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Dean Schultes  Latimer Lake Association
Lynn Ersland  Big Birch Lake Association
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Mark Buntjer  Dairy Ridge Manager
Ron Rickbeil  Farmer & Irrigator
Mike Sunder  American Foods Group Manager
Karen Nauber  Chamber of Commerce
Pete Klick  Maple Lake Association
Gary Barber  Osakis Lake Association
Executive Summary

Introduction
Todd County is a large rural county covering almost 1,000 square miles, located in the geographical center of Minnesota. It is part of the transitional area where the eastern forest meets the western prairie. It is located in between the regional centers of Alexandria, Brainerd and St. Cloud. Although the County is somewhat removed from the more urbanized areas in the state, its water resources connect it to the larger communities in a critical way.

The landscape is dominated by glacial debris in the form of drumlin hills, level outwash sands, peat swamps and steep terminal moraines where glaciers stopped and began to recede.

Climate throughout the area consists of short and fairly warm summers and winters are very cold. The short frost-free period limits cropping to mainly forage, small grain and adapted vegetables. Soil usually freezes from a few inches up to a foot, however it may freeze to a depth of several feet when cold weather occurs before snow cover.

Six watersheds flow through Todd County, so what occurs in these watersheds not only affects the water resources used by the citizens of the County, but other Minnesotans living along the Mississippi River corridor, including the Twin Cities.

Precipitation is the source of almost all water inputs into a watershed and is monitored all twelve months through SWCD stations and volunteers. Rainfall in the Central region shows no significant trend over the last 20 years but has risen significantly over the past 100 years. Implementing land use practices which accommodate for these rainfall events must be considered to increase resiliency of installed best management practices, farming operations and cities throughout the watershed. Upland treatments when possible, should be the focus as designing engineered structures for 50 or 100 year rain events may not be financially feasible.

Throughout the planning process the voiced expectation for how water is managed in the county is:

- For all users to become educated on how they personally impact water resources
- There is equal enforcement of water protection rules
- Wastewater is treated to meet water quality standards
- To conserve resources for the future by efficient use today
- Decisions made on one landowner’s property not negatively affect another landowner’s property whether it be dirty or excessive clean run-off.

Purpose
The Todd County water management planning process started when the Board of Commissioners passed a resolution on September 19, 1989 to enter into the Comprehensive Local Water Planning (CLWP) process under chapter 103B.311 and 103B.315. The original Todd County Comprehensive Local Water Plan was completed and adopted in 1991 and implementation began that year. In 1995, the County completed its first plan update, with
updates following in 2000, 2005 and 2010. The 2016 plan update continues the tradition of promoting better planning and management of our shared natural resources and will serve as a guide for resource protection through the year 2021.

The purpose of local water management planning at the county level is to meet the requirements set forth in Chapter 103B.311 and 103B.315, through identification of existing and potential problems or opportunities for protection, management, and development of water resources and related land resources. The development and implementation of a plan of action is to promote sound hydrologic management of water and related land resources and to work towards effective environmental protection and management throughout the entire County, including municipalities.

In Todd County, we recognize that we must develop a long term mechanism for managing our water resources or we will eventually lose the opportunity to make intelligent local choices that anticipate or prevent water resource problems before the costs escalate and options are limited. We also recognize that a well-developed water management plan can integrate local initiatives with existing state and federal water related programs and funding sources.

This integration and the partnerships that are developed with the Todd SWCD as the catalyst for the water management planning process allows for efficient management and local ownership of all of these programs for the protection of water resources and the general well-being of the environment. Accomplishments of the Todd County Local Water Management Plan is a result of local citizens, representatives from local organizations and agency staff all working together, as evident by the membership of the Water Plan Advisory Taskforce. Regular contact was also maintained with BWSR personnel to keep current on local water planning issues in the state.

Plan Structure
The local water management plan is currently undergoing a shift towards minor watershed based planning. In an effort to transition to this approach the plan outlines first a traditional water plan outline with countywide goals, objectives and implementation schedule. It then shifts gears by presenting each of our six watersheds in their own chapter. These chapters were structured this way in anticipation of the One Watershed, One Plan becoming a reality across the state. It also mimics much of the work produced by the Minnesota Pollution Control Agency (MPCA) in the Total Maximum Daily Loads (TMDLs) and Watershed Restoration and Protection Strategy (WRAPS) plans. These chapters also provide watershed specific strategies for both protection areas and areas of concerns. The final section, the appendices, contain specific documents, maps or more detailed information referenced in this Water Plan. Where necessary the reader is directed to a specific appendix for more information. As new data is available the County Water Planner will use the Todd County website as a way to communicate information to citizens.

Methodology

County Goals and Objectives
Countywide goals and objectives were formulated through the Priority Concerns Scoping Document (PCSD) process. This was a public process which involved both agency and citizen input. Surrounding LGU’s were contacted and asked to present applicable water resource based documents. Water Plans from the surrounding counties of Wadena, Douglas, Morrison, Stearns, Otter Tail and Cass were obtained. Citizen input was received through a survey, public hearing and Water Plan Task Force Meetings. Agency comments were obtained before the start of the Water Plan Update and again at the completion of the PCSD. More details on this process can be found in Appendix I.
Watershed Assessments

Watershed based specific strategies for both protection areas and areas of concerns were developed with the additional aid of current state agency efforts. Completed Minnesota Pollution Control Agency (MPCA) Total Maximum Daily Loads (TMDL) and Watershed Restoration and Protection Strategies (WRAPS) were consulted for the watershed which have been completed recently including the Sauk River Watershed, Red Eye River Watershed, Crow Wing River Watershed and the Long Prairie River Watershed. At the time of writing, both the Mississippi River Brainerd and Sartell were in process of being updated so water quality information was obtained off the MPCA website. Information regarding geology, public water, Lakes of Biological Significance, wild rice lakes, Lakes with Measured Phosphorus Sensitivity Significance, trout streams, Aquatic Invasive Species (AIS), groundwater monitoring, irrigation wells, dams, forested land, native plant communities, public land, and general lake information were obtained through the Department of Natural Resources (DNR). The Natural Resources Conservation Service (NRCS) Soil Survey has been referenced for this document. Areas with groundwater sensitivity were identified through the Minnesota Department of Agriculture (MDA) at the township level and the Minnesota Department of Health (MDH) for municipalities within Todd County which are covered by a Wellhead Protection Plan (WHPP). Wellhead Protection Plans from all cities in the county who are obligated to have a Wellhead Protection Plan were considered including the City of Long Prairie, City of Browerville, City of Clarissa, City of Eagle Bend, City of Bertha, City of Hewitt, City of Osakis and the City of Staples. In addition, the PCA’s Animal Feedlot Rules Chapter 7020 is referenced as is the MDA Wetland Conservation Act Rules Chapter 8420, the Minnesota Environmental Quality Board’s 2015 EQB Water Policy Report’s and the University of Minnesota Extension’s 2015 Fields to Streams, Managing Water in Rural Landscapes. Todd County specific information was gained through previous Water Plan’s, the Todd County Comprehensive Land Use Plan, the Todd County Planning and Zoning Ordinance and Todd Soil and Water Conservation District Annual Plan of Work. Valuable insight was provided by Dan Steward and Jeff Hrubes of BWSR. All maps credited to Todd County GIS were produced by Travis Genty.

The information presented in this updated Water Plan is therefore based on the most pressing concerns of our community members as well as the best available data available used in analyzing and rating individual watershed’s health. At the forefront of the Todd County Water Plan’s goals and objectives are the two core values of civic engagement and voluntary programs, both aimed at protecting and preserving our water quality and our unique landscape.

Minor Watershed Assessments

Minor or subwatersheds were also assessed in order to determine a protection approach to water conservation using current land cover data. Depending on the amount of disturbed land cover within a within a minor watershed determined the amount of risk to water quality. Using 2012 Landfire data and adjusting for land which is either cropped, in pasture or considered urban percentages of land disturbance of 10-20%, 20-40%, 40-60%, 60-80% and 80-100% were factored. This was then used to develop a protection matrix which gave the percentages a specific classification, risk, cost and opportunity/benefit rating.

A protection matrix below breaks down how water quality decisions can be ranked in the future to help ensure the most cost effective and opportunistic use of resources. Furthermore, the minor watershed map shows an overview of the entire county and the land cover disturbance rating. Additional maps of each of the subwatersheds will be available on the Todd County website as they are available. These maps include further
distinctions within the minor watershed to help aid in conservation planning and facilitate discussions between citizens and planners.

The methodology for minor watershed assessments was based largely on the work by Crow Wing County and Dan Steward at the Board of Water and Soil Resources (BWSR). Variation from this model was in two significant ways, mainly on not using public land and for not using water quality trends as indicators to the protection classification. The former was not used because Todd County does not have very much public land, which ultimately, would be the highest level of protection from land conversion and potential water contamination and was a main component to the Crow Wing model. This was justified by the author because looking at erosion potential and pollution threats, undisturbed areas such as forests, wetlands and grasslands ultimately offer the same runoff coefficient as public lands. The latter was not included because the author did not feel the water quality data for Todd County was complete enough to make accurate comparisons amongst watersheds. It is the goal of the next Water Plan Update to gather and compile a more complete picture of water quality within Todd County lakes. Water quality data was still used to develop watershed based priorities but was not use as a factor in the minor watershed assessments, it was exclusively developed on land cover.

### Protection Matrix

<table>
<thead>
<tr>
<th>% Disturbed</th>
<th>Risk</th>
<th>Costs</th>
<th>Opportunity/Benefits</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-20</td>
<td>Very Low</td>
<td>Low</td>
<td>Moderate</td>
<td>Vigilance</td>
</tr>
<tr>
<td>20-40</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
<td>Enhance Protection</td>
</tr>
<tr>
<td>40-60</td>
<td>Moderate</td>
<td>High</td>
<td>Moderate</td>
<td>Protect</td>
</tr>
<tr>
<td>60-100</td>
<td>High</td>
<td>Extreme</td>
<td>Low</td>
<td>Restore</td>
</tr>
</tbody>
</table>

**Meanings:**
- Threat to Water Quality
- Expense to Improve Water Quality
- Ability to Improve Water Quality Through Conservation Efforts

### Costs

<table>
<thead>
<tr>
<th>Costs</th>
<th>Very Low</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>Extreme</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ Amount</td>
<td>Unassisted</td>
<td>$100-5000</td>
<td>$5000-60,000</td>
<td>$60,000-200,000</td>
<td>&gt;$200,000</td>
</tr>
<tr>
<td>Examples</td>
<td>Tree Planting</td>
<td>Technical Assistance</td>
<td>Erosion Control</td>
<td>Feedlot Fix</td>
<td>Natural Stream Channel Restoration</td>
</tr>
</tbody>
</table>

2: Protection Matrix Based on Percent Disturbed Land Cover
Minor Watershed Classification Mapping

3: Minor Watershed Classification Mapping for Todd County
Chapter I: Todd County Goals & Objectives

Recommendations to Other Plans & Official Controls
This revision to the Water Plan should be incorporated into ongoing activities of the county and watersheds which extend beyond the county into surrounding counties and cities. The priority concerns and goals presented in this plan express the wishes of Todd County residents and natural resource professionals in the area.

Goal 1: Provide conservation education and information to citizens and public representatives

- Objective 1. Educate school aged citizens
- Objective 2. Inform the general public and landowners
- Objective 3. Reach elected officials and community leaders with conservation information

Achieving This Goal: School aged citizens will be educated through Enviro-fest and by presentations made to class rooms. Landowners and the general public will be informed using displays, newsletters, news articles, the radio, internet, workshops, events, and tours. Elected officials will be kept informed on issues through one-on-one meetings, tours, and presentations. Todd SWCD will actively seek to provide information and services to minorities and traditionally under-served groups.

Goal 2: Protect and improve the quality and quantity of Todd County water resources

- Objective 1. Implement practices and systems designed to protect and improve surface water quality
- Objective 2. Implement practices and systems designed to protect and improve groundwater quality
- Objective 3. Evaluate surface and groundwater and develop plans to address problems

Achieving This Goal: Surface and ground water protection measures will be implemented using cost-share, partnering with other agencies, and by providing technical assistance to landowners. Emphasis will be on high priority areas identified through monitoring as not meeting state water standards. Water quality protection will be central to planning efforts for the county water plan, wellhead protection programs, TMDL plans, and erosion control plans as necessary to protect water.

Goal 3: Provide technical assistance to landowners, partners, and county departments and officials

- Objective 1. Provide technical support related to wetlands
- Objective 2. Manage Todd County Feedlot Program
- Objective 3. Provide technical support related to water and land resources
- Objective 4. Assist USDA-NRCS and FSA with conservation program implementation, delivery and promotion
- Objective 5. Support development of wildlife habitat

Achieving This Goal: Todd County SWCD and NRCS will support landowners seeking to enroll in cost-share and other programs designed to improve water quality, protect natural resources, and enhance wildlife habitat. Todd County will administer the Feedlot and Wetlands programs county-wide, SWCD will offer an annual conservation tree and shrub program to landowners, and assist partners, county departments, and officials with

...
programs and information that improves and protects natural resources. Todd County SWCD and NRCS will promote the availability of Ag BMP low interest loans and other programs to landowners.

**IMPLEMENTATION SCHEDULE**

The cost column on the Implementation Schedule below correlates with the Protection Matrix “Costs” ranges on page 15.

<table>
<thead>
<tr>
<th>Goal 1: Provide conservation education and information to citizens and public representatives</th>
<th>Responsible Party</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 1. Educate school aged citizens.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sponsor and organize Enviro-Fest for Todd County 6th graders.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Provide Water Quality Education with SRWD.</td>
<td>SWCD &amp; SRWD</td>
<td>Low</td>
</tr>
<tr>
<td>Provide Aquatic Invasive Species (AIS) educational material and lessons to schools.</td>
<td>County</td>
<td>Low</td>
</tr>
<tr>
<td>Objective 2. Inform the general public and landowners.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prepare and distribute a Soil and Water newsletter bi-annually.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Display conservation booth at fairs and events.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Provide monthly conservation news on talk radio.</td>
<td>SWCD, County, Extension, SRWD, NRCS</td>
<td>Very Low</td>
</tr>
<tr>
<td>Provide monthly news articles to media.</td>
<td>SWCD, County, Extension, SRWD, NRCS</td>
<td>Very Low</td>
</tr>
<tr>
<td>Work with townships in Minnesota Department of Agriculture (MDA) Township Ground Water testing Program.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Participate in recognition programs for Conservationist of Year &amp; Land Stewardship Award.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Maintain and update SWCD/County web site.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Reach out to minority groups and Amish community.</td>
<td>SWCD, Extension, SRWD, NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Participate in a Soil Health Tour or field day.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Organize a River and Lake Day educational event for shoreland property landowners and lake associations.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Organize annual Feedlot Meeting for Todd County producers.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Educate landowners of their options if they are affected by the Buffer Law.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Heighten public’s awareness of contaminants cause and effect.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Inform public of where to dispose of hazardous and solid waste.</td>
<td>County</td>
<td>Low</td>
</tr>
<tr>
<td>Produce and distribute materials to inform the public on best management practices of storm water.</td>
<td>SWCD, SRWD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Work with media to promote upcoming educational events.</td>
<td>SWCD</td>
<td>Very Low</td>
</tr>
</tbody>
</table>
Use media sources to explain and promote the protection of habitat and agricultural land. | SWCD & NRCS | Low
---|---|---
Attend lake association meetings to distribute educational materials. | SWCD, SRWD & County | Low
Promote the reduction of nitrogen and phosphorus in water resources in the county. | SWCD & County | Low
Promote conservation drainage on new or existing subsurface and ditch drainage ways. | SWCD, Extension, SRWD, NRCS | Low

**Objective 3. Reach elected officials and community leaders with conservation information.**

<table>
<thead>
<tr>
<th>Task</th>
<th>Responsible Parties</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correspond with the county, state and federal elected and appointed officials throughout the year.</td>
<td>SWCD, Extension, SRWD, NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Participate and meet with legislators during the &quot;Day at the Capitol&quot; and at other events.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Invite elected and appointed officials to tours, demonstrations, and meetings.</td>
<td>SWCD, Extension, SRWD, NRCS</td>
<td>Very Low</td>
</tr>
<tr>
<td>Complete public notice of all construction and expansion events occurring within each township.</td>
<td>SWCD &amp; County</td>
<td>Very Low</td>
</tr>
<tr>
<td>Participate in annual Township Meeting in April of each year.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Organize a winter township meeting on wetlands and buffers.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Host informational meetings for city administrators, engineers, realtors and citizens on development impacts and best management practices.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Develop educational materials for citizens, realtors, lenders, and landscapers on ordinance basics and best management practices for development.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Goal 2: Protect and improve the quality and quantity of Todd County water resources**

**Objective 1. Implement practices and systems designed to protect and improve surface water quality.**

<table>
<thead>
<tr>
<th>Task</th>
<th>Responsible Party</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>With USDA-NRCS assistance - establish soil erosion protection on cropland including no-till, cover crops, prescribed grazing, and water and sediment control basins.</td>
<td>SWCD &amp; NRCS</td>
<td>Moderate</td>
</tr>
<tr>
<td>Establish irrigation management plans and conservation plans.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Review and assistance in the development of sound nutrient management systems for dairies, beef sites, and swine sites.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>With USDA-NRCS assistance - establish sound pest management on crop land.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Review and provide technical assistance during the installation of ag waste and runoff control systems.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Complete wetland restoration activities.</td>
<td>SWCD &amp; NRCS</td>
<td>Moderate</td>
</tr>
<tr>
<td>Develop prescribed grazing plans.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Complete non-crop land erosion projects such as bank re-vegetation projects inshore-land.</td>
<td>SWCD &amp; NRCS</td>
<td>Moderate</td>
</tr>
<tr>
<td>Lead implementation of Minnesota’s Buffer Initiative reaching for full compliance county wide.</td>
<td>SWCD</td>
<td>Moderate</td>
</tr>
<tr>
<td>Inform all landowners about need to establish buffers on public waters and along public ditches.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Objective</td>
<td>Action</td>
<td>Funding/Support</td>
</tr>
<tr>
<td>-----------</td>
<td>--------</td>
<td>----------------</td>
</tr>
<tr>
<td>Complete shoreline improvement projects.</td>
<td>SWCD</td>
<td>Moderate</td>
</tr>
<tr>
<td>Funding to cost share for alternate ditch designs, ditch abandonment and best management practices.</td>
<td>SWCD</td>
<td>High</td>
</tr>
<tr>
<td>Monitor water quality as directed by MPCA.</td>
<td>SWCD</td>
<td>Moderate</td>
</tr>
<tr>
<td>Promote retro-fitting rain gardens in storm water drainage areas.</td>
<td>SWCD &amp; County</td>
<td>Moderate</td>
</tr>
<tr>
<td>Identify and ensure proper reclamation of gravel pits.</td>
<td>County</td>
<td>Low</td>
</tr>
<tr>
<td>Objective 2. Implement practices to protect and improve groundwater quality.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With USDA-NRCS assistance establish sound nutrient management systems.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Provide technical assistance and approve plans for animal waste, pit closures and construction, and waste storage facilities.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Assist cities in implementing Wellhead Protection Programs as requested.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Promote and offer cost share for sealing wells.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Promote irrigation scheduling assistance program to provide scheduling information for landowners to utilize.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Review and assist in the development of comprehensive nutrient management plans.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Provide outreach and education and assist with groundwater monitoring of nitrates working with MDA.</td>
<td>SWCD</td>
<td>Moderate</td>
</tr>
<tr>
<td>Grant funding, cost share dollars, Ag BMP low interest loans for septic system upgrades.</td>
<td>County</td>
<td>Low</td>
</tr>
<tr>
<td>Provide support to Todd County Planning &amp; Zoning for compliance inspections.</td>
<td>County</td>
<td>Low</td>
</tr>
<tr>
<td>Encourage land uses that are not threatening to drinking water supplies in the Drinking Water Supply Management Area (DWSMA).</td>
<td>SWCD</td>
<td>Moderate</td>
</tr>
<tr>
<td>Target areas in need of restoration and/or clean-up such as salvage yards as relative to environmental impacts.</td>
<td>County</td>
<td>Low</td>
</tr>
<tr>
<td>Objective 3. Evaluate surface and groundwater and develop plans to address problems.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implement the Todd County Local Water Management Plan.</td>
<td>SWCD &amp; County</td>
<td>Moderate</td>
</tr>
<tr>
<td>View drainage systems as key to watershed management and implement water quality monitoring stations.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Track the trends of high capacity wells being installed for both urban and agricultural areas.</td>
<td>DNR</td>
<td>Moderate</td>
</tr>
<tr>
<td>Develop and implement a plan to assist landowners in the process of upgrading their septic system into compliance.</td>
<td>County</td>
<td>Moderate</td>
</tr>
<tr>
<td>Cooperate with MPCA in ongoing Total Maximum Daily Loads (TMDL) development and implementation efforts.</td>
<td>SWCD</td>
<td>Moderate</td>
</tr>
<tr>
<td>Monitor 13 DNR observation wells to track ground water levels over time.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Support Lake Association water quality monitoring efforts.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Develop methods to track soil erosion project sites, stream bank erosion, buffer strips, and other types of projects to enable better landowner follow-up and</td>
<td>SWCD &amp; GIS</td>
<td>Low</td>
</tr>
<tr>
<td>Obtain and catalog all available water quality data on all public water bodies and named streams within Todd County.</td>
<td>SWCD, GIS &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Objective</td>
<td>Responsible Party</td>
<td>Cost</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>------</td>
</tr>
<tr>
<td>Digitize current land imagery to help implement buffer program.</td>
<td>SWCD &amp; GIS</td>
<td>Moderate</td>
</tr>
<tr>
<td>Funding for assessment, sampling modeling and best management practices of storm water.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Utilize existing water quality data to determine long term trends.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Strengthen the ordinance to protect wetlands in shoreland area.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Review and update appropriate ordinances.</td>
<td>County</td>
<td>Low</td>
</tr>
<tr>
<td>Promote the stalk nitrate program with Todd County farmers as a way to improve nutrient management.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Goal 3: Provide technical assistance to landowners, partners, and county departments and officials**

