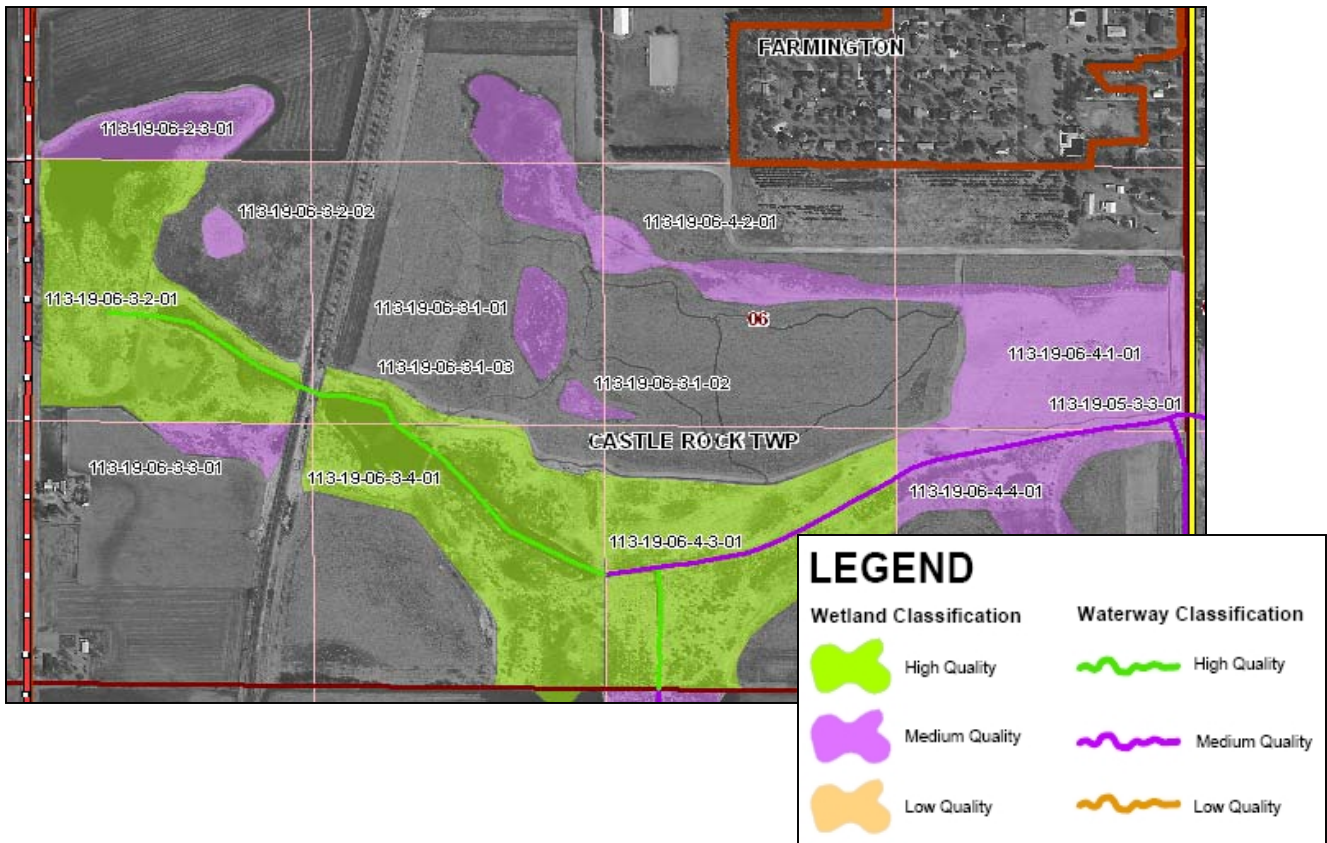


Figure 6. Final GIS Database.

## 6. Identify hydric soil units and inventory drained wetlands for evaluating restoration opportunities

Hydric soil units were identified using the NRCS SURGO Soil Data layer in GIS and recorded in the *Watershed Characteristics* category of the database. The “hydric soils” box was checked if present and individual Soil Types were listed (Figure 7).