**Objective 1. Provide technical support related to wetlands.**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Responsible Party</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordinate and administer wetland laws including swamp buster, 1985 Food Security Act, Clean Water Act 404 (CWA) and Wetland Conservation Act (WCA).</td>
<td>SWCD, NRCS &amp; County</td>
<td>Moderate</td>
</tr>
<tr>
<td>Maintain the wetlands in Todd County by administering the WCA law properly.</td>
<td>SWCD &amp; County</td>
<td>Moderate</td>
</tr>
<tr>
<td>Administer and perform wetland determinations related to proposed projects.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Assist landowners eligible for WCA exemptions to evaluate alternatives and minimize impacts.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Assist townships with conformance with wetland rules.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Schedule and hold Wetland Technical Evaluation Panels (TEP).</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Assist ditch inspector with wetland issues and through TEP reviews of planned ditch maintenance.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Objective 2. Manage Todd County Feedlot Program.**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Responsible Party</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete farm site inspections for compliance, open lot, land application, and construction.</td>
<td>SWCD</td>
<td>Moderate</td>
</tr>
<tr>
<td>Complete feedlot registrations as required.</td>
<td>SWCD &amp; County</td>
<td>Moderate</td>
</tr>
<tr>
<td>Attend and contribute to water quality information at Todd County livestock advisory committee meetings.</td>
<td>SWCD, Extension, SRWD, NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Collaborate with associated agencies, citizen groups, respond to questions, and assist in finding resolution to issues pertaining to feedlots, manure management, and water quality.</td>
<td>SWCD, Extension, SRWD, NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Assist producers in identifying potential funding sources and technical resources.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Review applications for protective measures and issue Construction Short Form (CSF) and interim permits in a timely manner.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Maintain complaint log, conduct site visits, and refer to MPCA cases that represent a flagrant or imminent threat to public or environmental health. Assist County in land use decisions pertaining to feedlots and water quality.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Task</td>
<td>Responsible Parties</td>
<td>Priority</td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
<td>------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Maintain records of notifications from feedlot producers claiming air quality exemptions.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Conduct spot checks on previously installed practices pertaining to feedlots, sediment control &amp; grazing systems.</td>
<td>SWCD, County &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Reclaim or recertify old agricultural waste pits.</td>
<td>SWCD, County &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Notify producers of changes in feedlot rules.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Objective 3. Provide technical support related to water and land resources</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assist Lake Associations in lake management outreach and projects.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Actively participate with other organizations for monitoring and surface water improvement projects.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Coordinate work with Sauk River Watershed District (SRWD) regarding planning efforts and other activities.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Assist state climatologist with volunteer rainfall monitoring program.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Review tax forfeited parcels submitted by the Auditor’s office.</td>
<td>SWCD</td>
<td>Moderate</td>
</tr>
<tr>
<td>Assist Todd County Public Works at MN DNR General Permit Annual Meeting.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Coordinate with Planning and Zoning to help manage floodplains.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Effectively work with Planning and Zoning staff with shoreland alteration projects and other activities that benefit natural resources.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Assist MN DNR and County with implementation of Aquatic Invasive Species (AIS) program.</td>
<td>SWCD &amp; County</td>
<td>High</td>
</tr>
<tr>
<td>Assist Todd County cities with Wellhead Protection (WHP) plans.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Pursue grant funding to work with other organizations for monitoring and surface water improvement projects, and to establish baseline monitoring data.</td>
<td>SWCD</td>
<td>Moderate</td>
</tr>
<tr>
<td>Participate in Todd County's ordinance update process.</td>
<td>SWCD &amp; County</td>
<td>Low</td>
</tr>
<tr>
<td>Reduce development violations by promoting proper permitting.</td>
<td>SWCD, County &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Seek greater emphasis on prosecution of natural resource laws and rules.</td>
<td>SWCD &amp; County</td>
<td>High</td>
</tr>
<tr>
<td><strong>Objective 4. Assist USDA-NRCS and FSA with conservation program implementation, delivery and promotion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintain agricultural land base in Todd County.</td>
<td>SWCD, County &amp; NRCS</td>
<td>Moderate</td>
</tr>
<tr>
<td>Develop contracts, administration, and provide assistance for the Conservation Reserve Program (CRP).</td>
<td>SWCD &amp; NRCS</td>
<td>High</td>
</tr>
<tr>
<td>Develop contracts, administration, and provide assistance related to Environmental Quality Incentive Program (EQIP).</td>
<td>SWCD &amp; NRCS</td>
<td>High</td>
</tr>
<tr>
<td>Develop contracts, administration, and provide assistance related to the Reinvest in Minnesota (RIM) easement program.</td>
<td>SWCD &amp; NRCS</td>
<td>High</td>
</tr>
<tr>
<td>Develop contracts, administration, and provide assistance related to the Agricultural Conservation Easement Program (ACEP) and Wetland Reserve Easement (WRE) programs.</td>
<td>SWCD &amp; NRCS</td>
<td>High</td>
</tr>
<tr>
<td>Promote pollinator habitat through Conservation Reserve Program (CRP)/Environmental Quality Incentive Program (EQIP)/Conservation Technical Assistance (CTA).</td>
<td>SWCD &amp; NRCS</td>
<td>High</td>
</tr>
<tr>
<td>Task</td>
<td>Responsibility</td>
<td>Level</td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
<td>-----------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Provide assistance related to Conservation Stewardship Program (CSP).</td>
<td>SWCD &amp; NRCS</td>
<td>Moderate</td>
</tr>
<tr>
<td>Complete conservation and compliance plans using the Field Office Technical Guide (eFOTG) standards and specifications.</td>
<td>SWCD &amp; NRCS</td>
<td>Moderate</td>
</tr>
<tr>
<td>Participate in project planning meetings with NRCS as needed.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Chair USDA's Local Work Group to set conservation priorities.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Assist in Highly Erodible Land (HEL) and wetland compliance as it relates to USDA programs.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Provide outreach support for USDA programs.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Objective 5. Support development of wildlife habitat</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support tree and shrubs plantings with landowners.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Organize an annual tree and shrub sale that supplies suitable stock to landowners.</td>
<td>SWCD</td>
<td>Low</td>
</tr>
<tr>
<td>Support Pheasant Forever Farm Bill Biologist tasked with establishing riparian buffers and grassland areas.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Provide service to landowners related to wildlife habitat establishment on private lands by supporting Pheasants Forever staff.</td>
<td>SWCD &amp; NRCS</td>
<td>Low</td>
</tr>
<tr>
<td>Target key erosion concern areas for establishment of buffers using Pheasants Forever technical staff.</td>
<td>SWCD, GIS &amp; NRCS</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
4: Major Watershed Boundaries in Todd County
5: Crow Wing River Watershed

Created by:
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Long Prairie, MN 56347
320-732-4248

Data Sources:
Watershed Data - MN DNR
Impaired Waters - MN PCA
County Data – Todd County GIS

Todd County GIS has made every effort to provide the most accurate and up-to-date information available and cannot be held responsible for any unforeseen errors or omissions.
Chapter II: CROW WING RIVER WATERSHED

Watershed Overview
The Crow Wing River Watershed is 1,946 square miles within the north central portion of the Upper Mississippi River Basin and includes all or parts of Becker, Cass, Clearwater, Crow Wing, Hubbard, Morrison, Otter Tail, Todd, and Wadena counties. It is comprised of two ecoregions, the Northern Lakes and Forests and the North Central Hardwood Forests.

Land use within the watershed is primarily forested/shrub lands, followed by agricultural lands, wetlands, open water, and developed lands. Agriculture is primarily livestock oriented. Much of the soil is sandy and does not produce significant crops without irrigation.

Municipalities located within the Crow Wing River Watershed include Akeley, Menahga, Nevis, Nisswa, Osage, Park Rapids, Pequot Lakes, Ponsford, and Staples.

There are a large number of pristine, high-value recreational lakes in the Crow Wing River Watershed and several cold water streams that support trout are located in the watershed. The major lakes include North Long, Gull, Big Sand, Badoura Bog, Edward, Potato and Shell. The major rivers and streams include Crow Wing, Stoney Brook, Kettle River, Shell River, Swan Creek and Tower Creek.

For more information from a watershed perspective and its overall health on a number of different criteria including hydrology, geomorphology, biology, connectivity and water quality refer to the Minnesota Department of Natural Resources (MNDNR) Watershed Health Assessment Framework online.

Todd County Portion Overview
In Todd County, the Crow Wing Watershed is fourth largest watershed in land area covering 103 miles in the Northern and Northeastern parts of the County. The Todd County portion is 5.2% of the total watershed.

Cities in this watershed include Bertha and Staples. Both cities have Wellhead Protection Areas and adhere to a Wellhead Protection Plan. Townships include portions of Bartlett, Bertha, Eagle Valley, Germania, Staples, Stowe Prairie, Villard and Wykeham.

Geology in the area consists of remnants of the Wadena Lobe consisting of mostly drumlins in the western arm and outwash plains in the section near Staples. This glacier entered from the north and eroded land surface while forming drumlins and depositing sediment of the Hewitt formation. The main river in the county, the Long Prairie River, flows northeast into the Crow Wing River. The Wing and the Partridge River also drain into the Crow Wing River.

The soils in these areas are directly related to the deposits left behind by the glaciers. The ability of the soils to absorb and transmit water is also affected by slope and topography. Infiltration rates and permeability affects run off rate and groundwater pollution potential. Land uses should always consider soil type as suitability may
be limited. The western arm contains soils which USDA has identified as Prime Farm Land on the upland areas whereas the area around Staples and at the base of the drumlins are comprised of wetlands.

Ten minor watersheds make up the hydrology of this area with elevation varying from 1212 feet to 1507 feet above sea level.

Major lakes over 100 acres include Hayden (377.94 acres), Benz (140.43 acres) and Toms (136.09 acres).

Major streams and rivers over five miles in length include the Little Partridge Creek (20.83 miles), Partridge River (18.80 miles) and the Crow Wing River (6.54 miles).

Major county and jurisdictional ditches over five miles long include CD15 (24.17 miles), CD27 (6.31 miles), CD20 (6.13 miles) and JD 05 (5.04 miles).

**Surface Water**

**Public (Protected) Waters**

A list of public or protected waters is included in Appendix VIII of this document. This designation may imply special zoning, buffer or state and federal agency requirements. Public waters include lakes, rivers, streams, and wetlands designated under Minnesota Statutes, section 103G.005, subdivision 15, any lakes or wetlands listed in the DNR Public Waters Inventory.

The Ordinary High Water Level (OHWL) is the state defined boundary for protected water and is the elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape. Generally it is the point where natural vegetation changes from predominately aquatic to predominately terrestrial. It is important because certain property and water rights can be affected by the location. For example when working above the OHWL the Todd County Planning and Zoning Department may require a permit, whereas when working below the OHWL the Department of Natural Resources will require a permit. This pertains to lakes, stream, rivers and wetlands. For watercourses it is the elevation of the top of bank for the channel.

**Lakes of Biological Significance**

The goal of this list was to identify lakes that exhibit the highest quality features within any of the four assessed biological communities. Therefore, a lake needed to meet criteria for only one of the community types (aquatic plants, fish, birds, amphibians) to be identified as a Lake of Biological Significance. Occurrences of high-quality features within the community types determined the biological significance rank (outstanding, high or moderate).

Currently there are no lakes within the watershed which have been identified as Lakes of Biological Significance by the Minnesota Department of Natural Resources (MNDNR).

**Wild Rice Lakes**

Wild rice within a lake or river can imply good water quality and a healthy ecosystem. It not only provides structure, cover and food to different species but also protects shorelines from wind erosion and ties up nutrients increasing water quality. Resource managers have identified lakes throughout the state in an effort to preserve, restore and enhance this resource.

There are several lakes within the watershed which have been identified as containing wild rice by the MNDNR. Lakes include Hayden, Pendergast and Stones.
Impaired Waters
The federal Clean Water Act requires states to adopt water quality standards to protect lakes, streams, and wetlands from pollution. The standards define how much of a pollutant (bacteria, nutrients, turbidity, mercury, etc.) can be in the water and still meet designated uses, such as drinking water, fishing, and swimming. A water body is “impaired” if it fails to meet one or more water quality standards.

Impaired water bodies currently identified by the Minnesota Pollution Control Agency (MPCA) include the Partridge River for E. coli and the Crow Wing River (Swan Creek to Mosquito Creek) for mercury in fish tissue.

<table>
<thead>
<tr>
<th>Waterbody Name</th>
<th>Crow Wing River Watershed Impairments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mercury</td>
</tr>
<tr>
<td>Partridge River</td>
<td>E.coli</td>
</tr>
</tbody>
</table>

Year Listed

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Crow Wing River</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partridge River</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6: Crow Wing River Watershed MPCA Impairments

Lakes with Measured Phosphorus Sensitivity
The phosphorus sensitivity significance index is a function of phosphorus sensitivity, lake size, lake total phosphorus concentration, proximity to PCA’s phosphorus impairment thresholds, and watershed disturbance.

There is only one lake within the watershed which had enough data to compile a sensitivity rating for phosphorus by the MNDNR and it is Hayden Lake.

Hayden Lake was given a restore classification based on its sensitivity significance index.

The chart signifies the lake’s total phosphorus (TP) loading sensitivity expressed as the loss of predicted Secchi disk water transparency (in inches) with 100 pounds of TP added. This loading is an estimate of total phosphorus and based on Minnesota’s eutrophication criteria for impairment for the specific lakes. Because there was only one lake in the watershed the comparison chart of all of Todd County’s lakes was added for overall reference.
Trout Streams
Designated trout streams have special management restrictions regarding their recreational use and are particularly sensitive to minor alterations in their habitats. Within Todd County there are four designated trout streams by the Department of Natural Resources (DNR). Crow Wing River Watershed does not have any designated trout streams but Fawn Creek is designated in Wadena County but not in the portion which runs into Todd County just west of Staples.
Aquatic Invasive Species

As of 2015 there are several waterbodies within Todd County which have one or more Aquatic Invasive Species (AIS) in them. The only one in this watershed is the Crow Wing River (Faucet Snail).

Todd County has developed an AIS Plan to help slow the spread of invasive species. Two major parts of the program, watercraft inspections and Zebra Mussel veliger monitoring are carried out in the watershed. Lakes were selected by the AIS committee and included lakes which were believed to be more at risk due to their recreational pressure and proximity to surrounding infected lakes. In addition to inspections and monitoring, education and outreach are being carried out within the watershed.

Within the watershed there is currently no inspections or monitoring being done.

Todd County will continue the AIS program as long as support is continued through the state.

Groundwater

Monitoring

The Department of Natural Resources (DNR) monitors groundwater levels through observation wells around the county. Their Cooperative Groundwater Monitoring (CGM) information can be found at http://www.dnr.state.mn.us/waters/cgm/index.html. Information presented in the data has been gathered by the Todd County SWCD.

The only active observation well within the Todd County portion of the Crow Wing River Watershed is located NE of Staples and is Obwell Number 77032. The well is 41 feet deep and has been monitored since August 1979. Monitoring shows a fairly consistent pattern of seasonal groundwater fluctuation over time.

8: DNR Obwell Water #77032 Water Level
City Drinking Water
As required by the Minnesota Wellhead Protection Rule every ten years the cities must update their Wellhead Protection Plans. These plans give detailed information on the area surrounding municipal wells and their vulnerability. They also spell out specific goals for protection. There are three Drinking Water Supply Areas (DWSMA) in the Crow Wing River Watershed. One is partially located in the Long Prairie River Watershed and is for the City of Eagle Bend, see the city drinking water section in the Long Prairie River Watershed for more information. The other two are located in Staples and Bertha.

BERTHA
The City of Bertha has two wells identified as Well 2 and 3. Well 2 is 128 feet deep and was constructed in 1955, it is a buried sand aquifer. Well 3 is 160 feet deep and was constructed in 1998 and is also a buried sand aquifer. The city serves a population of approximately 500 people. The vulnerability of the DWSMA is classified as low.

9: City of Bertha Drinking Water Supply Management Area (DWSMA)
Staples

The City of Staples obtains its drinking water supply from three primary wells, Well 3 (240138), Well 4 (693197), and Well 5 (693198). Although the city is located in both Wadena and Todd Counties the wells are located in Section 12 of Township 133 North, Range 33 West in Todd County. Well 3 was constructed in 1946 and is 69 feet deep, Well 4 was constructed in 2004 and is 84 feet deep and Well 5 was constructed in 2004 and is 72 feet deep. The system serves a population of approximately 3,104 through 1,089 connections. The vulnerability of the DWSMA is classified as moderate and high depending on the location.

Private Well Drinking Wells
The Minnesota Department of Agriculture (MDA) will begin a Township Testing program in Todd County starting 2016 to assess the level of nitrates in private wells. A portion of the township residents within the Crow Wing River Watershed have been invited to participate in the MDA testing program as Stowe Prairie was identified as an area vulnerable to nitrate contamination. Participation was based on at least 30% of the township having vulnerable geology and 20% of the township being in row crop production.

Irrigation Wells
Irrigation wells are permitted through the DNR through a system called MPARS. This is done in an effort to prevent well interference with private domestic well owners. The Crow Wing River Watershed has the second
lowest amount of active permitted irrigation pumping in the County with only six wells. The main current uses in highest to lowest order are for municipal water, construction de-watering and agricultural irrigation.

Irrigation water management primarily aims to control the volume and frequency of irrigation water applied to crops, so as to meet crop needs while conserving water resources. Recommendations on irrigation water Best Management Practices (BMPs) are provided by the Minnesota Department of Agriculture. Todd County also works in partnership with Hubbard and Wadena counties to provide an Irrigator Scheduler Program to local irrigators. One technician out of the Wadena SWCD office manages this program.

There is not enough data to know how additional irrigation permits may change groundwater supply or the potential impacts to nearby lakes, streams or rivers. Currently the MNDNR has three pilot groundwater management areas in the state to look closer at these issues. See Appendix III for more information on well locations and surficial aquifers within this watershed.

**Land Cover and Use**

General land cover in the county can be divided into four primary categories: Agriculture, Woodland, Water and Wetlands and Other including urban and built up areas. Watersheds are composed of groundwater recharge and storm water runoff generation areas. As far as water quality is concerned, forests and impervious surfaces typically found in urban areas represent the two ends of that spectrum, with other land covers falling in between. In addition to forests, wetlands and native grasslands also serve a special role in water quality. Wetlands offer flood protection, shoreline erosion control and help to filter and improve water quality. Native grasslands offer similar benefits as wetlands and forested areas such as water filtration and erosion control. All three offer the additional benefits of harboring wildlife habitat, building resilient ecosystem communities and are more robust during extreme weather conditions.

Agriculture presents many opportunities and challenges. Most watersheds within Todd County have substantial agricultural land cover with areas next to lakes and streams posing the highest risk to clean water. Through conservation minded principals and best management practices in cropping fields, grazing operations and feedlots these areas can add a greater awareness to our role of protecting and preserving natural resources. The Water Plan Task Force Committee felt strongly that run-off from fields be clean and that excess water from drainage not impact neighbors.

Minor or subwatersheds were assessed by the Todd County SWCD and GIS Department in order to determine a protection approach to water conservation using current land cover data. Depending on the amount of wetland and forested area within a minor watershed determined the amount of water quality protection which exists. Surface water was not included in the overall calculation as it was based on percent disturbed land cover. Disturbed land cover included agricultural (cropped and pasture), urban and built up areas (barren and quarries included) as identified by 2012 Landfire data.

As mentioned above there are ten minor watersheds in this area. They range in percent disturbed from 18 to 58 and protection classifications vary from Protection to Vigilance. Minor watersheds on the Highway 210 side show a lower risk for threats to water quality based on land cover than the western arm of the watershed. For a more detailed view of each minor watershed maps will be available on the Todd County website as they are developed.
Agriculture

Crop

The Crow Wing River Watershed has a significant portion which is rated as Prime Farmland or Farmland of Statewide Importance, mainly in the western lobe of the watershed. See Appendix II for maps pertaining to this land cover. Not only do these soils produce rich agricultural land but it also protects the quality of drinking water and supports wildlife habitat. Preserving agricultural land in the county is a high priority. In the 2015 Water Plan Survey over fifty percent of county residents responded that the destruction of healthy soils was one of the greatest threats to Todd County’s agricultural community. Installing and adhering to crop BMPs is the watersheds best effort at protecting soil for the future of farming.

There are many in field best management practices (BMPs) which can reduce erosion, build soil and manage water to enhance soils performance and profitability. Below is a table from the 2015 University of Minnesota Extension Fields to Streams, Managing Water in Rural Landscapes.

In addition, the Minnesota Department of Agriculture (MDA) works to monitor nutrients and pesticides in Minnesota’s waters. The MDA has partnered with East Otter Tail SWCD and Todd County to offer basal stalk nitrate testing to area corn farmers. Results are used to offer nitrogen management changes where appropriate.
<table>
<thead>
<tr>
<th>PRACTICES</th>
<th>EFFECTS</th>
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<tbody>
<tr>
<td></td>
<td>Increase spring transpiration</td>
</tr>
<tr>
<td><strong>1. IN-FIELD: CROP AND SOIL MANAGEMENT</strong></td>
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<tr>
<td>Perennial crops, and crop rotations with perennials or winter annuals</td>
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<tr>
<td>Cover crops</td>
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<td>Reduced tillage, contour cropping and residue management</td>
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<td>Compaction management</td>
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<td>Manure application</td>
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<td><strong>2. IN-FIELD: DRAINAGE WATER MANAGEMENT</strong></td>
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<tr>
<td>Alternative drainage design (depth, spacing, capacity)</td>
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<td>Controlled drainage</td>
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<td>Alternative tile inlets</td>
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<td><strong>3. IN-FIELD AND EDGE-OF-FIELD: SURFACE FLOW MANAGEMENT</strong></td>
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<td>Grassed waterways</td>
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<td>Filter strips, contour buffer strips</td>
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<tr>
<td><strong>4. IN-FIELD AND EDGE-OF-FIELD: WATER STORAGE AND INfiltration</strong></td>
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<td>Saturated buffers</td>
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<td>Restored and constructed wetlands</td>
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<tr>
<td>WASCOBs, terraces, and detention basins</td>
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<tr>
<td>Ponds and irrigation reservoirs</td>
<td>●  ●  ●  ●</td>
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<tr>
<td>Large retention basins</td>
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<td><strong>5. DITCH CHANNEL: WATER RETENTION</strong></td>
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<td>Structures for water control, including weirs and restricted size culverts</td>
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<tr>
<td>Two-stage ditch with restricted size culverts</td>
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<tr>
<td><strong>6. RIPARIAN AREA: RESTORATION AND PROTECTION</strong></td>
<td></td>
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<tr>
<td>Riparian vegetation</td>
<td>●  ●  ●  ●</td>
</tr>
<tr>
<td>Streambank, bluff, and shoreline protection</td>
<td>●</td>
</tr>
<tr>
<td>Restore channel meanders</td>
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</tr>
</tbody>
</table>
**Livestock**

Animal agriculture is a necessary and important part of our lives. Minnesota's livestock and poultry producers help support communities by generating tax revenue and creating jobs. As of 2011 Todd County ranks within the top ten counties for turkey production, cattle and calves, beef and milking cows according to the Minnesota Department of Agriculture (MDA).

As of 2014 there were 55 feedlots in shoreland areas and 675 feedlots which were required to be registered. Owners which are required to be registered include animal feedlots which are capable of holding 50 or more animal units or the manure for those animals or within shoreland, an area with ten or more but now greater than 50 animal units or the manure for those animals. There are over 16,000 animal units within Crow Wing River Watershed with four minors with over 2,000 animal units in each: 12050, 12051, 12048 and 12043.

Feedlots can be a water quality concern because of three of the most common pollutants to surface and groundwater: phosphorus, nitrates and pathogenic bacteria. While not all bacteria are pathogenic or found in livestock manure contamination by pathogens is a health hazard.

Water quality is protected through the Minnesota State Feedlot Rules by limiting subsurface and surface water discharges as well as restricting the location of new feedlots to set distances from private wells, shoreland and community or school water supply areas. Discharges include animal manure, manure contaminated runoff or process wastewater produced by milk house wastes or flush canals.

**Drainage**

In order to enable and enhance agricultural production, transportation and economic development drainage ditches were built. Water from previously unconnected depressions of saturated soil could then be conveyed to streams. Many streams and rivers were also straightened and widened for these reasons. All of the public ditch systems within the Crow Wing River Watershed were constructed between 1905 and 1923 with the exception of JD 8 and JD 5 which were constructed 1948 and 2011. Within the watershed there are almost 60 miles of county or jurisdictional ditches. Currently it is unknown how many miles of private ditches are in the watershed.

Subsurface drainage or tiling have historically been installed to drain wet areas which were not connected to ditch systems. More recently pattern tiling has been popular as it can remove water from entire fields. Todd County does not keep records of the amount or locations of tile as they are primarily on private lands and it is not regulated.

Agricultural drainage ultimately alters hydrology as its sole purpose is to reduce storage of excess moisture in the soil to accommodate air in the root zone to grow crops. The impact ultimately depends on the field conditions, precipitation, type of drainage, system design and the scale in relation to the watershed. Potential impacts include: Reduced time that water is being stored in soil, change of water pathways over land, decreased evaporation, increase in annual transpiration, increase in the amount of water to streams and rivers, reduction, delay or extension of peak flow within a stream or river and reduction in overland flow.

Concerns with agricultural drainage within the county include increased flows in rivers and streams, sediment transport, chemical transport and the uncertain effect on groundwater aquifer levels. High crop and land prices have the potential of increasing conversion of pasture and forage land to row crops, which in turn may lead to the installation of new drainage systems or drainage improvements to existing systems. Todd County has developed a Drainage Management Plan as well as updated its culvert inventories. More could be done to
mitigate water from drainage by constructing or restoring wetlands within the county. Individual landowners should also be encouraged to establish Drainage Water Management Plans for their lands.

Adequate drainage can be a critical component of a successful farm operation while at the same time new drainage and drainage improvements represent an opportunity to design and install systems in ways that help reduce nutrient losses into surface water and positively affect the timing and flows of drainage water into surface waters. These efforts combined with wetland restoration and water retention initiatives can have positive impacts upon water quality in agricultural landscapes. The Minnesota Department of Agriculture (MDA) has several recommendations regarding agricultural drainage and should be consulted when these opportunities arise. Conservation drainage or the use of drainage practices that are designed to provide the benefits of drainage while minimizing negative impacts on the environment should be the norm within the watershed.

Dams
Dams maintain lake levels and impound water for flood control, power production and water supply. Within Todd County there are 17 active dams. Dams also present the challenge of aquatic connectivity meaning organisms may not be able to move upstream or downstream. Barriers such as dams and road crossings alter flows in ways that can increase temperature, floods and cause erosion leading to increased sediment loads. This watershed does not have any active dams but the Partridge River does have a dam just inside Wadena County north of Highway 10 in Aldrich.

Forested Land
The Crow Wing River is 23% forested with most being classified as Deciduous Closed forest. Forested land in the watershed comprises almost 15,000 acres. See Appendix II for maps pertaining to this land cover.

Wetlands
The U.S. Corps of Engineers regulates wetlands according to Section 404 of the Clean Water Act. Additionally, the Minnesota Wetland Conservation Act regulates all wetlands in MN and is administered by Local Government Units. Regulated activities include draining, filling or excavating a wetland. Local permission can be obtained by contacting the Todd County Wetland Conservation Act (WCA) Technician. They will determine wetlands within the site and give recommendations as to avoid impacting the wetland. If disturbance is unavoidable the landowner will be required to minimize impacts to the wetland and finally mitigate those impacts to replace the loss of the wetland’s functions and values, in Todd County the minimum is a 2 to 1 acre replacement.

Wetlands serve many purposes and their preservation and restoration is a priority. Loss of wetlands can affect water quality, ground water quantity, floodwater retention, wildlife and many other environmental and societal benefits. A wetland inventory has not been developed within Todd County but would help identify, prioritize and restore wetland areas to help mitigate excess nutrient and water issues.

The Crow Wing River Watershed is 21% wetland with most being classified as shrub and emergent wetland (10.58% and 9.81%). Wetland in the watershed comprises almost 14,000 acres. See Appendix II for maps pertaining to this land cover.

Native Plant Communities
A native plant community is a group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. The Minnesota Department of Natural Resources (MNDNR) has identified several areas within the watershed which fall into this category.
Within the watershed half of the minor watersheds contain native plant communities. The largest concentrations are found around Pendergast Lake and sections within Villard and Germania Townships.

**Municipalities**
Staples and Bertha are both within this watershed and both have watercourses running through them. They also have a significant amount of impervious surface and therefore stormwater runoff. Both maintain city sewers, have holding ponds and provide public water to residents.

**Staples**
The City of Staples has just under 3,000 residents. Hayden Creek, ditch networks and wetlands all are within the city limits. Hayden Lake is just outside the city limits but Hayden Creek does pass through the lake. The city is split between Wadena and Todd County.

**Bertha**
The City of Bertha has just under 500 residents. Bear Creek, Little Partridge River, ditch networks and wetlands are all within the city reaches. The Little Partridge River is outside of the city limits but effluent from holding ponds is discharged to the waterway.

**Recreational & Public Land**
Private recreational land makes up a significant portion of land within Todd County. Both non-homestead lakeshore and non-homesteaded seasonal recreation consisting mostly of forested and wetlands fall in this category. In a survey conducted as part of the Priority Concerns Scoping Document (PCSD) hunting and fishing (59.8%) and swimming, canoeing, boating or jet skiing (35.9%) were the top two responses to the question, “When you think about Todd County Water what comes to mind for you?” The highest number of respondents also rated “Wildlife Habitat” as seeing some improvements within the county.

For the purposes of this plan public land within Todd County falls within four main categories listed below. Exact locations of local parks can be obtained from the Todd County Planning & Zoning office. Federal and state managed areas are shown on the Minnesota Public Recreation Information Maps (PRIM maps) online.

**City, Township or County Parks**
Established for various reasons but can provide excellent recreational opportunities. Staples has Odden Park, Northern Pacific Park, Lincoln Park, Veterans Park and Living Legacy Garden at Central Lakes College Ag Center. Pine Grove Park is just outside of Staples. Villard Township has a park and the City of Bertha has a Lions Park, Memorial Park and the Wayside Rest Park.

**Wildlife management areas (WMAs)**
Consist of wetlands, uplands, or woods owned and managed for wildlife by the Department of Natural Resources (DNR). Hunting and various recreational opportunities are open to the public. There are no WMAs in this watershed.

**State forests/Parks/Landings**
There are no state forests or parks in this watershed but there is a DNR landing on the Crow Wing River.

**Wildlife protection areas (WPAs)**
Most of these federally managed wetlands and surrounding uplands are open to hunting and various recreational opportunities. There are no WPAs in this watershed.
Regulated Development

County Zoning
Todd County has had an ordinance since March 18, 1976 and a shoreland ordinance in effect since July 1, 1972. The last comprehensive update was in May 2012 and it will continue to be modified with zoning requirements as necessary. The county has no jurisdiction over municipalities with shoreland ordinances. If new ordinances are developed in Todd County or the municipalities as a result of the Comprehensive Water Plan the Planning and Zoning Department, County Attorney, County Commissioners and any other necessary agency to ensure the new ordinances are compatible with existing ordinances.

Municipal Zoning
Both the cities of Bertha and Staples enforce their own local zoning ordinances and permits can be obtained by contacting the city office.

Township Zoning
Bertha and Stowe Prairie Townships are two of three townships in the county which enforces their own local ordinances and permits can be obtained by contacting the township clerk.

Additional Zoning Entities
There are no additional zoning entities within this watershed. Thirty Lakes Watershed District falls outside the boundaries of Todd County.

Pollution
Permitted Pollution
The Crow Wing River Watershed has several sites which have obtained permits to discharge effluent. The permit controls water pollution by regulating point source pollution. Point sources are discrete conveyances such as pipes or man-made ditches. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. An example of this would be Wastewater Discharge Permits for the Bertha Waste Water Treatment Plant (WWTP) which discharges into the Partridge River and the Staples WWTP which discharges into Hayden Creek. To find out more about permitted facilities and different permit types in the Crow Wing River Watershed see Appendix IX for more information.

Non-Point Source Pollution
Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many discrete sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands and ground waters.

The major source of NPS in the watershed is exposed soil leading to wind and water erosion, fertilizer and manure runoff, failing septic systems, internal loading, livestock overgrazing in streams, wildlife fecal runoff and possibly wetlands. For more information about NPS see Appendix X.

Individual Sewage Treatment System Inspections
Todd County requires Individual Sewage Treatment System (ISTS) inspections to be completed before finalizing a sale on a home. In addition the Todd County Planning and Zoning department have systematically been conducting ISTS inspections around several lakes around Todd County. Within the watershed there have been no lakes sampled as part of this program.
Watershed Restoration and Protection Areas

Restoration Areas

Partridge River
The Partridge River has been identified by the Minnesota Pollution Control Agency as being an impaired water body for bacteria. Contributing point and non-point pollution sources include fertilizer and manure run-off and municipal discharge. In addition there are over 2,200 registered animal units in minor watershed 12048 where the majority of the Partridge River is located.

Hayden Lake
Hayden Lake is 187 acre shallow lake outside the City of Staples. The contributing watershed is 4,618 acres and is 38% disturbed. Currently it does not have any water quality trends but the predicted total phosphorus load is almost double of what the lake has a threshold for potential impairment. Unfortunately because of the shallow nature of the lake it would be very difficult to see improvements in water quality without dramatic efforts.

Another consideration for Hayden Lake is Aquatic Invasive Species (AIS). AIS has been identified in the Crow Wing River and in nearby counties. Because of the proximity to Highway 210 it may be vulnerable to infection.

Channelized Streams and Ditches
Biological criteria have not been developed yet for channelized streams and ditches; therefore, assessment of fish and macroinvertebrate community data for aquatic life use support is not yet possible for channelized streams in Minnesota. However, in this watershed channelized ditches and streams are contributing significant amounts of water to Hayden Lake and to the Partridge River. These may be contributing excess sediment, nutrients and contributing to low dissolved oxygen levels.

In addition the City of Staples has a network of ditches that were built as early as 1907 to divert wetland and floodplain water. County Ditch 45, JD05 and JD08 are within the City of Staples. The city has fixed many water issues in the past but is still dealing with flooding, excess stormwater and property destruction caused by excess water flows and pressure.

Protection Areas

Groundwater
The Crow Wing River Watershed portions of Stowe Prairie have been identified to participate in the Minnesota Department of Agriculture (MDA) Township Testing Program because the area was identified to have least 30% of the township having vulnerable geology and 20% of the township being in row crop production.

Undisturbed Areas
Crow Wing River Watershed contains five minor watershed rated at a protection classification of vigilance or protect. These undisturbed landscapes contribute to the overall health of water quality in both groundwater and surface water. Minor watersheds 12043 and 12046 are both greater than 80% undisturbed and minors 12044, 12045 and 12049 are between 60-80% undisturbed. Efforts should be made to educate and provide technical assistance to landowners with forests, wetlands and grasslands or who are interested in re-establishing these areas.

Priority Concern 1: Riparian buffers
Increase the amount of buffers along riparian areas to bring landowners into compliance of the Buffer Law. This will also contribute to diminishing the disturbed areas within these minor watersheds.
**Priority Concern 2: E.coli contributions**

Work with applicators and landowners to meet setbacks and timing requirements of manure and chemical fertilizer applications. Control cattle access to streams by encouraging rotational grazing and flash grazing practices. Work with the City of Bertha over the long term to improve wastewater discharge into the Partridge River and the City of Staples on their contribution to Hayden Creek. Work with producers to control feedlot runoff with Best Management Practices (BMPs). Further bacteria testing could be done to identify contributing E.coli areas or species.

**Priority Concern 3: Channelized streams and ditches**

Educate landowners on the importance of wetlands and the repercussions of ditching and tiling. Encourage stream restoration to remove channelized sections of stream. Work to develop a wetland inventory within the watershed to help identify, prioritize and restore wetland areas to help mitigate excess nutrient and water issues. Where upgrading or increasing maintenance on existing drainage is not possible encourage conservation practices on upland areas to limit sediment and nutrients in ditch water. Maintain culvert heights as directed by the Todd County Culvert Inventory. Work with the City of Staples in resolving stormwater and ditch water diversions.
12: Long Prairie River Watershed
Chapter III: LONG PRAIRIE RIVER WATERSHED

Watershed Overview
The Long Prairie River Watershed covers approximately 862 square miles and is located in the central part of the Upper Mississippi River Basin and encompasses all or parts of Douglas, Otter Tail, Todd, Morrison and Wadena counties. It is comprised of two ecoregions, the Northern Lakes and Forests and the North Central Hardwood Forests.

The dominant land use within the watershed is agricultural at 57%, grasslands and forests make up 17% and 14% respectively, surface water makes up eight percent and four percent is urban.

Municipalities located within the Long Prairie River Watershed include Motley, Philbrook, Eagle Bend, Clarissa, Browerville, Long Prairie, Miltona, Belle River, Carlos, Alexandria, Holmes City, Sarfield and Forada.

The Long Prairie River watershed includes more than 240 lakes greater than 10 acres in size and 884 miles of rivers and streams. The Long Prairie River begins in Douglas County and flows through Todd and Morrison counties before entering the Crow Wing River south of Motley. Major lakes include Lobster, Le Homme Dieu, Carlos, Miltona, Mary, Ida, Alexander, Shamineau and Fish Trap. Major rivers and streams include Long Prairie, Spruce Creek and Stormy Creek.

For more information from a watershed perspective and its overall health on a number of different criteria including hydrology, geomorphology, biology, connectivity and water quality refer to the Minnesota Department of Natural Resources (MNDNR) Watershed Health Assessment Framework online.

Todd County Portion Overview
In Todd County, the Long Prairie River Watershed is the largest in land area covering 479 square miles in the Central part of the County. The Todd County segment contains the largest portion of the watershed at 54.2%. The Long Prairie River is the largest river in the county and flows east to Long Prairie from Lake Carlos in Douglas County and then flows north northeast into the Crow Wing River.

Cities in this watershed include Eagle Bend, Clarissa, Browerville and Long Prairie. All four of these cities have Wellhead Protection Areas and adhere to a Wellhead Protection Plan. Twenty townships fall within this watershed including portions of Bartlett, Bruce, Eagle Valley, Germania, Leslie, Little Elk, Little Sauk, Long Prairie, Reynolds, Staples, Turtle Creek, Villard and Wykeham and all of Burleene, Eagle Valley, Fawn Lake, Hartford, Iona, Moran and Ward.

Geology in the area consists of the Wadena Lobe Glacier. The meltwater excavated the channels of the Long Prairie and Eagle River drainage ways. The Des Moines Lobe ice blocked southward flowing drainage along the Long Prairie and Sauk River ancestral channel and caused the southernmost boundary of the watershed. The Long Prairie River turns and flows north at Long Prairie because of the St. Croix moraine, a formation formed by the Superior Lobe which left large deposits of sediment.
The soils in these areas are directly related to the deposits left behind by the glaciers. The ability of the soils to absorb and transmit water is also affected by slope and topography. Infiltration rates and permeability affects run off rate and groundwater pollution potential. Land uses should always consider soil type as suitability may be limited. The drumlin upland areas contains soils which USDA has identified as Prime Farm Land whereas the bases of the drumlins are comprised of wetlands. The Eagle and Long Prairie River areas consist of mainly sands and gravels and have very high permeability and infiltration rates and is where most of the irrigation is found within the county.

Forty-one minor watersheds make up the hydrology of this area with elevation varying from 1218 feet to 1512 feet above sea level.

Major lakes over 150 acres include Rice #77006100 (624.90 acres), Rice #77014600 (520.42 acres), Long (367.85 acres), Beck (332.85 acres), Mud (319.82 acres), Thunder (222.49 acres), Latimer (204.86 acres), McCarrahan (202.90 acres), Rodgers (174.86 acres), Coal (173.12 acres), Charlotte (172.61 acres), Mud (171.30 acres), Mill (169.89 acres), Dempsey (167.93 acres) and Lawrence (167.92 acres).

Major rivers and streams over ten miles in length include Long Prairie River (72.65 miles), Eagle Creek (26.75 miles), Turtle Creek (20.58 miles) and Moran Creek (16.87 miles).

Major county and jurisdictional ditches over ten miles in length include CD32 (37.32 miles), CD25 (23.20 miles), CD20 (21.06 miles), CD41 (19.32 miles), CD18 (15.25 miles), CD19 (11.80 miles), CD41 (19.32 miles), CD04 (13.19 miles) and CD34 (11.26 miles).

**Surface Water**

**Public (Protected) Waters**

A list of public or protected waters is included in Appendix VIII of this document. This designation may imply special zoning, buffer or state and federal agency requirements. Public waters include lakes, rivers, streams, and wetlands designated under Minnesota Statutes, section 103G.005, subdivision 15, any lakes or wetlands listed in the DNR Public Waters Inventory.

The Ordinary High Water Level (OHWL) is the state defined boundary for protected water and is the elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape. Generally it is the point where natural vegetation changes from predominately aquatic to predominately terrestrial. It is important because certain property and water rights can be affected by the location. For example when working above the OHWL the Todd County Planning and Zoning Department may require a permit, whereas when working below the OHWL the Department of Natural Resources will require a permit. This pertains to lakes, stream, rivers and wetlands. For watercourses it is the elevation of the top of bank for the channel.

**Lakes of Biological Significance**

The goal of this list was to identify lakes that exhibit the highest quality features within any of the four assessed biological communities. Therefore, a lake needed to meet criteria for only one of the community types (aquatic plants, fish, birds, amphibians) to be identified as a Lake of Biological Significance. Occurrences of high-quality features within the community types determined the biological significance rank (outstanding, high or moderate).
There are several lakes within the watershed which have been identified as Lakes of Biological Significance by the Minnesota Department of Natural Resources (MNDNR). Lakes include Beck, Charlotte, Coal, Lawrence, Long (Fawn & Turtle Creek Twp. 77006900), Rice, Rogers, Turtle and West Nelson.

**Wild Rice Lakes**

Wild rice within a lake or river can imply good water quality and a healthy ecosystem. It not only provides structure, cover and food to different species but also protects shorelines from wind erosion and ties up nutrients increasing water quality. Resource managers have identified lakes throughout the state in an effort to preserve, restore and enhance this resource.

There are several lakes within the watershed which have been identified as containing wild rice by the MNDNR. Lakes include Beck, Jacobson, Lawrence, Little Pine, Mud, Pine Island (Fawn Lake Twp. 77007700) Rice (Turtle Creek Twp. 77006100), Rice (Little Elk Twp. 77023500), Rogers, Thunder, Tucker, Unnamed (77014000, 77017600, 77019700 & 77017800), West Nelson.

**Impaired Waters**

The federal Clean Water Act requires states to adopt water quality standards to protect lakes, streams, and wetlands from pollution. The standards define how much of a pollutant (bacteria, nutrients, turbidity, mercury, etc.) can be in the water and still meet designated uses, such as drinking water, fishing, and swimming. A water body is “impaired” if it fails to meet one or more water quality standards.

Impaired water bodies currently identified by the Minnesota Pollution Control Agency (MPCA) include only one lake, Lake Latimer (3 miles south of Long Prairie) for Nutrients/Eutrophication Biological Indicators (Phosphorus).

MPCA identified Impaired Streams include Eagle Creek (headwaters to Long Prairie River) and Moran Creek (headwaters to Long Prairie River) for Escherichia coli. All of the Long Prairie River (Fish Trap Creek to Crow Wing River, Moran Creek to Fish Trap Creek, Turtle Creek to Moran Creek, Eagle Creek to Turtle Creek, Spruce Creek to Eagle Creek, Lake Carlos to Spruce Creek) for Aquatic Life/Dissolved Oxygen. Harris Creek (Unnamed creek to Eagle Creek), Venewitz Creek (Charlotte Lake to Long Prairie River) for Aquatic Life/Fish or macroinvertebrate bioassessments.

<table>
<thead>
<tr>
<th>Waterbody Name</th>
<th>Long Prairie River Watershed Impairments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Prairie River</td>
<td>Dissolved Oxygen</td>
</tr>
<tr>
<td></td>
<td>F-IBI</td>
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<tr>
<td></td>
<td>Mercury</td>
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<tr>
<td>Eagle Creek</td>
<td>F-IBI</td>
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<td></td>
<td>E.coli</td>
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<tr>
<td>Moran Creek</td>
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<td></td>
<td>E.coli</td>
</tr>
<tr>
<td>Harris Creek</td>
<td>F-IBI</td>
</tr>
<tr>
<td>Venewitz Creek</td>
<td>F-IBI</td>
</tr>
<tr>
<td>Latimer Lake</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nutrients</td>
</tr>
</tbody>
</table>

13: Long Prairie River Watershed MPCA Impairments
Lakes with Measured Phosphorus Sensitivity
The phosphorus sensitivity significance index is a function of phosphorus sensitivity, lake size, lake total phosphorus concentration, proximity to PCA’s phosphorus impairment thresholds, and watershed disturbance. It is possible once the TMDL is complete for this watershed there will be sufficient information to add additional lakes and change the order of the current list.

Within the watershed there are a handful of lakes which have had enough data to compile a sensitivity rating for phosphorus by the MNDNR. Lakes include Dower, Horseshoe, Charlotte, Fawn, Turtle, Coal, Mill, Pine Island (Fawn Lake Twp. 77007700), Thunder, Rice (Turtle Creek Twp. 77006100) and Latimer.

For this specific watershed, lakes in orange below were given a restore classification while lakes in yellow were given a protect classification based on their sensitivity significance index.

The chart also signifies the lake’s total phosphorus (TP) loading sensitivity expressed as the loss of predicted Secchi disk water transparency (in inches) with 100 pounds of TP added. This loading is an estimate of total phosphorus and based on Minnesota’s eutrophication criteria for impairment for the specific lakes. A comparison chart of all of Todd County’s lakes was added for overall reference.
Trout Streams
Designated trout streams have special management restrictions regarding their recreational use and are particularly sensitive to minor alterations in their habitats. Within Todd County there are four designated trout streams by the Department of Natural Resources (DNR). Long Prairie River Watershed does not have any designated trout streams.

Aquatic Invasive Species
As of 2015 there are several waterbodies within Todd County which have one or more Aquatic Invasive Species (AIS) in them. In the Long Prairie River Watershed only the Long Prairie River (Zebra Mussels) is suspected of harboring AIS because Lake Carlos, the headwaters, is infected.
Todd County has developed an AIS Plan to help slow the spread of invasive species. Two major parts of the program, watercraft inspections and Zebra Mussel veliger monitoring are carried out in the watershed. Lakes were selected by the AIS committee and included lakes which were believed to be more at risk due to their recreational pressure and proximity to surrounding infected lakes. In addition to inspections and monitoring, education and outreach were carried out within the watershed.

Lakes which were selected for both inspections and monitoring were broken up into zones and in this watershed included: SE Zone – Long Lake, Swan Lake, Mound, Moose, Mons, Little Swan, Latimer, Charlotte and NE Zone – Dower, Big Lake, Beauty, Pine Island, and Thunder Lakes.

Todd County will continue the AIS program as long as support is continued through the state.

**Groundwater Monitoring**

The Department of Natural Resources (DNR) monitors groundwater levels through observation wells around the county. Their Cooperative Groundwater Monitoring (CGM) information can be found at [http://www.dnr.state.mn.us/waters/cgm/index.html](http://www.dnr.state.mn.us/waters/cgm/index.html). Information presented in the data has been gathered by the Todd County SWCD.

There are seven active observation wells located within the Todd County portion of the Long Prairie River Watershed. The wells vary in depth from 21 to 147 feet deep and some have been monitored since May 1978. An example of Obwell 77013 hydrograph is below. The well is 14 feet deep, is located just east of Clarissa and has been monitored since 1978. Monitoring shows a fairly consistent pattern of seasonal groundwater fluctuation over time.

![DNR Obwell Water #77013 Water Level](image)
City Drinking Water
The Long Prairie River Watershed has four municipalities which provide water services to residents. All have also
developed a Drinking Waters Supply Management Area (DWSMA) surrounding the city wells. As required by the
Minnesota Wellhead Protection Rule every ten years the cities must update their Wellhead Protection Plans.
These plans give detailed information on the area surrounding municipal wells and their vulnerability. They also
spell out specific goals for protection.

Browerville
The City of Browerville has two wells which serve a population of 735 people at 305 connections. Well 7 is 61
feet deep was constructed in 2007. Well 8 is 60 feet deep, was constructed in 2008. One is located at Gilles Ave
S and 7th St. W and the other is straight west, outside of town. Old city wells were located within close proximity
to each other at the end of St. John’s Ave N off of 8th St. W. One of these, Well 4 is an emergency use only well.
Part of the DWSMA is within the City of Browerville but the majority is in Hartford and Iona Township. The
vulnerability of the DWSMA is classified as moderate.

16: City of Browerville Drinking Water Supply Management Area (DWSMA)
Clarissa
The City of Clarissa operates two primary wells and one emergency well. They serve approximately 624 residents through 276 connections. Well 4 and 5 are 84 feet deep and were constructed late in 2003. They are located SW of town. The vulnerability of the DWSMA is classified as moderate and high depending on the location.