Drained basins were identified primarily by using the drained modifier indicator within the National Wetland Inventory or visual confirmation from aerial photography and recorded in the *Individual Characteristics* category of the database. The “artificial drainage” box was checked if present along with the categorized types: culvert, ditch, sewer, or tile (Figure 8).

Restoration opportunities were evaluated both in terms of drainage alteration and vegetative alteration. In the *Individual Characteristics* category of the database, the “altered vegetation” box was checked if present along with categorized types: mowing, grazing, haying, or cultivation, the percent of the basin impacted: 0-25, 26-50, 51-75, or 76-100, and the restoration potential: high, medium, or low (Figure 8).

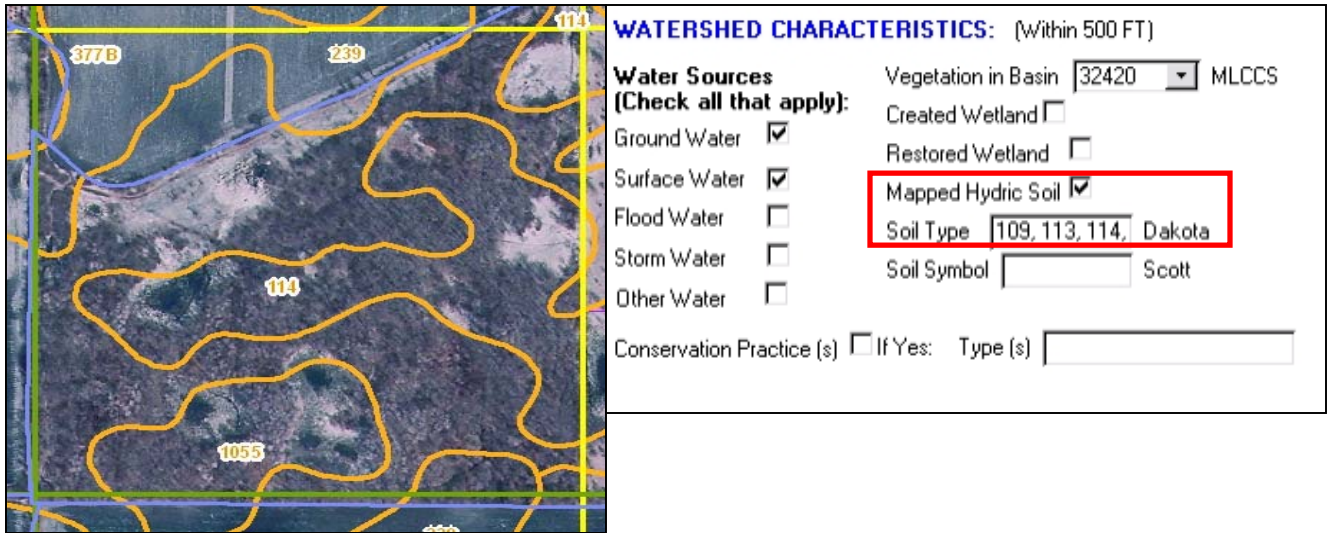


Figure 7. Identification of hydric soil units

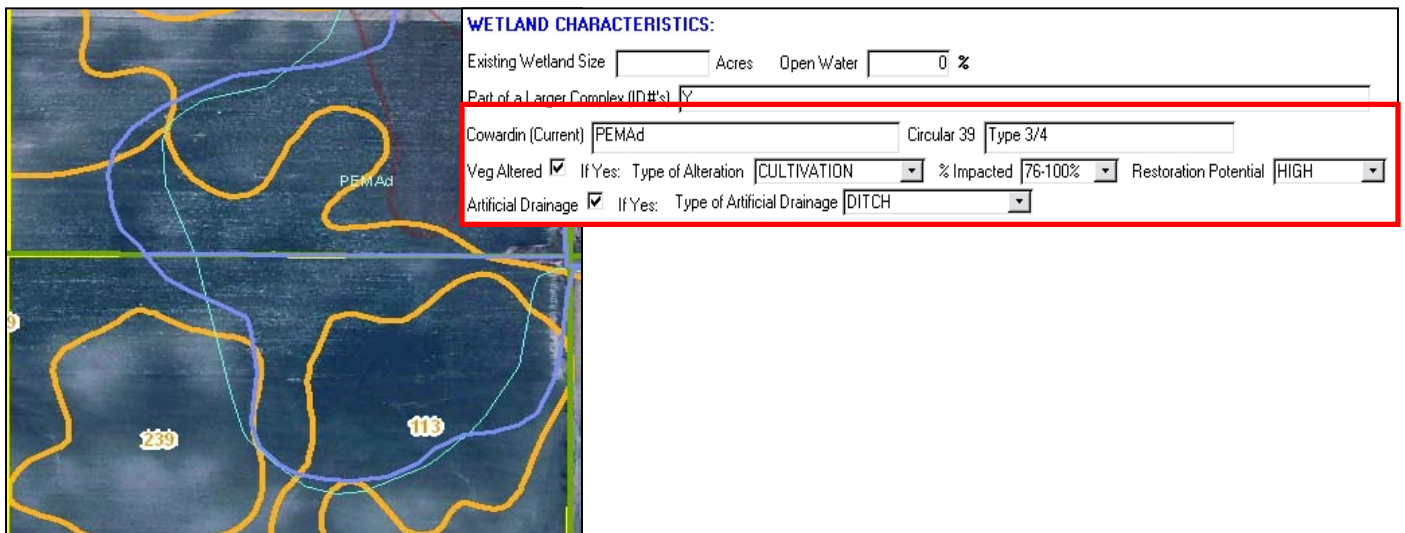


Figure 8. Identification of drained wetland basins using NWI “d” modifier and restoration potential.

## 7. Prioritize wetland protection efforts

In the Vermillion River Watershed, this was accomplished through the process of refining the Watershed Standards through discussions with the Watershed Planning Commission, the Technical Advisory Group, and the Joint Powers Board.

## 8. Develop a wetland management strategy

See Objective 4 above.

## 9. Draft model wetland protection and management ordinance

See Objective 4 above.