17: City of Clarissa Drinking Water Supply Management Area (DWSMA)
**Eagle Bend**
The City of Eagle Bend owns and operates one well and has an emergency backup well. It is 89 feet deep and serves a population of 535 people. It is located in the SE corner of the DWSMA area in primarily agricultural land. The DWSMA is partially located in the Crow Wing River Watershed and partially located in the Long Prairie River Watershed. The vulnerability of the DWSMA is classified as moderate.

![Map of Eagle Bend DWSMA](image)

*18: City of Eagle Bend Drinking Water Supply Management Area (DWSMA)*

**Long Prairie**
The City of Long Prairie has five wells which serve a population of approximately 3500 people with over 1008 connections. They vary in depth from 72 to 201 feet deep and were constructed between 1992 and 2003. The DWSMA vulnerability is classified as low, medium and high depending on the area.
**Private Drinking Wells**

The Minnesota Department of Agriculture (MDA) will begin a Township Testing program in Todd County starting 2016 to assess the level of nitrates in private wells. Ward, Hartford, Burleene and Round Prairie Township residents will be invited to participate. These townships were selected because at least 30% of the township has vulnerable geology and 20% of the township is in row crop production.

Any person in the county can easily and inexpensively get their well water tested. The Todd County SWCD and Extension Office provide sampling instructions, containers and interpretation of the results.

**Irrigation Wells**

Irrigation wells are permitted through the DNR through a system called MPARS. This is done in an effort to prevent well interference with private domestic well owners. The Long Prairie River Watershed has the highest amount of active permitted irrigation in the county at 94,530 gallons per minute permitted on 156 wells or 69% of the total use within Todd County. The main use is for crop irrigation which encompasses 90% of the use. Other uses in order from highest to lowest are for drinking water, industrial or food processing, pollution containment and basin level maintenance.

Irrigation water management primarily aims to control the volume and frequency of irrigation water applied to crops, so as to meet crop needs while conserving water resources. Recommendations on irrigation water Best Management Practices (BMPs) are provided by the Minnesota Department of Agriculture. Todd County also works in partnership with Hubbard and Wadena counties to provide an Irrigator Scheduler Program to local irrigators. One technician out of the Wadena SWCD office manages this program.

There is not enough data to know how additional irrigation permits may change groundwater supply or the potential impacts to nearby lakes, streams or rivers. Currently the MNDNR has three pilot groundwater management areas in the state to look closer at these issues. See Appendix III for more information on well locations and surficial aquifers within this watershed.

**Land Cover and Use**

General land cover in the county can be divided into four primary categories: Agriculture, Woodland, Water and Wetlands and Other including urban and built up areas. Watersheds are composed of groundwater recharge and storm water runoff generation areas. As far as water quality is concerned, forests and impervious surfaces typically found in urban areas represent the two ends of that spectrum, with other land covers falling in between. In addition to forests, wetlands and native grasslands also serve a special role in water quality. Wetlands offer flood protection, shoreline erosion control and help to filter and improve water quality. Native grasslands offer similar benefits as wetlands and forested areas such as water filtration and erosion control. All three offer the additional benefits of harboring wildlife habitat, building resilient ecosystem communities and are more robust during extreme weather conditions.

Agriculture presents many opportunities and challenges. Most watersheds within Todd County have substantial agricultural land cover with areas next to lakes and streams posing the highest risk to clean water. Through conservation minded principals and best management practices in cropping fields, grazing operations and feedlots these areas can add a greater awareness to our role of protecting and preserving natural resources. The Water Plan Task Force Committee felt strongly that run-off from fields be clean and that excess water from drainage not impact neighbors.
Minor or subwatersheds were assessed by the Todd County SWCD and GIS Department in order to determine a protection approach to water conservation using current land cover data. Depending on the amount of wetland and forested area within a minor watershed determined the amount of water quality protection which exists. Surface water was not included in the overall calculation as it was based on percent disturbed land cover. Disturbed land cover included agricultural (cropped and pasture), urban and built up areas (barren and quarries included) as identified by 2012 Landfire data.

As mentioned above there are 41 minor watersheds in this area. They range in percent disturbed from 12% to 63% and protection classifications vary from Vigilance to Restore making it the most diverse watershed in terms or protection strategies. For a more detailed view of each minor watershed maps will be available on the Todd County website as they are developed.

Agriculture

*Crop*

The Long Prairie River Watershed has a significant portion which is rated as Prime Farmland or Farmland of Statewide Importance. See Appendix III for maps pertaining to this land cover. Not only do these soils produce rich agricultural land but it also protects the quality of drinking water and supports wildlife habitat. Preserving agricultural land in the county is a high priority. In the 2015 Water Plan Survey over fifty percent of county residents responded that the destruction of healthy soils was one of the greatest threats to Todd County’s agricultural community. Installing and adhering to crop BMPs is the watershed’s best effort at protecting soil for the future of farming.

There are many in field best management practices (BMPs) which can reduce erosion, build soil and manage water to enhance soils performance and profitability. Below is a table from the 2015 University of Minnesota Extension Fields to Streams, Managing Water in Rural Landscapes.

In addition, the Minnesota Department of Agriculture (MDA) works to monitor nutrients and pesticides in Minnesota’s waters. The MDA has partnered with East Otter Tail SWCD and Todd County to offer basal stalk nitrate testing to area corn farmers. Results are used to offer nitrogen management changes where appropriate.
<table>
<thead>
<tr>
<th>PRACTICES</th>
<th>EFFECTS</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Increase spring transpiration</td>
</tr>
<tr>
<td></td>
<td>Increase infiltration</td>
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<tr>
<td></td>
<td>Increase soil water holding capacity</td>
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<td></td>
<td>Reduce total water (and nitrogen) delivery</td>
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<td></td>
<td>Increase denitrification</td>
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<td></td>
<td>Reduce n and sediment delivery</td>
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<tr>
<td></td>
<td>Increase open water evaporation</td>
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<tr>
<td></td>
<td>Reduce peak flows</td>
</tr>
<tr>
<td></td>
<td>Reduce in-stream velocity</td>
</tr>
<tr>
<td>1. IN-FIELD: CROP AND SOIL MANAGEMENT</td>
<td></td>
</tr>
<tr>
<td>Perennial crops, and crop rotations with perennial or winter annuals</td>
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</tr>
<tr>
<td>Cover crops</td>
<td>●</td>
</tr>
<tr>
<td>Reduced tillage, contour cropping and residue management</td>
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</tr>
<tr>
<td>Compaction management</td>
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</tr>
<tr>
<td>Manure application?</td>
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</tr>
<tr>
<td>2. IN-FIELD: DRAINAGE WATER MANAGEMENT</td>
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<tr>
<td>Alternative drainage design (depth, spacing, capacity)?</td>
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<tr>
<td>Controlled drainage</td>
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</tr>
<tr>
<td>Alternative tile inlets</td>
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<tr>
<td>3. IN-FIELD AND EDGE-OF-FIELD: SURFACE FLOW MANAGEMENT</td>
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</tr>
<tr>
<td>Grassed waterways</td>
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<td>Filter strips, contour buffer strips</td>
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<tr>
<td>4. IN-FIELD AND EDGE-OF-FIELD: WATER STORAGE AND INFILTRATION</td>
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</tr>
<tr>
<td>Saturated buffers</td>
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<td>Restored and constructed wetlands</td>
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</tr>
<tr>
<td>WASCOBs, terraces, and detention basins</td>
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</tr>
<tr>
<td>Ponds and irrigation reservoirs</td>
<td>●</td>
</tr>
<tr>
<td>Large retention basins</td>
<td>●</td>
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<tr>
<td>5. DITCH CHANNEL: WATER RETENTION</td>
<td></td>
</tr>
<tr>
<td>Structures for water control, including weirs and restricted size culverts</td>
<td>●</td>
</tr>
<tr>
<td>Two-stage ditch with restricted size culverts</td>
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<tr>
<td>6. RIPARIAN AREA: RESTORATION AND PROTECTION</td>
<td></td>
</tr>
<tr>
<td>Riparian vegetation</td>
<td>●</td>
</tr>
<tr>
<td>Streambank, bluff, and shoreline protection</td>
<td>●</td>
</tr>
<tr>
<td>Restore channel meanders</td>
<td>●</td>
</tr>
</tbody>
</table>

20: 2015 University of Minnesota Extension Fields to Streams, Managing Water in Rural Landscapes- Best Management Practices (BMPs) and Effects
Livestock

Animal agriculture is a necessary and important part of our lives. Minnesota's livestock and poultry producers help support communities by generating tax revenue and creating jobs. As of 2011 Todd County ranks within the top ten counties for turkey production, cattle and calves, beef and milking cows according to the Minnesota Department of Agriculture (MDA).

As of 2014 there were 55 feedlots in shoreland areas and 675 feedlots which were required to be registered. Owners which are required to be registered include animal feedlots which are capable of holding 50 or more animal units or the manure for those animals or within shoreland, an area with ten or more but now greater than 50 animal units or the manure for those animals.

There are over 55,000 animal units within the Long Prairie River Watershed with six minors with over 2,000 animal units in each: 14057, 14046, 14043, 14040, 14035 and 14027.

Feedlots can be a water quality concern because of three of the most common pollutants to surface and groundwater: phosphorus, nitrates and pathogenic bacteria. While not all bacteria are pathogenic or found in livestock manure contamination by pathogens is a health hazard.

Water quality is protected through the Minnesota State Feedlot Rules by limiting subsurface and surface water discharges as well as restricting the location of new feedlots to set distances from private wells, shoreland and community or school water supply areas. Discharges include animal manure, manure contaminated runoff or process wastewater produced by milk house wastes or flush canals.

Drainage

In order to enable and enhance agricultural production, transportation and economic development drainage ditches were built. Water from previously unconnected depressions of saturated soil could then be conveyed to streams. Many streams and rivers were also straightened and widened for these reasons. All of the public ditch systems within the Long Prairie River Watershed were constructed between 1904 and 1923 with the exception of a segment of CD22 which was constructed in 1983. Within the watershed there are almost 253 miles of county or jurisdictional ditches. Currently it is unknown how many miles of private ditches are in the watershed.

Subsurface drainage or tiling have historically been installed to drain wet areas which were not connected to ditch systems. More recently pattern tiling has been popular as it can remove water from entire fields. Todd County does not keep records of the amount or locations of tile as they are primarily on private lands and it is not regulated.

Agricultural drainage ultimately alters hydrology as its sole purpose is to reduce storage of excess moisture in the soil to accommodate air in the root zone to grow crops. The impact ultimately depends on the field conditions, precipitation, type of drainage, system design and the scale in relation to the watershed. Potential impacts include: Reduced time that water is being stored in soil, change of water pathways over land, decreased evaporation, increase in annual transpiration, increase in the amount of water to streams and rivers, reduction, delay or extension of peak flow within a stream or river and reduction in overland flow.

Concerns with agricultural drainage within the county include increased flows in rivers and streams, sediment transport, chemical transport and the uncertain effect on groundwater aquifer levels. High crop and land prices have the potential of increasing conversion of pasture and forage land to row crops, which in turn may lead to the installation of new drainage systems or drainage improvements to existing systems. Todd County has
developed a Drainage Management Plan as well as updated its culvert inventories. More could be done to mitigate water from drainage by constructing or restoring wetlands within the county.

Adequate drainage can be a critical component of a successful farm operation while at the same time new drainage and drainage improvements represent an opportunity to design and install systems in ways that help reduce nutrient losses into surface water and positively affect the timing and flows of drainage water into surface waters. These efforts combined with wetland restoration and water retention initiatives can have positive impacts upon water quality in agricultural landscapes. The Minnesota Department of Agriculture (MDA) has several recommendations regarding agricultural drainage and should be consulted when these opportunities arise. Conservation drainage or the use of drainage practices that are designed to provide the benefits of drainage while minimizing negative impacts on the environment should be the norm within the watershed.

Dams
Dams maintain lake levels and impound water for flood control, power production and water supply. Within Todd County there are 17 active dams. Dams also present the challenge of aquatic connectivity meaning organisms may not be able to move upstream or downstream. Barriers such as dams and road crossings alter flows in ways that can increase temperature, floods and cause erosion leading to increased sediment loads. This watershed has six listed dams only three of which are active, Stoerzinger Pond No. 2, Biermeier Pond and Staples WMA. The remaining were either not built or have been removed including one on the Long Prairie River in Leslie Township and one right next to it which flowed to Lake Osakis.

Forested Land
The Long Prairie River is 26% forested with most being classified as Deciduous Closed forest. Forested land in Todd County comprises 152,000 acres and almost 80,000 of those acres are in this watershed. See Appendix III for maps pertaining to this land cover.

Wetlands
The U.S. Corps of Engineers regulates wetlands according to Section 404 of the Clean Water Act. Additionally, the Minnesota Wetland Conservation Act regulates all wetlands in MN and is administered by Local Government Units. Regulated activities include draining, filling or excavating a wetland. Local permission can be obtained by contacting the Todd County Wetland Conservation Act (WCA) Technician. They will determine wetlands within the site and give recommendations as to avoid impacting the wetland. If disturbance is unavoidable the landowner will be required to minimize impacts to the wetland and finally mitigate those impacts to replace the loss of the wetland’s functions and values, in Todd County the minimum is a 2 to 1 acre replacement.

Wetlands serve many purposes and their preservation and restoration is a priority. Loss of wetlands can affect water quality, ground water quantity, floodwater retention, wildlife and many other environmental and societal benefits. A wetland inventory has not been developed within Todd County but would help identify, prioritize and restore wetland areas to help mitigate excess nutrient and water issues.

The Long Prairie River Watershed is 23% wetland with most being classified as shrub and emergent wetland (10.45% and 10.43%). Wetland in the watershed comprises almost 70,000 acres. See Appendix III for maps pertaining to this land cover.
Native Plant Communities
A native plant community is a group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. The Minnesota Department of Natural Resources (MNDNR) has identified several areas within the watershed which fall into this category.

Within the watershed 68 percent of the minor watersheds contain native plant communities. The largest concentrations are found on the northeastern border of the watershed, specifically in Turtle Creek and Fawn Lake Township. Notable portions are also found around the Long Prairie River in Leslie, Long Prairie and Hartford Townships as well as near McCarrahan Lake.

Municipalities
Browerville, Clarissa, Eagle Bend and Long Prairie are all located within this watershed and all of them have watercourses running through them. They also have a significant amount of impervious surface and therefore stormwater runoff. All maintain city sewers, have holding ponds and provide public water to residents.

Browerville
The City of Browerville has just under 700 residents. Eagle, Harris and Drayer Creek as well as the Long Prairie River are all within the city limits. Many wetlands also are within the city, mainly around the waters mentioned above but not all.

Clarissa
The City of Clarissa has just over 500 residents. Only Eagle Creek flows through the city limits. Wetlands also are present, mainly around the waters mentioned above but not all.

Eagle Bend
The City of Eagle Bend has just under 800 residents. Only Eagle Creek flows through the city limits but there are several wetland complexes also within the city.

Long Prairie
The City of Long Prairie has just under 3,500 residents. The Long Prairie River, Venewitz Creek and Lake Charlotte are all within the city limits. Many wetlands also are within the city, mainly around the waters mentioned above but not all.

Stormwater from the City of Long Prairie drains toward the Long Prairie River and Venewitz Creek. A grassed seepage basin is located near Well #6, providing drainage for residential and public school property runoff.

According to Part One of the Well Head Protection Plan (WHPP), Charlotte Lake is hydraulically connected to the aquifer used by the city wells and provides a significant amount of recharge to wells number seven, eight and nine. Through analysis, it was determined approximately 70% of water from Well #7 and 30% from Well #8 comes from the Charlotte Lake. Although Well #9 was not evaluated for connectivity, it exists in the same aquifer and vicinity as the other two wells and it is assumed to have similar dilutions from the lake.

Recreational & Public Land
Private recreational land makes up a significant portion of land within Todd County. Both non-homestead lakeshore and non-homesteaded seasonal recreation consisting mostly of forested and wetlands fall in this category. In a survey conducted as part of the Priority Concerns Scoping Document (PCSD) hunting and fishing (59.8%) and swimming, canoeing, boating or jet skiing (35.9%) were the top two responses to the question,
“When you think about Todd County Water what comes to mind for you?” The highest number of respondents also rated “Wildlife Habitat” as seeing some improvements within the county.

For the purposes of this plan public land within Todd County falls within four main categories listed below. Exact locations of local parks can be obtained from the Todd County Planning & Zoning office. Federal and state managed areas are shown on the Minnesota Public Recreation Information Maps (PRIM maps) online.

**City, Township or County Parks**
Established for various reasons but can provide excellent recreational opportunities. Dower Lake Recreational Area is located outside of Staples, Browerville has South Park and Motzko Field, Clarissa has a city park, Eagle Bend has a city park and Nelson Park, Long Prairie has Lake Charlotte Park, Westside Park and the Todd County Fairgrounds.

**Wildlife management areas (WMAs)**
Consist of wetlands, uplands, or woods owned and managed for wildlife by the Department of Natural Resources (DNR). Hunting and various recreational opportunities are open to the public. There are a number of WMA’s in this watershed including, Lawrence Lake, Staples, Long Prairie River, Sheets Lake, Turtle Creek, Phillbrook, Kobliska, Hartford, Iona, Burleene and Lasher Lake.

**State Forests/Parks/Landings**
There are no state forests or parks in this watershed but there are a number of DNR landings including on the Long Prairie River, Latimer, Charlotte, Mill, Coal, Thunder, Rice, Horseshoe, Turtle, Long and Dower.

**Wildlife Protection Areas (WPAs)**
Most of these federally managed wetlands and surrounding uplands are open to hunting and various recreational opportunities. There are no WPAs in this watershed.

**Regulated Development**

**County Zoning**
Todd County has had a land use ordinance since March 18, 1976 and a shoreland ordinance in effect since July 1, 1972. The last comprehensive update was in May 2012 and it will continue to be modified with zoning requirements as necessary. The county has no jurisdiction over municipalities with land use or shoreland ordinances. If new ordinances are developed in Todd County or the municipalities as a result of the Comprehensive Water Plan the Planning and Zoning Department, County Attorney, County Commissioners and any other necessary agency to ensure the new ordinances are compatible with existing ordinances.

**Municipal Zoning**
The cities of Browerville, Clarissa, Eagle Bend and Long Prairie enforce their own local zoning ordinances and permits can be obtained by contacting the city office.

**Township Zoning**
Bruce Township is one of three townships in the county which enforces their own local ordinances and permits can be obtained by contacting the township clerk.

**Additional Zoning Entities**
Sylvan Shores Property Owners Association has their own set of governing documents for parcels within the association which includes the requirement for a Sylvan Shores Permit for certain land use activities.
There are no additional zoning entities and there are no official watershed districts within the Long Prairie River Watershed.

**Pollution**

**Permitted Pollution**
The Long Prairie River Watershed has several sites which have obtained permits to discharge effluent. The permit controls water pollution by regulating point source pollution. Point sources are discrete conveyances such as pipes or man-made ditches. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. Examples of this would be Wastewater Discharge Permits for the Alexandria Lake Area Sanitary District which discharges into the Lake Carlos chain of lakes, the Cities of Carlos, Long Prairie, Browerville, Clarissa and Eagle Bend Waste Water Treatment Facilities and the Long Prairie Superfund Site which discharges treated groundwater into the Long Prairie River. To find out more about permitted facilities and different permit types in the Long Prairie River Watershed see Appendix IX for more information.

**Non-Point Source Pollution**
Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many discrete sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands and ground waters.

The major source of NPS in the watershed is exposed soil leading to wind and water erosion, groundwater withdrawal, fertilizer and manure runoff, failing septic systems, internal loading, upstream lake loading, livestock overgrazing in streams, wildlife fecal runoff and possibly wetlands. For more information about NPS see Appendix X.

**Individual Sewage Treatment System Inspections**
Todd County requires Individual Sewage Treatment System (ISTS) inspections to be completed before finalizing a sale on a home. In addition the Todd County Planning and Zoning department have systematically been conducting ISTS inspections around several lakes around Todd County. Within the watershed there has only been one lake sampled as part of this program and it was Latimer in 2011. Many which were originally found out of compliance have since been upgraded. In 2017 Long Prairie Township is scheduled to begin ISTS inspections.

**Watershed Restoration and Protection Areas**

**Restoration Areas**

**Latimer Lake**
Latimer is a 203 acre lake south of Long Prairie. Water quality has been poor over the entire time of record from the late 1970’s to early 1980’s. Primary stressors has been identified as an excess of nutrients, both externally and internally loading. Inlets include Roundup Lake to the south and a ditch system near the public access on the east side of the lake. It outlets on the northwest corner of the lake. Seventy percent of the 1,992 acre watershed is disturbed. A 40% load reduction of phosphorus would have to be met in order to reach the lakes threshold limit for potential impairment. Of the 2,194 lakes within the priority ranking Latimer was placed in the highest category.
Venewitz Creek
Primary stressors for identified for the creek which runs from Lake Charlotte to the Long Prairie River through the City of Long Prairie are altered hydrology and bedded sediments.

Harris Creek
Primary stressors identified for the creek which runs to Eagle Creek are altered hydrology, fish passage, habitat, dissolved oxygen, phosphorus and bedded sediments.

Long Prairie River
This river is not only the largest but is a waterbody which defines the county. Impairments identified for the river which runs from Lake Carlos to the Crow Wing River are low dissolved oxygen, fish IBI, mercury in fish tissues and the potential for municipal and industrial discharges to cause ammonia toxicity was determined.

Protection Areas
Lake Charlotte
This lake has been identified as a Lake of Biological Significance by the Department of Natural Resources with the highest rating of Outstanding. The lake also is within the City of Long Prairie’s drinking water recharge area and has a public park with beach and swimming area. Seventy-four percent of the contributing 9,822 acre watershed is disturbed. The predicted total phosphorus load is below the threshold for the lake but still 30 pounds above the target total phosphorus lake concentration, which is a goal for improving water quality. Of the 2,194 lakes within the priority ranking Charlotte was placed in the highest category.

Horseshoe Lake
Seventy percent of the 1,100 acre contributing watershed is disturbed. The predicted total phosphorus load is below the threshold for the lake but still 16 pounds above the target total phosphorus lake concentration, which is a goal for improving water quality. Of the 2,194 lakes within the priority ranking Horseshoe was placed in the highest category.

Dower Lake
This lake is a highly recreated lake outside the City of Staples. It also has a significant native plant community of Oak and Maple trees. Thirty-five percent of the 1,846 acre contributing watershed is disturbed. The predicted total phosphorus load is below the threshold for the lake but still 13 pounds above the target total phosphorus lake concentration, which is a goal for improving water quality. Of the 2,194 lakes within the priority ranking Dower was placed in the highest category.

Turtle Lake
This lake has been identified as a Lake of Biological Significance by the Department of Natural Resources with the highest rating of Outstanding. Only nineteen percent of the 502 acre contributing watershed is disturbed. The predicted total phosphorus load is below the threshold for the lake but still 14 pounds above the target total phosphorus lake concentration, which is a goal for improving water quality. Of the 2,194 lakes within the priority ranking Turtle was placed in the highest category.

Priority Concern 1: Sedimentation of the Long Prairie River
Encourage landowners and cities to adopt Best Management Practices (BMPs) of installing riparian buffers, erosion control and storm water control measures. Encourage practices such as contour cropping, grassed waterways, conservation tillage and sediment basins to discourage further sedimentation. Limit sediment and nutrients in contributing ditch water through installing upland practices. Discourage further channelization of
ditches and waterways within the benefited area of the Long Prairie River. Work to develop a wetland inventory within the watershed to help identify, prioritize and restore wetland areas to help mitigate excess nutrient and water issues.

**Priority Concern 2: Groundwater recharge and DWSMA Protection**
Work with cities to develop and maintain Drinking Water Supply Management Areas (DWSMAs). Work with landowners within Wellhead Protection Areas to adopt BMPs for nutrient management and chemical applications, seal abandoned wells, close abandoned manure pits and upgrade failing septic systems.

**Priority Concern 3: Chemical Pollution Control**
Encourage nitrogen and phosphorus reductions by adhering to nutrient and manure management BMPs. Encourage landowners and cities to adopt BMPs of installing riparian buffers, erosion control and storm water control measures. Encourage contour cropping, grassed waterways, conservation tillage and sediment basins to discourage further sedimentation. Work with the cities of Carlos, Long Prairie, Browerville, Clarissa and Eagle Bend and industrial producers along waterways in controlling stormwater and/or retention pond overflows. Work with the City of Long Prairie to resolve contaminated sites within the city. Educate the public on the detrimental effects of degrading wetlands and the role they serve. Educate the public on the use of tiling and effluents from them. Educate the public on the risks associated with chemical pollution particularly endocrine disrupting chemicals.
Mississippi - Brainerd Watershed
Minor Watersheds

<table>
<thead>
<tr>
<th>ID</th>
<th>Stream Name</th>
<th>Area (sq. mi)</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>10051</td>
<td>Elk River</td>
<td>7.48</td>
<td>5.85%</td>
</tr>
<tr>
<td>10075</td>
<td>Little Elly River</td>
<td>15.33</td>
<td>12.01%</td>
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<tr>
<td>10073</td>
<td>Unknown</td>
<td>10.60</td>
<td>10.37%</td>
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<tr>
<td>10097</td>
<td>Iron Creek</td>
<td>4.00</td>
<td>3.13%</td>
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<tr>
<td>10093</td>
<td>Swan River</td>
<td>2.99</td>
<td>2.34%</td>
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<tr>
<td>10405</td>
<td>Molly Creek</td>
<td>7.45</td>
<td>5.89%</td>
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<tr>
<td>10094</td>
<td>Taylor Creek</td>
<td>0.02</td>
<td>0.02%</td>
</tr>
<tr>
<td>10130</td>
<td>Kaman Creek</td>
<td>7.80</td>
<td>6.03%</td>
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<td>10131</td>
<td>Swan River</td>
<td>7.92</td>
<td>6.03%</td>
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<td>10132</td>
<td>Swan River</td>
<td>7.35</td>
<td>5.75%</td>
</tr>
<tr>
<td>10133</td>
<td>Big Swan Lake</td>
<td>20.17</td>
<td>15.48%</td>
</tr>
<tr>
<td>10134</td>
<td>Orangeville Creek</td>
<td>6.01</td>
<td>4.70%</td>
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<td>10135</td>
<td>Swan River</td>
<td>7.29</td>
<td>5.75%</td>
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<tr>
<td>Total</td>
<td>127.60</td>
<td>100.00%</td>
<td></td>
</tr>
</tbody>
</table>

Minor Watershed Boundary
- Lake
- City Limit
- State Highway
- County State Aid Highway
- County Road

Created by:
Todd County GIS
215 1st Ave E, Ste. 102
Long Prairie, MN 56347
320.725.4349

Data Sources:
Watershed Data - MN DNR
Impaired Waters - MN PCA
County Data - Todd County GIS

Todd County GIS has made every effort to provide the most accurate and up-to-date information available and is not responsible for any unforeseen errors or omissions.

21: Mississippi River Brainerd Watershed
Chapter IV: MISSISSIPPI RIVER
BRainerd Watershed

Watershed Overview
The Mississippi River - Brainerd Watershed covers 1,687 square miles in the north central part of the Upper Mississippi River Basin in central Minnesota and encompasses all or parts of Aitkin, Cass, Crow Wing, Morrison and Todd counties. The majority of the watershed is within the North Central Hardwood Forest with small sections in the Northern Lakes and Forests ecoregion.

The dominant land use within the watershed is forested land at 42%, while grasslands and shrub wetlands make up 38%, agricultural row crops make up ten percent, surface water accounts for six percent, and four percent is urban.

Municipalities located within the Mississippi River Brainerd include Kimberly, Aitkin, Cuyuna, Crosby, Brainerd, Baxter Fort Ripley, Randall, Little Falls and Swanville.

The watershed has approximately 2,149 total river miles and contains 212 lakes greater than 10 acres in size. The watershed boundary begins in Aitkin County where the Mississippi River flows through the cities of Aitkin, Brainerd/Baxter, and Little Falls. Major lakes include Cedar, Farm Island, Bay, South Long and Rice. Major rivers and streams include the Mississippi, Spring Branch, Rice, Rabbit and the Nokasippi.

For more information from a watershed perspective and its overall health on a number of different criteria including hydrology, geomorphology, biology, connectivity and water quality refer to the Minnesota Department of Natural Resources (MNDNR) Watershed Health Assessment Framework online.

Todd County Portion Overview
In Todd County, The Mississippi River - Brainerd Watershed is the third largest in land size covering 128 square miles along the South-East side of the County. The Todd County portion is 7.6% of the total watershed.

Cities in this watershed include Burtrum, Grey Eagle and Swanville. Both Grey Eagle and Swanville have Source Water Assessment Areas. Swanville’s area mainly falls inside Morrison County and Grey Eagle falls within this watershed and the Sauk River Watershed. Townships include portions of Birchdale, Bruce, Grey Eagle, Little Elk, Long Prairie, Round Prairie and Turtle Creek and all of Burnhamville.

Geology in the area consists of the St. Croix Moraine complex which makes up a dramatic landscape of hills and many of Todd County’s lakes. The terminal moraines were formed by the Superior Lobe ice which deposited Cromwell Formation sediment. It deposited enough sediment to block the Long Prairie River from flowing further east and forcing it north. The short steep slopes extend in several directions and because of the terrain this watershed has maintained many native plant communities and is heavily forested. This portion of the county is drained by the Swan River which flows into Morrison County at Swanville which also is the lowest point in elevation within the county at 1,162 feet above sea level.

The soils in these areas are directly related to the deposits left behind by the glaciers. The ability of the soils to absorb and transmit water is also affected by slope and topography. Infiltration rates and permeability affects
run off rate and groundwater pollution potential. Land uses should always consider soil type as suitability may be limited. Wetlands are found throughout this watershed and soils developed in this moraine area are poorly to moderately drained. Water slowly penetrates those soils and moves slowly through them once absorbed. In areas of greater slope and soil texture faster infiltration rates are found. Areas of USDA identified Prime Farmland are found more in the southern part of the watershed.

Thirteen minor watersheds make up the hydrology of this area with elevation varying from 1162 feet to 1513 feet above sea level.

Major lakes over 150 acres include Big Swan (1,061.54 acres), Long (469.32 acres), Twin (317.34 acres), Pine Island (295.68 acres), Big (295.29 acres), Trace (286.85 acres), Mound (277.99 acres), Beauty (242.21 acres), Lady (224.50 acres), Little Rice (186.93 acres) and Little Swan (176.99 acres).

Major rivers and streams over five miles in length include Swan River (9.27 miles), Schwanke Creek (6.73 miles) and Molly Creek (5.10 miles).

There is only one major county ditch over five miles in length, it is CD40 (8.92 miles).

**Surface Water**

**Public (Protected) Waters**

A list of public or protected waters is included in Appendix VIII of this document. This designation may imply special zoning, buffer or state and federal agency requirements. Public waters include lakes, rivers, streams, and wetlands designated under Minnesota Statutes, section 103G.005, subdivision 15, any lakes or wetlands listed in the DNR Public Waters Inventory.

The Ordinary High Water Level (OHWL) is the state defined boundary for protected water and is the elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape. Generally it is the point where natural vegetation changes from predominately aquatic to predominately terrestrial. It is important because certain property and water rights can be affected by the location. For example when working above the OHWL the Todd County Planning and Zoning Department may require a permit, whereas when working below the OHWL the Department of Natural Resources will require a permit. This pertains to lakes, stream, rivers and wetlands. For watercourses it is the elevation of the top of bank for the channel.

**Lakes of Biological Significance**

The goal of this list was to identify lakes that exhibit the highest quality features within any of the four assessed biological communities. Therefore, a lake needed to meet criteria for only one of the community types (aquatic plants, fish, birds, amphibians) to be identified as a Lake of Biological Significance. Occurrences of high-quality features within the community types determined the biological significance rank (outstanding, high or moderate).

There are several lakes within the watershed which have been identified as Lakes of Biological Significance by the Minnesota Department of Natural Resources (MNDNR). Lakes include Pine Island, Coal, Beauty, Little Swan, Mons, Bass, Big Swan, Long, Lady, Mound and Pepin.
Wild Rice Lakes
Wild rice within a lake or river can imply good water quality and a healthy ecosystem. It not only provides structure, cover and food to different species but also protects shorelines from wind erosion and ties up nutrients increasing water quality. Resource managers have identified lakes throughout the state in an effort to preserve, restore and enhance this resource.

There is one lake within the watershed which has been identified as containing wild rice by the MNDNR, it is Twin Lakes in Grey Eagle Township. Reports of wild rice have been verified in Big Swan Lake as well.

Impaired Waters
The federal Clean Water Act requires states to adopt water quality standards to protect lakes, streams, and wetlands from pollution. The standards define how much of a pollutant (bacteria, nutrients, turbidity, mercury, etc.) can be in the water and still meet designated uses, such as drinking water, fishing, and swimming. A water body is “impaired” if it fails to meet one or more water quality standards.

Impaired water bodies currently identified by the Minnesota Pollution Control Agency (MPCA) include Long Lake for mercury in fish tissue and the Swan River (Big Swan headwaters to Morrison County) for dissolved oxygen.

<table>
<thead>
<tr>
<th>Waterbody Name</th>
<th>Mississippi River Brainerd Watershed Impairments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big Swan</td>
<td>Mercury</td>
</tr>
<tr>
<td>Long Lake</td>
<td>Nutrients, Mercury</td>
</tr>
<tr>
<td>Swan River</td>
<td>Fecal Coliform*, Dissolved Oxygen</td>
</tr>
<tr>
<td>Trace Lake</td>
<td>Nutrients</td>
</tr>
<tr>
<td></td>
<td><strong>Year Listed</strong></td>
</tr>
</tbody>
</table>

* Removed from Inventory - Restored By Corrective Actions

22: Mississippi River Brainerd Watershed MPCA Impairments

Lakes with Measured Phosphorus Sensitivity
The phosphorus sensitivity significance index is a function of phosphorus sensitivity, lake size, lake total phosphorus concentration, proximity to PCA’s phosphorus impairment thresholds, and watershed disturbance. It is possible once the TMDL is complete for this watershed there will be sufficient information to add additional lakes and change the order of the current list. Within the watershed there are a handful of lakes which have had enough data to compile a sensitivity rating for phosphorus by the MNDNR. Lakes include Mons, Little Swan, Mound, Lady, Long, Buckhead, Big Swan, Moose and Trace.

For this specific watershed, lakes in orange below were given a restore classification while lakes in yellow were given a protect classification based on their sensitivity significance index.

The chart also signifies the lake’s total phosphorus (TP) loading sensitivity expressed as the loss of predicted Secchi disk water transparency (in inches) with 100 pounds of TP added. This loading is an estimate of total...
phosphorus and based on Minnesota’s eutrophication criteria for impairment for the specific lakes. A comparison chart of all of Todd County’s lakes was added for overall reference.

### All Todd County Inches Lost of Water Clarity
(For every 100 pounds phosphorus)

- **Bass**: 71.5
- **Turtle**: 67.0
- **Cedar**: 67.0
- **Pine Island**: 62.3
- **Horseshoe**: 62.3
- **Mound**: 58.5
- **Fawn**: 58.5
- **Mill**: 58.5
- **Dower**: 52.9
- **Coal**: 52.9
- **Long**: 52.9
- **Mons**: 52.9
- **Fairy**: 52.9
- **Mary**: 52.9
- **Thunder**: 143
- **Charlotte**: 143
- **Buckhead**: 143
- **Lady**: 143
- **Moose**: 143
- **Long**: 7.7
- **Little Swan**: 7.7
- **Latimer**: 4.7
- **Little Osakis**: 4.7
- **Trace**: 4.7
- **Big Birch**: 4.7
- **Little Birch**: 4.7
- **Maple**: 4.7
- **Rice**: 4.7
- **Hayden**: 4.7
- **Big Swan**: 4.7
- **Goose**: 4.7
- **Mud**: 4.7
- **Fall**: 4.7
- **Guernsey**: 4.7
- **Little Saus**: 4.7
- **Osakis**: 4.7
- **Juergens**: 4.7
- **Saus**: 4.7

### Mississippi River Brainerd Watershed Inches Lost of Water Clarity
(For every 100 pounds phosphorus)

- **Trace**: Orange = Restore
- **Moose**: Yellow = Protect
- **Big Swan**: Orange = Restore
- **Buckhead**: Yellow = Protect
- **Long**: Orange = Restore
- **Lady**: Yellow = Protect
- **Mound**: Orange = Restore
- **Mons**: Yellow = Protect

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**Trout Streams**
Designated trout streams have special management restrictions regarding their recreational use and are particularly sensitive to minor alterations in their habitats. Within Todd County there are four designated trout streams by the Department of Natural Resources (DNR). Mississippi River Brainerd Watershed has two designated trout streams, Little Rice Lake Outlet in Bruce Township and Larson Creek in Burnhamville Township.
Aquatic Invasive Species
As of 2015 there are several waterbodies within Todd County which have one or more Aquatic Invasive Species (AIS) in them. In the Mississippi River Brainerd Watershed there is no evidence of AIS.

Todd County has developed an AIS Plan to help slow the spread of invasive species. Two major parts of the program, watercraft inspections and Zebra Mussel veliger monitoring are carried out in the watershed. Lakes were selected by the AIS committee and included lakes which were believed to be more at risk due to their recreational pressure and proximity to surrounding infected lakes. In addition to inspections and monitoring, education and outreach are being carried out within the watershed.

Lakes which were selected for both inspections and monitoring were broken up into zones and in this watershed included: Birch Lake Zone – includes Big and Little Birch Lakes, Bass, Twin, Mary, and Goose Lakes, SE Zone – Long Lake, Swan Lake, Mound, Moose, Mons, Little Swan, Latimer, Charlotte and NE Zone – Dower, Big Lake, Beauty, Pine Island, and Thunder Lakes.

Todd County will continue the AIS program as long as support is continued through the state.

Ground Water
Monitoring
The Department of Natural Resources (DNR) monitors groundwater levels through observation wells around the county. Their Cooperative Groundwater Monitoring (CGM) information can be found at http://www.dnr.state.mn.us/waters/cgm/index.html. Information presented in the data has been gathered by the Todd County SWCD.

There are no active observation wells located within the Mississippi River Brainerd Watershed in Todd County.

City Drinking Water
The Mississippi River Brainerd Watershed has two municipalities which provide water services to residents. Both cities have not yet developed a Wellhead Protection Plan (WHPP) but will be required to in the near future. As required by the Minnesota Wellhead Protection Rule every ten years the cities must update their Wellhead Protection Plans. These plans give detailed information on the area surrounding municipal wells and their vulnerability. They also spell out specific goals for protection.

Burtrum
The City of Burtrum has just around 140 residents and all are on private wells.

Grey Eagle
The City of Grey Eagle provides municipal drinking water to residents. The WHPP is set to begin in March 2016 and will be finished by March 2018. As the city is located in both the Sauk River and Mississippi River Brainerd Watersheds the Drinking Water Supply Management Area (DWSMA) and WHPP will most likely be in both watersheds.

Swanville
The City of Swanville provides municipal drinking water to residents. The WHPP is set to begin in February 2016 and will be finished by February 2018. As the city is located in both Todd and Morrison Counties the DWSMA and WHPP will most likely cross these boundaries.
Private Drinking Wells
The Minnesota Department of Agriculture (MDA) will begin a Township Testing program in Todd County starting 2016 to assess the level of nitrates in private wells. Both Burnhamville and Round Prairie Township residents will be invited to participate. These townships were selected because at least 30% of the township has vulnerable geology and 20% of the township is in row crop production.

Any person in the county can easily and inexpensively get their well water tested. The Todd County SWCD and Extension Office provide sampling instructions, containers and interpretation of the results.

Irrigation Wells
Irrigation wells are permitted through the DNR through a system called MPARS. This is done in an effort to prevent well interference with private domestic well owners. The Mississippi River Brainerd Watershed has the third lowest amount of active permitted irrigation in the county at 3,600 gallons per minute permitted on seven wells or 2.6% of the total use within Todd County. The only current use is for crop irrigation.

Irrigation water management primarily aims to control the volume and frequency of irrigation water applied to crops, so as to meet crop needs while conserving water resources. Recommendations on irrigation water Best Management Practices (BMPs) are provided by the Minnesota Department of Agriculture. Todd County also works in partnership with Hubbard and Wadena counties to provide an Irrigator Scheduler Program to local irrigators. One technician out of the Wadena SWCD office manages this program.

There is not enough data to know how additional irrigation permits may change groundwater supply or the potential impacts to nearby lakes, streams or rivers. Currently the MNDNR has three pilot groundwater management areas in the state to look closer at these issues. See Appendix III for more information on well locations and surficial aquifers within this watershed.

Land Cover and Use
General land cover in the county can be divided into four primary categories: Agriculture, Woodland, Water and Wetlands and Other including urban and built up areas. Watersheds are composed of groundwater recharge and storm water runoff generation areas. As far as water quality is concerned, forests and impervious surfaces typically found in urban areas represent the two ends of that spectrum, with other land covers falling in between. In addition to forests, wetlands and native grasslands also serve a special role in water quality. Wetlands offer flood protection, shoreline erosion control and help to filter and improve water quality. Native grasslands offer similar benefits as wetlands and forested areas such as water filtration and erosion control. All three offer the additional benefits of harboring wildlife habitat, building resilient ecosystem communities and are more robust during extreme weather conditions.

Agriculture presents many opportunities and challenges. Most watersheds within Todd County have substantial agricultural land cover with areas next to lakes and streams posing the highest risk to clean water. Through conservation minded principals and best management practices in cropping fields, grazing operations and feedlots these areas can add a greater awareness to our role of protecting and preserving natural resources. The Water Plan Task Force Committee felt strongly that run-off from fields be clean and that excess water from drainage not impact neighbors.

Minor or subwatersheds were assessed by the Todd County SWCD and GIS Department in order to determine a protection approach to water conservation using current land cover data. Depending on the amount of wetland and forested area within a minor watershed determined the amount of water quality protection which exists.
Surface water was not included in the overall calculation as it was based on percent disturbed land cover. Disturbed land cover included agricultural (cropped and pasture), urban and built up areas (barren and quarries included) as identified by 2012 Landfire data.

As mentioned above there are 13 minor watersheds in this area. They range in percent disturbed from 10% to 61% and protection classifications vary from Vigilance to Protect with the exception of one minor in Round Prairie which was classified as Restore. For a more detailed view of each minor watershed maps will be available on the Todd County website as they are developed.

**Agriculture**

**Crop**

The Mississippi River Brainerd Watershed has a lesser portion which is rated as Prime Farmland or Farmland of Statewide Importance than the rest of the watersheds but does have areas in the southern part which are listed. See Appendix IV for maps pertaining to this land cover. Not only do these soils produce rich agricultural land but it also protects the quality of drinking water and supports wildlife habitat. Preserving agricultural land in the county is a high priority. In the 2015 Water Plan Survey over fifty percent of county residents responded that the destruction of healthy soils was one of the greatest threats to Todd County’s agricultural community. Installing and adhering to crop BMPs is the watershed’s best effort at protecting soil for the future of farming.

There are many in field best management practices (BMPs) which can reduce erosion, build soil and manage water to enhance soils performance and profitability. Below is a table from the 2015 University of Minnesota Extension Fields to Streams, Managing Water in Rural Landscapes.

In addition, the Minnesota Department of Agriculture (MDA) works to monitor nutrients and pesticides in Minnesota’s waters. The MDA has partnered with East Otter Tail SWCD and Todd County to offer basal stalk nitrate testing to area corn farmers. Results are used to offer nitrogen management changes where appropriate.
<table>
<thead>
<tr>
<th>PRACTICES</th>
<th>EFFECTS</th>
<th>Increase spring transpiration</th>
<th>Increase soil water holding capacity</th>
<th>Reduce total water and nitrogen delivery</th>
<th>Increase denitrification</th>
<th>Reduce P and sediment delivery</th>
<th>Increase open water evaporation</th>
<th>Reduce peak flows</th>
<th>Reduce in-stream velocity</th>
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<tbody>
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<td>1. IN-FIELD: CROP AND SOIL MANAGEMENT</td>
<td>Perennial crops, and crop rotations with perennials or winter annuals</td>
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<td>Cover crops</td>
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<td>Reduced tillage, contour cropping and residue management</td>
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<td>Manure application</td>
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<td>2. IN-FIELD: DRAINAGE WATER MANAGEMENT</td>
<td>Alternative drainage design (depth, spacing, capacity)</td>
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<td>Controlled drainage</td>
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<td></td>
<td>Alternative tile inlets</td>
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<td>3. IN-FIELD AND EDGE-OF-FIELD: SURFACE FLOW MANAGEMENT</td>
<td>Grassed waterways</td>
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<tr>
<td></td>
<td>Filter strips, contour buffer strips</td>
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<td>4. IN-FIELD AND EDGE-OF-FIELD: WATER STORAGE AND INFILTRATION</td>
<td>Saturated buffers</td>
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<td>Restored and constructed wetlands</td>
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<tr>
<td></td>
<td>WASCOBs, terraces, and detention basins</td>
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<td>Ponds and irrigation reservoirs</td>
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<td>Large retention basins</td>
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<td>5. DITCH CHANNEL: WATER RETENTION</td>
<td>Structures for water control, including weirs and restricted size culverts</td>
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<tr>
<td></td>
<td>Two-stage ditch with restricted size culverts</td>
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<td>6. RIPARIAN AREA: RESTORATION AND PROTECTION</td>
<td>Riparian vegetation</td>
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<td>Streambank, bluff, and shoreline protection</td>
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<td>Restore channel meanders</td>
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24: 2015 University of Minnesota Extension Fields to Streams, Managing Water in Rural Landscapes- Best Management Practices (BMPs) and Effects
Preserving agricultural land in the county is a high priority. In the 2015 Water Plan Survey over fifty percent of county residents responded that the destruction of healthy soils was one of the greatest threats to Todd County’s agricultural community. Installing and adhering to crop BMPs is the watershed’s best effort at protecting soil for the future of farming.

Livestock
Animal agriculture is a necessary and important part of our lives. Minnesota’s livestock and poultry producers help support communities by generating tax revenue and creating jobs. As of 2011 Todd County ranks within the top ten counties for turkey production, cattle and calves, beef and milking cows according to the Minnesota Department of Agriculture (MDA).

As of 2014 there were 55 feedlots in shoreland areas and 675 feedlots which were required to be registered. Owners which are required to be registered include animal feedlots which are capable of holding 50 or more animal units or the manure for those animals or within shoreland, an area with ten or more but now greater than 50 animal units or the manure for those animals.

There are over 26,000 animal units within the Mississippi River Brainerd Watershed with four minors with over 2,000 animal units in each: 10133, 10131, 10061 and 10060.

Feedlots can be a water quality concern because of three of the most common pollutants to surface and groundwater: phosphorus, nitrates and pathogenic bacteria. While not all bacteria are pathogenic or found in livestock manure contamination by pathogens is a health hazard.

Water quality is protected through the Minnesota State Feedlot Rules by limiting subsurface and surface water discharges as well as restricting the location of new feedlots to set distances from private wells, shoreland and community or school water supply areas. Discharges include animal manure, manure contaminated runoff or process wastewater produced by milk house wastes or flush canals.

Drainage
In order to enable and enhance agricultural production, transportation and economic development drainage ditches were built. Water from previously unconnected depressions of saturated soil could then be conveyed to streams. Many streams and rivers were also straightened and widened for these reasons. All of the public ditch systems within the Mississippi River Brainerd Watershed were constructed between 1918 and 1921. Within the watershed there are almost 17 miles of county or jurisdictional ditches. Currently it is unknown how many miles of private ditches are in the watershed.