## 10. Assist communities with incorporating and adopting appropriate ordinances

Wetland management standards in the Vermillion River Watershed were developed through the Watershed Standards (Attachment C). The North Cannon River Watershed Management Plan requires that member communities adopt a wetland management and protection ordinance. The Dakota County SWCD is committed to assisting the NCRWMO with drafting and disseminating a model ordinance in early 2008.

## Project Press and Exposure:

This project was described in various newsletter articles and presentations. Introductory and progress articles were included in the Dakota County SWCD Newsletter, "News & Notes" in 2006 and 2007. An introductory article was also written for the Dakota County Physical Development Division Newsletter in 2006. The project was highlighted on the Dakota County SWCD website under new and upcoming GIS projects. Finally, the project was presented at the annual statewide Minnesota GIS/LIS Conference for GIS professionals in Rochester, MN on October 11, 2007. The presentation consisted of a 30-minute talk attended by approximately 80 conference attendees and a 48-inch poster display showcasing the project goals, components, and results.

## Final Project Budget:

<b>Program Element</b>	<b>VRWJPO Match Pledged</b>	<b>MEP Grant Pledged</b>	<b>VRWJPO Match Spent</b>	<b>MEP Grant Spent</b>
Inventory and Assessment	\$34,000	\$30,000	\$62,307	\$30,000
Ordinance Incorporation	\$10,000	\$0	\$10,000	\$0
Total Budget	\$44,000	\$30,000		
Total Spent	\$72,307	\$30,000		
Funds Remaining	-\$28,307	\$0		

Total Project Costs: \$102,307; Total Grant Expenses: \$30,000; Total Match Expenses: \$72,307