Subsurface drainage or tiling have historically been installed to drain wet areas which were not connected to ditch systems. More recently pattern tiling has been popular as it can remove water from entire fields. Todd County does not keep records of the amount or locations of tile as they are primarily on private lands and it is not regulated.

Agricultural drainage ultimately alters hydrology as its sole purpose is to reduce storage of excess moisture in the soil to accommodate air in the root zone to grow crops. The impact ultimately depends on the field conditions, precipitation, type of drainage, system design and the scale in relation to the watershed. Potential impacts include: Reduced time that water is being stored in soil, change of water pathways over land, decreased evaporation, increase in annual transpiration, increase in the amount of water to streams and rivers, reduction, delay or extension of peak flow within a stream or river and reduction in overland flow.
Concerns with agricultural drainage within the county include increased flows in rivers and streams, sediment transport, chemical transport and the uncertain effect on groundwater aquifer levels. High crop and land prices have the potential of increasing conversion of pasture and forage land to row crops, which in turn may lead to the installation of new drainage systems or drainage improvements to existing systems. Todd County has developed a Drainage Management Plan as well as updated its culvert inventories. More could be done to mitigate water from drainage by constructing or restoring wetlands within the county.

Adequate drainage can be a critical component of a successful farm operation while at the same time new drainage and drainage improvements represent an opportunity to design and install systems in ways that help reduce nutrient losses into surface water and positively affect the timing and flows of drainage water into surface waters. These efforts combined with wetland restoration and water retention initiatives can have positive impacts upon water quality in agricultural landscapes. The Minnesota Department of Agriculture (MDA) has several recommendations regarding agricultural drainage and should be consulted when these opportunities arise. Conservation drainage or the use of drainage practices that are designed to provide the benefits of drainage while minimizing negative impacts on the environment should be the norm within the watershed.

**Dams**

Dams maintain lake levels and impound water for flood control, power production and water supply. Within Todd County there are 17 active dams. Dams also present the challenge of aquatic connectivity meaning organisms may not be able to move upstream or downstream. Barriers such as dams and road crossings alter flows in ways that can increase temperature, floods and cause erosion leading to increased sediment loads. This watershed has six listed dams all of which are active: Little Swan Lake, Ruff-Nik WMA-North Pool (DNR-Wildlife), Kominek Pond (DNR-Wildlife), Stoerzinger Pond No. 1 and Johnson Pond. Little Swan Lake is slated to be removed in 2016 and be replaced with a bridge.

**Forested Land**

The Mississippi River Brainerd has the highest percentage of forested land within the county at 35%, most being classified as Deciduous Closed forest. Forested land in the watershed comprises over 28,000 acres. See Appendix IV for maps pertaining to this land cover.

**Wetlands**

The U.S. Corps of Engineers regulates wetlands according to Section 404 of the Clean Water Act. Additionally, the Minnesota Wetland Conservation Act regulates all wetlands in MN and is administered by Local Government Units. Regulated activities include draining, filling or excavating a wetland. Local permission can be obtained by contacting the Todd County Wetland Conservation Act (WCA) Technician. They will determine wetlands within the site and give recommendations as to avoid impacting the wetland. If disturbance is unavoidable the landowner will be required to minimize impacts to the wetland and finally mitigate those impacts to replace the loss of the wetland’s functions and values, in Todd County the minimum is a 2 to 1 acre replacement.

Wetlands serve many purposes and their preservation and restoration is a priority. Loss of wetlands can affect water quality, ground water quantity, floodwater retention, wildlife and many other environmental and societal benefits. A wetland inventory has not been developed within Todd County but would help identify, prioritize and restore wetland areas to help mitigate excess nutrient and water issues.

The Mississippi River Brainerd River Watershed has the highest percentage of wetlands of any in Todd County comprising 26% of the land cover, most being classified as emergent and shrub wetland (11.51% and 8.27%).
Wetland in the watershed comprises almost 21,000 acres. See Appendix IV for maps pertaining to this land cover.

**Native Plant Communities**
A native plant community is a group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. The Minnesota Department of Natural Resources (MNDNR) has identified several areas within the watershed which fall into this category.

Within the watershed 62% the minor watersheds contain native plant communities. The largest concentrations are found in the northern portions of the watershed within Turtle Creek, Little Elk and Bruce Townships and around Mound, Mons, Moose and Bass Lake.

**Municipalities**
Burtrum, Grey Eagle and Swanville are all located within this watershed and all of them have waterbodies within them except for Burtrum. They all have impervious surfaces and therefore stormwater runoff. All maintain city sewers, have holding ponds and provide public water to residents except for Burtrum.

**Burtrum**
The City of Burtrum has just around 140 residents. There are no waterbodies within the city limits, Buck Lake is just outside on the western side. There are some wetlands within the city.

**Grey Eagle**
The City of Grey Eagle has just under 700 residents. Trace Lake is on the northwestern boundary of the city limits. There are very few wetlands within the city. Bass Lake is just east of the city.

**Swanville**
The City of Swanville has just around 350 residents. Lake Pepin is on the western boundary of the city limits and there are many wetlands in the Todd County portion of the city. Swan River is just outside the boundary of the city but its water flow into Pepin.

**Recreational & Public Land**
Private recreational land makes up a significant portion of land within Todd County. Both non-homestead lakeshore and non-homesteaded seasonal recreation consisting mostly of forested and wetlands fall in this category. In a survey conducted as part of the Priority Concerns Scoping Document (PCSD) hunting and fishing (59.8%) and swimming, canoeing, boating or jet skiing (35.9%) were the top two responses to the question, “When you think about Todd County Water what comes to mind for you?” The highest number of respondents also rated “Wildlife Habitat” as seeing some improvements within the county.

For the purposes of this plan public land within Todd County falls within four main categories listed below. Exact locations of local parks can be obtained from the Todd County Planning & Zoning office. Federal and state managed areas are shown on the Minnesota Public Recreation Information Maps (PRIM maps) online.

**City, Township or County Parks**
Established for various reasons but can provide excellent recreational opportunities. Burtrum has a city park, Grey Eagle has Lion’s Centennial Park and Swanville has a city park and a park at Pepin Lake. Eagle Mountain recreational area is just south of Mound Lake.
**Wildlife management areas (WMAs)**
Consist of wetlands, uplands, or woods owned and managed for wildlife by the Department of Natural Resources (DNR). Hunting and various recreational opportunities are open to the public. There are a number of WMAs in the watershed including Ruff-Nic, Ireland, Ostendorff, Buckhorn Lake and a portion of Oak Ridge. Just east of the county in Morrison are several other WMA’s including Little Elk (on the border of Todd County), Clare Johnson-Carl W. Schmidt and Sponsa.

**State forests/Parks/Landings**
There are no state forests or parks but there are DNR landings are on Mound, Twin, Lady, Big Swan, Trace, Moose, Buck, Long, Bass, Pepin, Mons, Little Swan, Beauty, Pine Island and Big lakes.

**Wildlife protection areas (WPAs)**
Most of these federally managed wetlands and surrounding uplands are open to hunting and various recreational opportunities. There are no WPAs in this watershed.

**Regulated Development**
**County Zoning**
Todd County has had a land use ordinance since March 18, 1976 and a shoreland ordinance in effect since July 1, 1972. The last comprehensive update was in May 2012 and it will continue to be modified with zoning requirements as necessary. The county has no jurisdiction over municipalities with land use or shoreland ordinances. If new ordinances are developed in Todd County or the municipalities as a result of the Comprehensive Water Plan the Planning and Zoning Department, County Attorney, County Commissioners and any other necessary agency to ensure the new ordinances are compatible with existing ordinances.

**Municipal Zoning**
The cities of Burtrum, Grey Eagle and Swanville enforce their own local zoning ordinances and permits can be obtained by contacting the city office.

**Township Zoning**
Bruce Township is one of three townships in the county which enforces their own local ordinances and permits can be obtained by contacting the township clerk.

**Additional Zoning Entities**
There are no additional zoning entities and there are no official watershed districts within the Mississippi River Brainerd Watershed.

**Pollution**
**Permitted Pollution**
The Mississippi River Brainerd Watershed has several sites which have obtained permits to discharge effluent. The permit controls water pollution by regulating point source pollution. Point sources are discrete conveyances such as pipes or man-made ditches. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. Examples of this would be a Wastewater Discharge Permits for the City of Burtrum and the Swanville and Grey Eagle Waste Water Treatment Facilities. To find out more about permitted facilities and different permit types in the Mississippi River Brainerd Watershed see Appendix IX for more information.
Non-Point Source Pollution
Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many discrete sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands and ground waters.

The major source of NPS in the watershed is exposed soil leading to wind and water erosion, upstream lake loading, internal loading, failing septic system, fertilizer and manure runoff and livestock overgrazing in streams. For more information about NPS see Appendix X.

Individual Sewage Treatment System Inspections
Todd County requires Individual Sewage Treatment System (ISTS) inspections to be completed before finalizing a sale on a home. In addition the Todd County Planning and Zoning department have systematically been conducting ISTS inspections around several lakes around Todd County. Within the watershed there have been several lakes sampled as part of this program. Big Swan, Long, Moose and Mound all completed in 2014. Many which were originally found out of compliance have since been upgraded. In 2017 septic inventories are scheduled for Bass, Lady, Little Swan, Mons and Trace.

Watershed Restoration and Protection Areas

Restoration Areas
Swan River Watershed
Specifically minors 10133, 10132, 10060 and 10131 as these are the watersheds which encompass the Swan River and the chain of lakes including Trace, Twin, Lady, Big Swan, Little Swan and Pepin. This area is a priority not only for Todd County but Morrison County as well.

As of writing this report the Little Swan or Pillsbury dam is in the process of being removed and replaced with a culvert which will encourage fish passage.

Moose Lake
Inlets include two sites on the southern side of the lake. It outlets on the norther side of the lake where it flows through a rock dam into Moose Lake Creek. Sixty-nine percent of the 996 acre watershed is disturbed. A 38% load reduction of phosphorus would have to be met in order to reach the lakes threshold limit for potential impairment. Of the 2,194 lakes within the priority ranking Moose was placed in the highest category.

Trace Lake
The only inlets include in on the northern tip of the lake and the outlet is just west of it. The shallow lake has about forty-three percent of the 256 acre watershed is disturbed. A 23% load reduction of phosphorus would have to be met in order to reach the lakes threshold limit for potential impairment. Of the 2,194 lakes within the priority ranking Trace was placed in the highest category.

Protection Areas
Groundwater
Both Burnhamville and Round Prairie Township residents are invited to participate in the Minnesota Department of Agriculture (MDA) Township Testing program. These townships were selected because at least 30% of the township has vulnerable geology and 20% of the township is in row crop production.
Mons Lake
Sixty percent of the 35,504 acre contributing watershed is disturbed. The predicted total phosphorus load is below the threshold for the lake but still 81 pounds above the target total phosphorus lake concentration, which is a goal for improving water quality. Of the 2,194 lakes within the priority ranking Mons was placed in the highest category.

Mound Lake
Fifteen percent of the 986 acre contributing watershed is disturbed. The predicted total phosphorus load is below the threshold for the lake but still 20 pounds above the target total phosphorus lake concentration, which is a goal for improving water quality. Of the 2,194 lakes within the priority ranking Mound was placed in the highest category.

Lady Lake
Sixty-three percent of the 5,266 acre contributing watershed is disturbed. The predicted total phosphorus load is below the threshold for the lake but still 54 pounds above the target total phosphorus lake concentration, which is a goal for improving water quality. Of the 2,194 lakes within the priority ranking Lady was placed in the highest category.

Long Lake
Fifty-eight percent of the 6,842 acre contributing watershed is disturbed. The predicted total phosphorus load is below the threshold for the lake but still 186 pounds above the target or a 28% reduction of total phosphorus lake concentration, which is a goal for improving water quality. Of the 2,194 lakes within the priority ranking Long was placed in the highest category.

Undisturbed Areas
Mississippi River Watershed contains nine minor watershed rated at a protection classification of vigilance or protect. These undisturbed landscapes contribute to the overall health of water quality in both groundwater and surface water. Minor watersheds 10051, 10056, 14030, 14038, 14052, 10130 and 10057 are greater than 80% undisturbed and minors 10131 and 10135 are between 60-80% undisturbed. Many of these minors also contain native plant communities and lakes of biological significance. Efforts should be made to educate and provide technical assistance to landowners with forests, wetlands and grasslands or who are interested in re-establishing these areas.

Priority Concern 1: Riparian areas
Increase the amount of buffers along riparian areas to bring landowners into compliance of the Buffer Law. This will also contribute to diminishing the disturbed areas within these minor watersheds. Educate, provide technical assistance and cost-share opportunities to shoreland owners about restoring their shore as most of the counties Biologically Significant Lakes are within this watershed.

Priority Concern 2: Swan River Watershed area
Minors 10131, 10060, 10061 and 10133 have some of the highest animal units per minor watershed in the county. In addition, many of the lakes in the area are classified as Lakes of Biological Significance by the DNR. Work with producers and landowners to fix feedlots, close abandoned manure and gravel pits and adhere to Best Management Practices (BMPs) on shoreland, cropland and livestock producers. Work with applicators and landowners to meet setbacks and timing requirements of manure and chemical fertilizer applications. Control cattle access to streams by encouraging rotational grazing and flash grazing practices. Encourage shoreland restoration along lakes and streams in this area. Provide technical assistance to private well owners who are
participating in the Burnhamville Township Testing program or who would chose to test well water on their own. Work to develop a wetland inventory within the watershed to help identify, prioritize and restore wetland areas to help mitigate excess nutrient and water issues.

Priority Concern 3: Destruction of healthy systems
This watershed contains a very diverse landscape formed by the St. Croix Moraine complex and has steep slopes, highly forested land, high quality lakes and many corridors for wildlife. Encourage landowners to protect the land through conservation easements or additional native plantings. Encourage producers to sign up for Conservation Reserve Program (CRP) in sensitive areas.
Mississippi - Sartell Watershed

Minor Watersheds

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<tr>
<th>Minor Watersheds</th>
<th>#</th>
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<td>North Two</td>
<td>4.32</td>
<td>100.00%</td>
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<td>Total</td>
<td>4</td>
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<td>4.32</td>
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Created by:
Todd County GIS
216 1st Ave S, Ste. 102
Long Prairie, MN 56347
320-732-4248

Data Sources:
Watershed Data - MN DNR
Impaired Waters - MN PCA
County Data - Todd County GIS

Todd County GIS has made every effort to provide the most accurate and up-to-date information available and cannot be held responsible for any unknown errors or omissions.

25: Mississippi River Sartell Watershed
Chapter V: MISSISSIPPI RIVER
SARTELL WATERSHED

Watershed Overview
The Mississippi River - Sartell watershed covers approximately 1,020 square miles in the central part of the
Upper Mississippi River Basin and includes parts of Benton, Crow Wing, Mille Lacs, Morrison, Stearns, and Todd
counties. It is located in the North Central Hardwood Forest ecoregion. The watershed is also known locally as
the Platte-Spunk Rivers watershed.

The dominant land use within the watershed is primarily grass/pasture/hay agricultural at 35%, 29% in
agricultural row crops, 19% in forested land, and nine percent wetlands.

Major communities located in the watershed include Lastrup, Pierz, Buckman, Royalton, Upsala, Bowlus, Rice,

The Mississippi River - Sartell watershed has 879 total river miles and contains 232 lakes with a total acreage of
13,319. Major lakes include Big Watab, Pelican, Tow River Lake, Platte, Sullivan, Little Rock and Spunk (Big,
Middle and Lower). The major streams and rivers include the Mississippi, Hillman Creek, Little Rock Creek,
North Two River, South Two River, Platte, Skunk, Spunk Creek, Two River and Watab.

For more information from a watershed perspective and its overall health on a number of different criteria
including hydrology, geomorphology, biology, connectivity and water quality refer to the Minnesota Department
of Natural Resources (MNDNR) Watershed Health Assessment Framework online.

Todd County Portion Overview
In Todd County, the Mississippi River- Sartell is the smallest watershed covering only 8 square miles in the
South-Easternmost corner. The Todd County portion is 0.4% of the total watershed.

There are no cities within Todd County located in this watershed. Part of Grey Eagle Township is within the
watershed.

Geology in the area consists of the St. Croix Moraine complex which makes up a dramatic landscape of hills and
small lakes. The terminal moraines were formed by the Superior Lobe ice which deposited Cromwell Formation
sediment.

The soils in these areas are directly related to the deposits left behind by the glaciers. The ability of the soils to
absorb and transmit water is also affected by slope and topography. Infiltration rates and permeability affects
run off rate and groundwater pollution potential. Land uses should always consider soil type as suitability may
be limited. Wetlands are found throughout this watershed and soils developed in this moraine area are poorly
to moderately drained. Water slowly penetrates those soils and moves slowly through them once absorbed. In
areas of greater slope and soil texture faster infiltration rates are found. Areas of USDA identified Prime
Farmland are found more in the southern part of the watershed and the northern area is dominated by
deciduous trees due to slope and topography.
Only one minor watershed makes up the hydrology of this area with elevation varying from 1201 feet to 1395 feet above sea level.

The largest lakes in the Todd County portion of the watershed over 50 acres are Mary (83.36 acres) and Nellies (57.18 acres).

There are no significant streams or rivers nor are there any public ditches.

**Surface Water**

**Public (Protected) Waters**

A list of public or protected waters is included in Appendix VIII of this document. This designation may imply special zoning, buffer or state and federal agency requirements. Public waters include lakes, rivers, streams, and wetlands designated under Minnesota Statutes, section 103G.005, subdivision 15, any lakes or wetlands listed in the DNR Public Waters Inventory.

The Ordinary High Water Level (OHWL) is the state defined boundary for protected water and is the elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape. Generally it is the point where natural vegetation changes from predominately aquatic to predominately terrestrial. It is important because certain property and water rights can be affected by the location. For example when working above the OHWL the Todd County Planning and Zoning Department may require a permit, whereas when working below the OHWL the Department of Natural Resources will require a permit. This pertains to lakes, stream, rivers and wetlands. For watercourses it is the elevation of the top of bank for the channel.

**Lakes of Biological Significance**

The goal of this list was to identify lakes that exhibit the highest quality features within any of the four assessed biological communities. Therefore, a lake needed to meet criteria for only one of the community types (aquatic plants, fish, birds, amphibians) to be identified as a Lake of Biological Significance. Occurrences of high-quality features within the community types determined the biological significance rank (outstanding, high or moderate).

There are two lakes within the watershed which have been identified as Lakes of Biological Significance by the Minnesota Department of Natural Resources (MNDNR). Lakes include Mary and Cedar.

**Wild Rice Lakes**

Wild rice within a lake or river can imply good water quality and a healthy ecosystem. It not only provides structure, cover and food to different species but also protects shorelines from wind erosion and ties up nutrients increasing water quality. Resource managers have identified lakes throughout the state in an effort to preserve, restore and enhance this resource.

There have been no lakes within the watershed which have been identified as containing wild rice by the MNDNR.

**Impaired Waters**

The federal Clean Water Act requires states to adopt water quality standards to protect lakes, streams, and wetlands from pollution. The standards define how much of a pollutant (bacteria, nutrients, turbidity, mercury, etc.) can be in the water and still meet designated uses, such as drinking water, fishing, and swimming. A water body is “impaired” if it fails to meet one or more water quality standards.
Impaired water bodies currently identified by the Minnesota Pollution Control Agency (MPCA) include both Cedar and Mary Lake for mercury in fish tissues.

<table>
<thead>
<tr>
<th>Waterbody Name</th>
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<tr>
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<td>Mercury</td>
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*26: Mississippi River Sartell Watershed MPCA Impairments*

**Lakes with Measured Phosphorus Sensitivity**
The phosphorus sensitivity significance index is a function of phosphorus sensitivity, lake size, lake total phosphorus concentration, proximity to PCA’s phosphorus impairment thresholds, and watershed disturbance. It is possible once the TMDL is complete for this watershed there will be sufficient information to add additional lakes and change the order of the current list.

Within the watershed there is only one lake which has had enough data to compile a sensitivity rating for phosphorus by the MNDNR and it is Mary.

Mary was given a protection classification based on its sensitivity significance index.

The chart signifies the lake’s total phosphorus (TP) loading sensitivity expressed as the loss of predicted Secchi disk water transparency (in inches) with 100 pounds of TP added. This loading is an estimate of total phosphorus and based on Minnesota’s eutrophication criteria for impairment for the specific lakes. Because there was only one lake in the watershed the comparison chart of all of Todd County’s lakes was added for overall reference.
All Todd County
INCHES LOST OF WATER CLARITY
(For every 100 pounds phosphorus)

Trout Streams
Designated trout streams have special management restrictions regarding their recreational use and are particularly sensitive to minor alterations in their habitats. Within Todd County there are four designated trout...
streams by the Department of Natural Resources (DNR). Mississippi River Sartell Watershed does not have any designated trout streams.

**Aquatic Invasive Species**

As of 2015 there are several waterbodies within Todd County which have one or more Aquatic Invasive Species (AIS) in them. In the Mississippi River Sartell Watershed there is no evidence of AIS.

Todd County has developed an AIS Plan to help slow the spread of invasive species. Two major parts of the program, watercraft inspections and Zebra Mussel veliger monitoring are carried out in the watershed. Lakes were selected by the AIS committee and included lakes which were believed to be more at risk due to their recreational pressure and proximity to surrounding infected lakes. In addition to inspections and monitoring, education and outreach are being carried out within the watershed.

Lakes which were selected for both inspections and monitoring were broken up into zones and in this watershed included: Birch Lake Zone – includes Big and Little Birch Lakes, Bass, Twin, Mary, and Goose Lakes.

Todd County will continue the AIS program as long as support is continued through the state.

**Groundwater**

**Monitoring**

The Department of Natural Resources (DNR) monitors groundwater levels through observation wells around the county. Their Cooperative Groundwater Monitoring (CGM) information can be found at [http://www.dnr.state.mn.us/waters/cgm/index.html](http://www.dnr.state.mn.us/waters/cgm/index.html). Information presented in the data has been gathered by the Todd County SWCD.

There are no active observation wells located within the Mississippi River Sartell Watershed in Todd County.

**City Drinking Water**

The Mississippi River Sartell Watershed does not have any municipalities which provide water services to residents.

**Private Drinking Wells**

The Minnesota Department of Agriculture (MDA) will begin a Township Testing program in Todd County starting 2016 to assess the level of nitrates in private wells. Grey Eagle, the only township in this watershed will not be part of this program.

Any person in the county can easily and inexpensively get their well water tested. The Todd County SWCD and Extension Office provide sampling instructions, containers and interpretation of the results.

**Irrigation Wells**

Irrigation wells are permitted through the DNR through a system called MPARS. This is done in an effort to prevent well interference with private domestic well owners. The Mississippi River Sartell Watershed has no active permitted irrigation in the area.

Irrigation water management primarily aims to control the volume and frequency of irrigation water applied to crops, so as to meet crop needs while conserving water resources. Recommendations on irrigation water Best Management Practices (BMPs) are provided by the Minnesota Department of Agriculture. Todd County also works in partnership with Hubbard and Wadena counties to provide an Irrigator Scheduler Program to local irrigators. One technician out of the Wadena SWCD office manages this program.
There is not enough data to know how additional irrigation permits may change groundwater supply or the potential impacts to nearby lakes, streams or rivers. Currently the MNDNR has three pilot groundwater management areas in the state to look closer at these issues. See Appendix III for more information on well locations and surficial aquifers within this watershed.

**Land Cover and Use**

General land cover in the county can be divided into four primary categories: Agriculture, Woodland, Water and Wetlands and Other including urban and built up areas. Watersheds are composed of groundwater recharge and storm water runoff generation areas. As far as water quality is concerned, forests and impervious surfaces typically found in urban areas represent the two ends of that spectrum, with other land covers falling in between. In addition to forests, wetlands and native grasslands also serve a special role in water quality. Wetlands offer flood protection, shoreline erosion control and help to filter and improve water quality. Native grasslands offer similar benefits as wetlands and forested areas such as water filtration and erosion control. All three offer the additional benefits of harboring wildlife habitat, building resilient ecosystem communities and are more robust during extreme weather conditions.

Agriculture presents many opportunities and challenges. Most watersheds within Todd County have substantial agricultural land cover with areas next to lakes and streams posing the highest risk to clean water. Through conservation minded principals and best management practices in cropping fields, grazing operations and feedlots these areas can add a greater awareness to our role of protecting and preserving natural resources.

Minor or subwatersheds were assessed by the Todd County SWCD and GIS Department in order to determine a protection approach to water conservation using current land cover data. Depending on the amount of wetland and forested area within a minor watershed determined the amount of water quality protection which exists. Surface water was not included in the overall calculation as it was based on percent disturbed land cover. Disturbed land cover included agricultural (cropped and pasture), urban and built up areas (barren and quarries included) as identified by 2012 Landfire data.

As mentioned above there is only one minor watershed in this area. The percent disturbed is 36% giving it a protection classification of Enhance Protection. For a more detailed view of this minor watershed, a map will be available on the Todd County website when it is developed.

**Agriculture**

**Crop**

The Mississippi River Sartell has a lesser portion than other watersheds which is rated as Prime Farmland or Farmland of Statewide Importance but there are sections in the southwestern corner. See Appendix V for maps pertaining to this land cover. Not only do these soils produce rich agricultural land but it also protects the quality of drinking water and supports wildlife habitat. Preserving agricultural land in the county is a high priority. In the 2015 Water Plan Survey over fifty percent of county residents responded that the destruction of healthy soils was one of the greatest threats to Todd County’s agricultural community. Installing and adhering to crop BMPs is the watersheds best effort at protecting soil for the future of farming.
There are many in field best management practices (BMPs) which can reduce erosion, build soil and manage water to enhance soils performance and profitability. Below is a table from the 2015 University of Minnesota Extension Fields to Streams, Managing Water in Rural Landscapes.

In addition, the Minnesota Department of Agriculture (MDA) works to monitor nutrients and pesticides in Minnesota’s waters. The MDA has partnered with East Otter Tail SWCD and Todd County to offer basal stalk nitrate testing to area corn farmers. Results are used to offer nitrogen management changes where appropriate.
<table>
<thead>
<tr>
<th>PRACTICES</th>
<th>EFFECTS</th>
<th>Increase spring transpiration</th>
<th>Increase infiltration</th>
<th>Increase soil water holding capacity</th>
<th>Reduce total water (and nitrogen) delivery</th>
<th>Reduce N and P and sediment delivery</th>
<th>Reduce open water evaporation</th>
<th>Reduce peak flows</th>
<th>Reduce in-stream velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. IN-FIELD: CROP AND SOIL MANAGEMENT</td>
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<tr>
<td>Perennial crops, and crop rotations with perennials or winter annuals</td>
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<tr>
<td>Cover crops</td>
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<tr>
<td>Reduced tillage, contour cropping and residue management</td>
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<td>Compaction management</td>
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<td>Manure application</td>
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<td>2. IN-FIELD: DRAINAGE WATER MANAGEMENT</td>
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<td>Alternative drainage design (depth, spacing, capacity)</td>
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<td>Controlled drainage</td>
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<tr>
<td>Alternative tile inlets</td>
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<tr>
<td>3. IN-FIELD AND EDGE-OF-FIELD: SURFACE FLOW MANAGEMENT</td>
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<tr>
<td>Greased waterways</td>
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<td>Filter strips, contour buffer strips</td>
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<td>4. IN-FIELD AND EDGE-OF-FIELD: WATER STORAGE AND INFILTRATION</td>
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<td>Saturated buffers</td>
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<tr>
<td>Restored and constructed wetlands</td>
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<tr>
<td>WASCOBs, terraces, and detention basins</td>
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<td>Ponds and irrigation reservoirs</td>
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<td>Large retention basins</td>
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<td>5. DITCH CHANNEL: WATER RETENTION</td>
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<td>Structures for water control, including weirs and restricted size culverts</td>
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<td>Two-stage ditch with restricted size culverts</td>
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<td>6. RIPARIAN AREA: RESTORATION AND PROTECTION</td>
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<tr>
<td>Riparian vegetation</td>
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<td>Streambank, bluff, and shoreline protection</td>
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<td>Restore channel meanders</td>
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</table>
Livestock

Animal agriculture is a necessary and important part of our lives. Minnesota’s livestock and poultry producers help support communities by generating tax revenue and creating jobs. As of 2011 Todd County ranks within the top ten counties for turkey production, cattle and calves, beef and milking cows according to the Minnesota Department of Agriculture (MDA).

As of 2014 there were 55 feedlots in shoreland areas and 675 feedlots which were required to be registered. Owners which are required to be registered include animal feedlots which are capable of holding 50 or more animal units or the manure for those animals or within shoreland, an area with ten or more but now greater than 50 animal units or the manure for those animals.

There are just over 500 animal units within the Mississippi River Sartell Watershed’s one minor, 15001.

Feedlots can be a water quality concern because of three of the most common pollutants to surface and groundwater: phosphorus, nitrates and pathogenic bacteria. While not all bacteria are pathogenic or found in livestock manure contamination by pathogens is a health hazard.

Water quality is protected through the Minnesota State Feedlot Rules by limiting subsurface and surface water discharges as well as restricting the location of new feedlots to set distances from private wells, shoreland and community or school water supply areas. Discharges include animal manure, manure contaminated runoff or process wastewater produced by milk house wastes or flush canals.

Drainage

In order to enable and enhance agricultural production, transportation and economic development drainage ditches were built. Water from previously unconnected depressions of saturated soil could then be conveyed to streams. Many streams and rivers were also straightened and widened for these reasons. There are no public ditches within the watershed. Currently it is unknown how many miles of private ditches are in the watershed.

Subsurface drainage or tiling have historically been installed to drain wet areas which were not connected to ditch systems. More recently pattern tiling has been popular as it can remove water from entire fields. Todd County does not keep records of the amount or locations of tile as they are primarily on private lands and it is not regulated.

Agricultural drainage ultimately alters hydrology as its sole purpose is to reduce storage of excess moisture in the soil to accommodate air in the root zone to grow crops. The impact ultimately depends on the field conditions, precipitation, type of drainage, system design and the scale in relation to the watershed. Potential impacts include: Reduced time that water is being stored in soil, change of water pathways over land, decreased evaporation, increase in annual transpiration, increase in the amount of water to streams and rivers, reduction, delay or extension of peak flow within a stream or river and reduction in overland flow.

Concerns with agricultural drainage within the county include increased flows in rivers and streams, sediment transport, chemical transport and the uncertain effect on groundwater aquifer levels. High crop and land prices have the potential of increasing conversion of pasture and forage land to row crops, which in turn may lead to the installation of new drainage systems or drainage improvements to existing systems. Todd County has developed a Drainage Management Plan as well as updated its culvert inventories. More could be done to mitigate water from drainage by constructing or restoring wetlands within the county.
Adequate drainage can be a critical component of a successful farm operation while at the same time new drainage and drainage improvements represent an opportunity to design and install systems in ways that help reduce nutrient losses into surface water and positively affect the timing and flows of drainage water into surface waters. These efforts combined with wetland restoration and water retention initiatives can have positive impacts upon water quality in agricultural landscapes. The Minnesota Department of Agriculture (MDA) has several recommendations regarding agricultural drainage and should be consulted when these opportunities arise. Conservation drainage or the use of drainage practices that are designed to provide the benefits of drainage while minimizing negative impacts on the environment should be the norm within the watershed.

**Dams**

Dams maintain lake levels and impound water for flood control, power production and water supply. Within Todd County there are 17 active dams. Dams also present the challenge of aquatic connectivity meaning organisms may not be able to move upstream or downstream. Barriers such as dams and road crossings alter flows in ways that can increase temperature, floods and cause erosion leading to increased sediment loads. This watershed does not have any active dams.

**Forested Land**

The Mississippi River Sartell has the highest percentage of forested land within the county at 35% (tied with Mississippi River Brainerd), most being classified as Deciduous Closed forest. Forested land in the watershed comprises over 1,000 acres. See Appendix V for maps pertaining to this land cover.

**Wetlands**

The U.S. Corps of Engineers regulates wetlands according to Section 404 of the Clean Water Act. Additionally, the Minnesota Wetland Conservation Act regulates all wetlands in MN and is administered by Local Government Units. Regulated activities include draining, filling or excavating a wetland. Local permission can be obtained by contacting the Todd County Wetland Conservation Act (WCA) Technician. They will determine wetlands within the site and give recommendations as to avoid impacting the wetland. If disturbance is unavoidable the landowner will be required to minimize impacts to the wetland and finally mitigate those impacts to replace the loss of the wetland’s functions and values, in Todd County the minimum is a 2 to 1 acre replacement.

Wetlands serve many purposes and their preservation and restoration is a priority. Loss of wetlands can affect water quality, ground water quantity, floodwater retention, wildlife and many other environmental and societal benefits. A wetland inventory has not been developed within Todd County but would help identify, prioritize and restore wetland areas to help mitigate excess nutrient and water issues.

The Mississippi River Sartell River Watershed is 23% wetland with most being classified as emergent wetland (12.44%). Wetland in the watershed comprises almost 660 acres. See Appendix V for maps pertaining to this land cover.

**Native Plant Communities**

A native plant community is a group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. The Minnesota Department of Natural Resources (MNDNR) has identified several areas within the watershed which fall into this category.

The one minor watershed does contain two sections of native plant communities. One is near Mound Lake and the other is an inland piece, both native communities are Red Oak and Basswood stands.
Municipalities
The Mississippi River Sartell Watershed does not have any municipalities within the Todd County portion of the watershed.

Recreational & Public Land
Private recreational land makes up a significant portion of land within Todd County. Both non-homestead lakeshore and non-homesteaded seasonal recreation consisting mostly of forested and wetlands fall in this category. In a survey conducted as part of the Priority Concerns Scoping Document (PCSD) hunting and fishing (59.8%) and swimming, canoeing, boating or jet skiing (35.9%) were the top two responses to the question, “When you think about Todd County Water what comes to mind for you?” The highest number of respondents also rated “Wildlife Habitat” as seeing some improvements within the county.

For the purposes of this plan public land within Todd County falls within four main categories listed below. Exact locations of local parks can be obtained from the Todd County Planning & Zoning office. Federal and state managed areas are shown on the Minnesota Public Recreation Information Maps (PRIM maps) online.

City, Township or County Parks
Established for various reasons but can provide excellent recreational opportunities. There are no parks in the watershed. Eagle Mountain recreational area is just south of Mound Lake.

Wildlife management areas (WMAs)
Consist of wetlands, uplands, or woods owned and managed for wildlife by the Department of Natural Resources (DNR). Hunting and various recreational opportunities are open to the public. Oak Ridge is the only WMA in the watershed.

State forests/Parks/Landings
There are no state forests or parks but there is a DNR landing on Mary Lake.

Wildlife protection areas (WPAs)
Most of these federally managed wetlands and surrounding uplands are open to hunting and various recreational opportunities. There are no WPAs in this watershed.

Regulated Development
County Zoning
Todd County has had a land use ordinance since March 18, 1976 and a shoreland ordinance in effect since July 1, 1972. The last comprehensive update was in May 2012 and it will continue to be modified with zoning requirements as necessary. The county has no jurisdiction over municipalities with land use or shoreland ordinances. If new ordinances are developed in Todd County or the municipalities as a result of the Comprehensive Water Plan the Planning and Zoning Department, County Attorney, County Commissioners and any other necessary agency to ensure the new ordinances are compatible with existing ordinances.

Municipal Zoning
There are no cities within the Todd County portion of the watershed which enforces their own ordinances.

Township Zoning
Grey Eagle is the only township within the Todd County portion of the watershed and they no longer enforce their own ordinances.
Additional Zoning Entities
There are no additional zoning entities and there are no official watershed districts within the Todd County portion of the Mississippi River Sartell Watershed.

Pollution
Permitted Pollution
The Mississippi River Sartell Watershed has several sites which have obtained permits to discharge effluent. The permit controls water pollution by regulating point source pollution. Point sources are discrete conveyances such as pipes or man-made ditches. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. To find out more about permitted facilities and different permit types in the Mississippi River Sartell Watershed see Appendix IX for more information.

Non-Point Source Pollution
Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many discrete sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands and ground waters.

The major source of NPS in the watershed is exposed soil leading to wind and water erosion, livestock overgrazing, failing septic systems, fertilizer and manure runoff and eroding shorelines. For more information of NPS refer to Appendix X.

Individual Sewage Treatment System Inspections
Todd County requires Individual Sewage Treatment System (ISTS) inspections to be completed before finalizing a sale on a home. In addition the Todd County Planning and Zoning department have systematically been conducting ISTS inspections around several lakes around Todd County. Within the watershed there have been no lakes sampled as part of this program.

Watershed Restoration and Protection Areas

Restoration Areas
The watershed is comprised of one minor and has no identified areas of restoration.

Protection Areas
Mary Lake
This lake has been identified as a Lake of Biological Significance by the Department of Natural Resources with the highest rating of Moderate. Sixty-three of the 1,248 acre contributing watershed is disturbed. The predicted total phosphorus load is barely below the threshold for the lake but still 34 pounds above the target total phosphorus lake concentration, which is a goal for improving water quality. Of the 2,194 lakes within the priority ranking Mary was placed in the highest category.

Cedar Lake
This lake has been identified as a Lake of Biological Significance by the Department of Natural Resources with the highest rating of Outstanding.
**Priority Concern 1: Inform the general public and landowners**
Inform the general public about the threats of AIS, how to continue to protect water quality and the importance of Best Management Practices (BMPs) on the landscape.

**Priority Concern 2: Wetlands**
Work to develop a wetland inventory within the watershed to help identify, prioritize and restore wetland areas to help mitigate excess nutrient and water issues.
Chapter VI: REDEYE RIVER WATERSHED

Watershed Overview

The Redeye River Watershed covers 899 square miles and is located the northwestern to north-central part of the Upper Mississippi River Basin in central Minnesota and encompasses all or parts of Becker, Otter Tail, Todd, and Wadena counties. The majority of the watershed is within the North Central Hardwood Forest with small sections in the Northern Lakes and Forests ecoregion.

The dominant land use within the watershed is agricultural at nearly half, forests make up 30%, wetlands makes up 15%, and four percent is urban.

Major communities located in the watershed include Wadena, Verndale, Deer Creek, Henning, Ottertail, New York Mills, Sebeka and Hewitt.

There are 11 creeks and 7 county ditches, as well as numerous smaller flowages. The watershed contains approximately 126 lakes with a total acreage of 8,228. The major lakes include Wolf, Gourd, West Leaf, Middle Leaf and East Leaf. The major rivers and streams include Redeye, Leaf and Wing. The Redeye River begins at Wolf Lake and travels south where it joins the Leaf River and eventually joins the Crow Wing River north of Staples.

Water resources in the Redeye River Watershed are found in a range of conditions, from very high water quality to significant impairment. The primary resource concerns in the watershed are wind and water soil erosion, surface and groundwater management/quality, and changing land use patterns. Increased development, wetland removal, and increased agriculture have all likely contributed increased sediment and pollutant loadings to surface waters, thus reducing populations of sensitive aquatic species.

For more information from a watershed perspective and its overall health on a number of different criteria including hydrology, geomorphology, biology, connectivity and water quality refer to the Minnesota Department of Natural Resources (MNDNR) Watershed Health Assessment Framework online.

Todd County Portion Overview

In Todd County, the Redeye River Watershed is the second smallest, covering 46 square miles in the Northwest corner of the County. The Todd County portion is 5.3% of the total watershed. It does not contain any of the lakes mentioned above but the Wing River flows through Todd County as does a number of unprotected streams.

Hewitt is the only city in Todd County located in this watershed. The city has Wellhead Protection Areas and adheres to a Wellhead Protection Plan. Townships include portions of Bertha, Stowe Prairie and Wykeham.

Geology in the area consists of remnants of the Wadena Lobe consisting of drumlins and outwash plains. The glacier entered from the north and eroded land surface while forming drumlins and depositing sediment of the Hewitt formation. These low, elongated hills have long, smooth side slopes and drainage outlets are not readily available. This watershed also has the highest elevation in the county at 1,513 feet called Mt. Nebo.
The soils in these areas are directly related to the deposits left behind by the glaciers. The ability of the soils to absorb and transmit water is also affected by slope and topography. Infiltration rates and permeability affects run off rate and groundwater pollution potential. Land uses should always consider soil type as suitability may be limited. The watershed contains soils which the USDA has identified as Prime Farm Land in the upland areas and Farmland of Statewide Importance along the Partridge River whereas the areas at the base of the drumlins are comprised of wetlands. Trees are found in areas where slope and topography have made it difficult to farm.

Six minor watersheds make up the hydrology of this area with elevation varying from 1340 feet to 1513 feet above sea level.

There are no major lakes in the Todd County portion of this watershed.

There is only one major river in the watershed over 15 miles and it is the Wing River (18.88 miles).

There are no public ditches in this watershed.

**Surface Water**

**Public (Protected) Waters**

A list of public or protected waters is included in Appendix VIII of this document. This designation may imply special zoning, buffer or state and federal agency requirements. Public waters include lakes, rivers, streams, and wetlands designated under Minnesota Statutes, section 103G.005, subdivision 15, any lakes or wetlands listed in the DNR Public Waters Inventory.

The Ordinary High Water Level (OHWL) is the state defined boundary for protected water and is the elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape. Generally it is the point where natural vegetation changes from predominately aquatic to predominately terrestrial. It is important because certain property and water rights can be affected by the location. For example when working above the OHWL the Todd County Planning and Zoning Department may require a permit, whereas when working below the OHWL the Department of Natural Resources will require a permit. This pertains to lakes, stream, rivers and wetlands. For watercourses it is the elevation of the top of bank for the channel.

**Lakes of Biological Significance**

The goal of this list was to identify lakes that exhibit the highest quality features within any of the four assessed biological communities. Therefore, a lake needed to meet criteria for only one of the community types (aquatic plants, fish, birds, amphibians) to be identified as a Lake of Biological Significance. Occurrences of high-quality features within the community types determined the biological significance rank (outstanding, high or moderate).

There are no lakes within the watershed which have been identified as Lakes of Biological Significance by the Minnesota Department of Natural Resources (MNDNR).

**Wild Rice Lakes**

Wild rice within a lake or river can imply good water quality and a healthy ecosystem. It not only provides structure, cover and food to different species but also protects shorelines from wind erosion and ties up nutrients increasing water quality. Resource managers have identified lakes throughout the state in an effort to preserve, restore and enhance this resource.
There are no lakes within the watershed which have been identified as containing wild rice by the MNDNR.

**Impaired Waters**

The federal Clean Water Act requires states to adopt water quality standards to protect lakes, streams, and wetlands from pollution. The standards define how much of a pollutant (bacteria, nutrients, turbidity, mercury, etc.) can be in the water and still meet designated uses, such as drinking water, fishing, and swimming. A water body is “impaired” if it fails to meet one or more water quality standards.

Impaired water bodies currently identified by the Minnesota Pollution Control Agency (MPCA) include the Wing River. There are no lake impairments in all of the Redeye River Watershed currently.

<table>
<thead>
<tr>
<th>Waterbody Name</th>
<th>Redeye River Watershed Impairments</th>
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<tbody>
<tr>
<td>Wing River</td>
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</table>

**Lakes with Measured Phosphorus Sensitivity**

The phosphorus sensitivity significance index is a function of phosphorus sensitivity, lake size, lake total phosphorus concentration, proximity to PCA’s phosphorus impairment thresholds, and watershed disturbance.

Within the watershed there are no lakes which have had enough data to compile a sensitivity rating for phosphorus by the MNDNR.

**Trout Streams**

Designated trout streams have special management restrictions regarding their recreational use and are particularly sensitive to minor alterations in their habitats. Within Todd County there are four designated trout streams by the Department of Natural Resources (DNR). Redeye River Watershed does not have any designated trout streams but just across the border in Wadena County Union Creek runs through the City of Wadena is designated.

**Aquatic Invasive Species**

As of 2015 there are several waterbodies within Todd County which have one or more Aquatic Invasive Species (AIS) in them. In the Redeye River Watershed there is no evidence of AIS.

Todd County has developed an AIS Plan to help slow the spread of invasive species. Two major parts of the program, watercraft inspections and Zebra Mussel veliger monitoring are carried out in the watershed. Lakes were selected by the AIS committee and included lakes which were believed to be more at risk due to their recreational pressure and proximity to surrounding infected lakes. In addition to inspections and monitoring, education and outreach are being carried out within the watershed.

Lakes which were selected for both inspections and monitoring were broken up into zones and there were no inspections or monitoring locations in this watershed. The closest would be: NE Zone – Dower, Big Lake, Beauty, Pine Island, and Thunder Lakes.
Todd County will continue the AIS program as long as support is continued through the state.

**Groundwater**

**Monitoring**
The Department of Natural Resources (DNR) monitors groundwater levels through observation wells around the county. Their Cooperative Groundwater Monitoring (CGM) information can be found at [http://www.dnr.state.mn.us/waters/cgm/index.html](http://www.dnr.state.mn.us/waters/cgm/index.html). Information presented in the data has been gathered by the Todd County SWCD.

There are no active observation wells located within the Redeye River Watershed in Todd County.

**City Drinking Water**
The Redeye River Watershed has one municipality which provides water services to residents. All have also developed a Drinking Waters Supply Management Area (DWSMA) surrounding the city wells. As required by the Minnesota Wellhead Protection Rule every ten years the cities must update their Wellhead Protection Plans. These plans give detailed information on the area surrounding municipal wells and their vulnerability. They also spell out specific goals for protection.

**Hewitt**
The City of Hewitt has one primary and one emergency well which serves approximately 272 residents through 117 connections. Well 2 is 177 feet deep and was constructed in 2004. Both wells are located off of Front and 4th. The vulnerability of the DWSMA is classified as low and is contained within the city limits.
Private Drinking Wells
The Minnesota Department of Agriculture (MDA) will begin a Township Testing program in Todd County starting 2016 to assess the level of nitrates in private wells. Stowe Prairie residents will be invited to participate. This township was selected because at least 30% of the township has vulnerable geology and 20% of the township is in row crop production.

Any person in the county can easily and inexpensively get their well water tested. The Todd County SWCD and Extension Office provide sampling instructions, containers and interpretation of the results.

Irrigation Wells
Irrigation wells are permitted through the DNR through a system called MPARS. This is done in an effort to prevent well interference with private domestic well owners. The Redeye River Watershed has the third highest...
amount of active permitted irrigation in the county at 15,925 gallons per minute permitted on 24 wells which encompass 11.7% of the total use within Todd County. The main current use is for crop irrigation accounting for 97% of total usage. The City of Hewitt accounts for the other usage.

Irrigation water management primarily aims to control the volume and frequency of irrigation water applied to crops, so as to meet crop needs while conserving water resources. Recommendations on irrigation water Best Management Practices (BMPs) are provided by the Minnesota Department of Agriculture. Todd County also works in partnership with Hubbard and Wadena counties to provide an Irrigator Scheduler Program to local irrigators. One technician out of the Wadena SWCD office manages this program.

There is not enough data to know how additional irrigation permits may change groundwater supply or the potential impacts to nearby lakes, streams or rivers. Currently the MNDNR has three pilot groundwater management areas in the state to look closer at these issues. See Appendix III for more information on well locations and surficial aquifers within this watershed.

**Land Cover and Use**

General land cover in the county can be divided into four primary categories: Agriculture, Woodland, Water and Wetlands and Other including urban and built up areas. Watersheds are composed of groundwater recharge and storm water runoff generation areas. As far as water quality is concerned, forests and impervious surfaces typically found in urban areas represent the two ends of that spectrum, with other land covers falling in between. In addition to forests, wetlands and native grasslands also serve a special role in water quality. Wetlands offer flood protection, shoreline erosion control and help to filter and improve water quality. Native grasslands offer similar benefits as wetlands and forested areas such as water filtration and erosion control. All three offer the additional benefits of harboring wildlife habitat, building resilient ecosystem communities and are more robust during extreme weather conditions.

Agriculture presents many opportunities and challenges. Most watersheds within Todd County have substantial agricultural land cover with areas next to lakes and streams posing the highest risk to clean water. Through conservation minded principals and best management practices in cropping fields, grazing operations and feedlots these areas can add a greater awareness to our role of protecting and preserving natural resources. The Water Plan Task Force Committee felt strongly that run-off from fields be clean and that excess water from drainage not impact neighbors.

Minor or subwatersheds were assessed by the Todd County SWCD and GIS Department in order to determine a protection approach to water conservation using current land cover data. Depending on the amount of wetland and forested area within a minor watershed determined the amount of water quality protection which exists. Surface water was not included in the overall calculation as it was based on percent disturbed land cover. Disturbed land cover included agricultural (cropped and pasture), urban and built up areas (barren and quarries included) as identified by 2012 Landfire data.

As mentioned above there are six minor watersheds in this area. They range in percent disturbed from 40% to 55% and protection classifications all fall within Protection. For a more detailed view of each minor watershed maps will be available on the Todd County website as they are developed.
Agriculture

**CROP**

The Redeye River Watershed has a significant portion which is rated as Prime Farmland or Farmland of Statewide Importance. See Appendix VI for maps pertaining to this land cover. Not only do these soils produce rich agricultural land but it also protects the quality of drinking water and supports wildlife habitat. Preserving agricultural land in the county is a high priority. In the 2015 Water Plan Survey over fifty percent of county residents responded that the destruction of healthy soils was one of the greatest threats to Todd County’s agricultural community. Installing and adhering to crop BMPs is the watershed’s best effort at protecting soil for the future of farming.

There are many in-field best management practices (BMPs) which can reduce erosion, build soil and manage water to enhance soils performance and profitability. Below is a table from the 2015 University of Minnesota Extension Fields to Streams, Managing Water in Rural Landscapes.

In addition, the Minnesota Department of Agriculture (MDA) works to monitor nutrients and pesticides in Minnesota’s waters. The MDA has partnered with East Otter Tail SWCD and Todd County to offer basal stalk nitrate testing to area corn farmers. Results are used to offer nitrogen management changes where appropriate.
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<tr>
<th>PRACTICES</th>
<th>EFFECTS</th>
<th>Increase spring transpiration</th>
<th>Increase infiltration</th>
<th>Increase soil water holding capacity</th>
<th>Reduce total water (and nitrogen) delivery</th>
<th>Increase dissolved oxygen reduction</th>
<th>Increase P and sediment delivery</th>
<th>Reduce open water evaporation</th>
<th>Reduce peak flows</th>
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<td>1. IN-FIELD: CROP AND SOIL MANAGEMENT</td>
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<td>Reduced tillage, contour cropping and residue management</td>
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32: 2015 University of Minnesota Extension Fields to Streams, Managing Water in Rural Landscapes - Best Management Practices (BMPs) and Effects
Livestock

Animal agriculture is a necessary and important part of our lives. Minnesota's livestock and poultry producers help support communities by generating tax revenue and creating jobs. As of 2011 Todd County ranks within the top ten counties for turkey production, cattle and calves, beef and milking cows according to the Minnesota Department of Agriculture (MDA).

As of 2014 there were 55 feedlots in shoreland areas and 675 feedlots which were required to be registered. Owners which are required to be registered include animal feedlots which are capable of holding 50 or more animal units or the manure for those animals or within shoreland, an area with ten or more but now greater than 50 animal units or the manure for those animals.

There are just over 2,800 animal units within the Redeye River Watershed with none of the minors having over 2,000 animal units.

Feedlots can be a water quality concern because of three of the most common pollutants to surface and groundwater: phosphorus, nitrates and pathogenic bacteria. While not all bacteria are pathogenic or found in livestock manure contamination by pathogens is a health hazard.

Water quality is protected through the Minnesota State Feedlot Rules by limiting subsurface and surface water discharges as well as restricting the location of new feedlots to set distances from private wells, shoreland and community or school water supply areas. Discharges include animal manure, manure contaminated runoff or process wastewater produced by milk house wastes or flush canals.

Drainage

In order to enable and enhance agricultural production, transportation and economic development drainage ditches were built. Water from previously unconnected depressions of saturated soil could then be conveyed to streams. Many streams and rivers were also straightened and widened for these reasons. Within the watershed there are zero miles of county or jurisdictional ditches. Currently it is unknown how many miles of private ditches are in the watershed.

Subsurface drainage or tiling have historically been installed to drain wet areas which were not connected to ditch systems. More recently pattern tiling has been popular as it can remove water from entire fields. Todd County does not keep records of the amount or locations of tile as they are primarily on private lands and it is not regulated.

Agricultural drainage ultimately alters hydrology as its sole purpose is to reduce storage of excess moisture in the soil to accommodate air in the root zone to grow crops. The impact ultimately depends on the field conditions, precipitation, type of drainage, system design and the scale in relation to the watershed. Potential impacts include: Reduced time that water is being stored in soil, change of water pathways over land, decreased evaporation, increase in annual transpiration, increase in the amount of water to streams and rivers, reduction, delay or extension of peak flow within a stream or river and reduction in overland flow.

Concerns with agricultural drainage within the county include increased flows in rivers and streams, sediment transport, chemical transport and the uncertain effect on groundwater aquifer levels. High crop and land prices have the potential of increasing conversion of pasture and forage land to row crops, which in turn may lead to the installation of new drainage systems or drainage improvements to existing systems. Todd County has
developed a Drainage Management Plan as well as updated its culvert inventories. More could be done to mitigate water from drainage by constructing or restoring wetlands within the county.

Adequate drainage can be a critical component of a successful farm operation while at the same time new drainage and drainage improvements represent an opportunity to design and install systems in ways that help reduce nutrient losses into surface water and positively affect the timing and flows of drainage water into surface waters. These efforts combined with wetland restoration and water retention initiatives can have positive impacts upon water quality in agricultural landscapes. The Minnesota Department of Agriculture (MDA) has several recommendations regarding agricultural drainage and should be consulted when these opportunities arise. Conservation drainage or the use of drainage practices that are designed to provide the benefits of drainage while minimizing negative impacts on the environment should be the norm within the watershed.

Dams
Dams maintain lake levels and impound water for flood control, power production and water supply. Within Todd County there are 17 active dams. Dams also present the challenge of aquatic connectivity meaning organisms may not be able to move upstream or downstream. Barriers such as dams and road crossings alter flows in ways that can increase temperature, floods and cause erosion leading to increased sediment loads. This watershed has an active dam on the Wing River at Hewitt. The dam is a concrete weir and is listed in poor condition. The DNR has also noted there is heavy erosion, cracking, spalling, leakage, displacement and is causing bank scouring.

Forested Land
The Redeye River Watershed is 25% forested with it mainly being classified as deciduous closed forest. Forested land in the watershed comprises over 7,600 acres. See Appendix VI for maps pertaining to this land cover.

Wetlands
The U.S. Corps of Engineers regulates wetlands according to Section 404 of the Clean Water Act. Additionally, the Minnesota Wetland Conservation Act regulates all wetlands in MN and is administered by Local Government Units. Regulated activities include draining, filling or excavating a wetland. Local permission can be obtained by contacting the Todd County Wetland Conservation Act (WCA) Technician. They will determine wetlands within the site and give recommendations as to avoid impacting the wetland. If disturbance is unavoidable the landowner will be required to minimize impacts to the wetland and finally mitigate those impacts to replace the loss of the wetland’s functions and values, in Todd County the minimum is a 2 to 1 acre replacement.

Wetlands serve many purposes and their preservation and restoration is a priority. Loss of wetlands can affect water quality, ground water quantity, floodwater retention, wildlife and many other environmental and societal benefits. A wetland inventory has not been developed within Todd County but would help identify, prioritize and restore wetland areas to help mitigate excess nutrient and water issues.

The Redeye River Watershed is 18% wetland with most being classified as emergent and shrub wetland (9.16% and 8.70%). Wetland in the watershed comprises just over 5,500 acres. See Appendix VI for maps pertaining to this land cover.

Native Plant Communities
A native plant community is a group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. The Minnesota Department of Natural Resources (MNDNR) has identified several areas within the watershed which fall into this category.
Within the watershed there is only one minor watershed containing native plant communities and it is a very small contribution encompassing only East Annalaide Lake.

**Municipalities**

*Hewitt*

The only city, Hewitt, is located within this watershed and the Wing River flows through the city. Many wetlands also exist within the city, mainly on the boarders of the river but not all. Hewitt has impervious surfaces and therefore stormwater runoff. The city maintains its own city sewers, has holding ponds and provides public water to residents. There is a dam located where Highway 210 and 71 cross.

**Recreational & Public Land**

Private recreational land makes up a significant portion of land within Todd County. Both non-homestead lakeshore and non-homesteaded seasonal recreation consisting mostly of forested and wetlands fall in this category. In a survey conducted as part of the Priority Concerns Scoping Document (PCSD) hunting and fishing (59.8%) and swimming, canoeing, boating or jet skiing (35.9%) were the top two responses to the question, “When you think about Todd County Water what comes to mind for you?” The highest number of respondents also rated “Wildlife Habitat” as seeing some improvements within the county.

For the purposes of this plan public land within Todd County falls within four main categories listed below. Exact locations of local parks can be obtained from the Todd County Planning & Zoning office. Federal and state managed areas are shown on the Minnesota Public Recreation Information Maps (PRIM maps) online.

*City, Township or County Parks*

Established for various reasons but can provide excellent recreational opportunities. The City of Hewitt has a city park, Center Park and Riverside Park on the Wing River.

*Wildlife management areas (WMAs)*

Consist of wetlands, uplands, or woods owned and managed for wildlife by the Department of Natural Resources (DNR). Hunting and various recreational opportunities are open to the public. There are no WMAs in this watershed.

*State forests/Parks/Landings*

There are no state forests, parks or landings in this watershed.

*Wildlife protection areas (WPAs)*

Most of these federally managed wetlands and surrounding uplands are open to hunting and various recreational opportunities. There are no WPAs in this watershed.

**Regulated Development**

*County Zoning*

Todd County has had a land use ordinance since March 18, 1976 and a shoreland ordinance in effect since July 1, 1972. The last comprehensive update was in May 2012 and it will continue to be modified with zoning requirements as necessary. The county has no jurisdiction over municipalities with land use or shoreland ordinances. If new ordinances are developed in Todd County or the municipalities as a result of the Comprehensive Water Plan the Planning and Zoning Department, County Attorney, County Commissioners and any other necessary agency to ensure the new ordinances are compatible with existing ordinances.
Municipal Zoning
The City of Hewitt enforces their own local zoning ordinances and permits can be obtained by contacting the city office.

Township Zoning
Bertha and Stowe Prairie Townships are two of three townships in the county which enforces their own local ordinances and permits can be obtained by contacting the township clerk.

Additional Zoning Entities
There are no additional zoning entities and there are no official watershed districts within the Todd County portion of the Redeye River Watershed.

Pollution
Permitted Pollution
The Redeye River Watershed has several sites which have obtained permits to discharge effluent. The permit controls water pollution by regulating point source pollution. Point sources are discrete conveyances such as pipes or man-made ditches. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. An example of this would be a Wastewater Discharge Permit for the City of Hewitt Waste Water Treatment Facility. To find out more about permitted facilities and different permit types in the Redeye River Watershed see Appendix IX for more information.

Non-Point Source Pollution
Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many discrete sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands and ground waters.

The major source of NPS in the watershed is exposed soil leading to wind and water erosion, groundwater withdrawal, stormwater runoff, fertilizer and manure runoff, livestock overgrazing, failing septic systems, wildlife fecal runoff and possibly wetlands. For more information of NPS refer to Appendix X.

**Individual Sewage Treatment System Inspections**
Todd County requires Individual Sewage Treatment System (ISTS) inspections to be completed before finalizing a sale on a home. In addition the Todd County Planning and Zoning department have systematically been conducting ISTS inspections around several lakes around Todd County. Within the watershed there have been no lakes sampled as part of this program.

Watershed Restoration and Protection Areas

**Restoration Areas**
City of Hewitt Dam
The dam at Hewitt, although small, potentially prohibits fish passage which in turn effects colonization of fish species upstream within the Wing River and its tributaries. Dams create recreational opportunities for fishing and camping and also aid in water storage and flood control. However, dams can also restrict water flow to downstream areas, create impoundments upstream, alter stream flow, and prevent fish migration, among other impacts. Although the number of fish taxa did not change above or below the dam, the presence of larger, long lived species declined above the dam. Species such as shorthead and silver redhorse were present below the
dam but absent above, and although present above the dam, the abundance of white sucker declined above the dam. These findings suggest that the dam in Hewitt is having a negative effect on the ability of fish species to migrate upstream on the Wing River.

**Protection Areas**

**Groundwater**
Local groundwater conditions may vary, but due to the surficial geology and heavy agricultural use, nitrate is a potential contaminant of concern in the Redeye River Watershed. The MDA regularly samples groundwater across the region for nitrate. To protect human health, the MDH encourages well owners to test their water supply for nitrate on a regular basis. Most groundwater supplies are pumped from the surficial sand aquifers and a number of buried sand aquifers. These sands are very transmissible and as a result, water levels of surficial water bodies as well as base flow in the Redeye River are closely related to groundwater levels in the surficial aquifer.

**Wetlands**
The Wetland Conservation Act (WCA) was passed in 1991 and has been implemented by Todd County ever since. The ultimate goal of the Act is no more net loss of wetlands. In order to attain this goal, draining, filling, and excavation is prohibited unless: The drain, fill or excavation activity is exempt or wetlands are replaced by restoring or creating wetland areas of at least equal public value.

**Priority Concern 1: Wetlands**
Controlling flood waters through retention structures such as wetlands helps maintain and improve surface and groundwater quantities and quality as well as protects private assets. Work to develop a wetland inventory within the watershed to help identify, prioritize and restore wetland areas to help mitigate excess nutrient and water issues. Educate landowners about the influence tiling has on the amount of water into ditch networks.

**Priority Concern 2: E.coli contributions**
Work with applicators and landowners to meet setbacks and timing requirements of manure and chemical fertilizer applications. Work with producers to control feedlot runoff with Best Management Practices (BMPs). Control cattle access to streams by encouraging rotational grazing and flash grazing practices. Further bacteria testing could be done to identify contributing E.coli areas or species. Minor 13003 has over 1,300 animal units within its boundaries and it is the minor which the Wing River passes through.

**Priority Concern 3: Groundwater**
The direct correlation of increasing groundwater withdrawals and decreasing surficial water quantity has been documented in other areas of Minnesota such as Little Rock Creek and White Bear Lake. Data does indicate a continued increase in groundwater withdrawals from the watershed. More stream flow information would be beneficial for determining trends in groundwater/surface water interactions. Also, expanded and continued study of groundwater/surface water interactions should be a priority, due to the transmissive surficial geology and rising trend in groundwater use in this watershed.

Work with the City of Hewitt to develop and maintain Drinking Water Supply Management Areas (DWSMAs). Work with landowners within Wellhead Protection Areas to adopt BMPs for nutrient management and chemical applications, seal abandoned wells, close abandoned manure pits and upgrade failing septic systems. Provide outreach and technical assistance to private well owners who are either involved in the Township Testing program or have their water tested on their own.
33: Sauk River Watershed
Chapter VII: SAUK RIVER WATERSHED

Watershed Overview
The Sauk River watershed covers 1,041 square miles in the West Central Upper Mississippi River Basin in central Minnesota and encompasses portions of Douglas, Pope, Todd, Stearns and Meeker Counties. The watershed lies in the central portion of the North Central Hardwood Forest ecoregion.

The dominant land use within the watershed is 55% cropland, 16% percent open water and wetland, 12% hay, pasture and grassland, 11% percent forest/shrub and six percent developed.

Cities within the watershed include Osakis, West Union, Westport, Sauk Centre, Melrose, St. Rosa, Greenwald, New Munich, Freeport, Spring Hill, St. Martin, Farming, Richmond, Cold Spring, Eden Valley, St. Joseph, Waite Park and Sauk Rapids. The watershed is within three miles of Alexandria and borders St. Cloud.

The Sauk River watershed extends from the eastern portions of Douglas and Pope Counties in the west to the Mississippi River upstream of St. Cloud in the east. The major lakes include Lake Osakis, Sauk Lake, Big Birch, Little Birch, Big Fish Lake and Sauk River Chain of Lakes. The major river is the Sauk which drains the watershed as it meanders for 120 miles in a northwest to southeast direction until it empties in the Mississippi River two miles North of St. Cloud. Within the Sauk River Watershed there are 28 county and judicial ditch systems that drain relatively large areas. There are also many miles of private ditch networks in the watershed and hundreds of miles of buried tile systems.

Within the watershed there is also an extreme diversity of natural resources from riverine to recreational lakes, prairie potholes to sand plains, native prairie to hardwood forests. As a result, there is a wide range of resource management and protection needs, with waters ranging from pristine to impaired waters.

For more information from a watershed perspective and its overall health on a number of different criteria including hydrology, geomorphology, biology, connectivity and water quality refer to the Minnesota Department of Natural Resources (MNDNR) Watershed Health Assessment Framework online.

Todd County Portion Overview
In Todd County, the Sauk River Watershed is the second largest in land area covering 215 square miles. The Todd County portion is the second largest behind Stearns County, encompassing 21% of the total watershed.

Cities in the watershed include Grey Eagle, Osakis and West Union. Only Osakis has Wellhead Protection Areas and adheres to a Wellhead Protection Plan at this time. Grey Eagle is located in this watershed and also in the Mississippi River Brainerd. Townships include portions of Grey Eagle, Leslie, Little Sauk, Reynolds and Round Prairie and also all of Birchdale, Kandota, Gordon and West Union.

The geology of this area consists of the Des Moines Lobe glacier which left calcareous, silty clay soils in a rolling, pothole type of landscape. The Sauk valley was formed by an interglacial stream that created a bed of glacial outwash through which the Sauk River currently flows. The Sauk River flows through Todd County starting at
Lake Osakis and flows east through Guernsey Lake, Little Sauk Lake (also known as Long Bridge) and Juergens Lake, then south through Sauk Lake and past Sauk Centre eventually into the Mississippi River.

The soils in these areas are directly related to the deposits left behind by the glaciers. The ability of the soils to absorb and transmit water is also affected by slope and topography. Infiltration rates and permeability affects run off rate and groundwater pollution potential. Land uses should always consider soil type as suitability may be limited. Soils in this area are classified as Mollisols and Alfisols with mainly sand and gravel outwash deposits. Till and drift contain high clay and silt fractions. Some of the most valuable cropland in the county is in this area as the soils are heavy and slopes have allowed for larger fields and low ground areas to be tiled.

Twenty-two minor watersheds make up the hydrology of this area with elevation varying from 1182 feet to 1465 feet above sea level.

Major lakes with over 150 acres in Todd County include Osakis (5,423.92 acres), Big Birch (1,421.92 acres), Sauk (1357.72 acres), Little Birch (710.29 acres), Maple (557.94 acres), Fairy (345.45 acres), Little Sauk (323.23 acres), Goose (295.44 acres), William (165.24 acres), Long (158.60 acres) and Felix (156.10 acres).

Major streams and rivers over ten miles of segment within Todd County include only the Sauk River (17.10 miles).

There is only one major county ditch over ten miles in length, CD33 (17.95 miles).

**Surface Water**

**Public (Protected) Waters**

A list of public or protected waters is included in Appendix VIII of this document. This designation may imply special zoning, buffer or state and federal agency requirements. Public waters include lakes, rivers, streams, and wetlands designated under Minnesota Statutes, section 103G.005, subdivision 15, any lakes or wetlands listed in the DNR Public Waters Inventory.

The Ordinary High Water Level (OHWL) is the state defined boundary for protected water and is the elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape. Generally it is the point where natural vegetation changes from predominately aquatic to predominately terrestrial. It is important because certain property and water rights can be affected by the location. For example when working above the OHWL the Todd County Planning and Zoning Department may require a permit, whereas when working below the OHWL the Department of Natural Resources will require a permit. This pertains to lakes, stream, rivers and wetlands. For watercourses it is the elevation of the top of bank for the channel.

**Lakes of Biological Significance**

The goal of this list was to identify lakes that exhibit the highest quality features within any of the four assessed biological communities. Therefore, a lake needed to meet criteria for only one of the community types (aquatic plants, fish, birds, amphibians) to be identified as a Lake of Biological Significance. Occurrences of high-quality features within the community types determined the biological significance rank (outstanding, high or moderate).
There are several lakes within the watershed which have been identified as Lakes of Biological Significance by the Minnesota Department of Natural Resources (MNDNR). Lakes include Big Birch, Cedar, Fairy, Little Birch, Long (Birchdale Twp. 77014900), Osakis and Sauk.

Wild Rice Lakes
Wild rice within a lake or river can imply good water quality and a healthy ecosystem. It not only provides structure, cover and food to different species but also protects shorelines from wind erosion and ties up nutrients increasing water quality. Resource managers have identified lakes throughout the state in an effort to preserve, restore and enhance this resource.

There are no lakes within the watershed which have been identified as containing wild rice by the MNDNR. Local landowners have reported wild rice in Prairie Creek, Hennessey and Little Birch lakes.

Impaired Waters
The federal Clean Water Act requires states to adopt water quality standards to protect lakes, streams, and wetlands from pollution. The standards define how much of a pollutant (bacteria, nutrients, turbidity, mercury, etc.) can be in the water and still meet designated uses, such as drinking water, fishing, and swimming. A water body is “impaired” if it fails to meet one or more water quality standards.

Impaired water bodies currently identified by the Minnesota Pollution Control Agency (MPCA) include the following lakes: Big Sauk (Mercury and Nutrients), Juergens (Nutrients), Little Sauk (Nutrients), Maple (Mercury and Nutrients), Guernsey (Nutrients), Faille (Nutrients) and Osakis (Mercury and Nutrients).

Impaired streams and rivers include Ashley Creek (Dissolved Oxygen, E.coli, Macroinvertebrate and Fish IBI), Crooked Lake Ditch (E.coli, Macro. IBI), Sauk River (Headwaters to Guernsey Lake with Mercury), Sauk River (Guernsey Lake to Little Sauk Lake with Mercury), Sauk River (Little Sauk Lake to Juergens Lake with Mercury), Sauk River (Juergens Lake to Sauk Lake with Mercury), Unnamed creek (Headwaters to Sauk River with Fish IBI) and Unnamed Ditch (Unnamed creek to Sauk Lake with Fish and Macro. IBI).
Lakes with Measured Phosphorus Sensitivity
The phosphorus sensitivity significance index is a function of phosphorus sensitivity, lake size, lake total phosphorus concentration, proximity to PCA’s phosphorus impairment thresholds, and watershed disturbance.

Within the watershed there are a handful of lakes which have had enough data to compile a sensitivity rating for phosphorus by the MNDNR. Lakes include Cedar, Bass, Long, Fairy, Little Birch, Big Birch, Little Osakis, Osakis, Little Sauk, Mud, Guernsey, Sauk, Juergens, Maple, Faille and Goose.

For this specific watershed, lakes in orange below were given a restore classification while lakes in yellow were given a protect classification based on their sensitivity significance index.

The chart also signifies the lake’s total phosphorus (TP) loading sensitivity expressed as the loss of predicted Secchi disk water transparency (in inches) with 100 pounds of TP added. This loading is an estimate of total phosphorus and based on Minnesota’s eutrophication criteria for impairment for the specific lakes. A comparison chart of all of Todd County’s lakes was added for overall reference.
35: All Todd County & Sauk River Watershed Lakes - Inches Lost of Water Clarity

**Trout Streams**
Designated trout streams have special management restrictions regarding their recreational use and are particularly sensitive to minor alterations in their habitats. Within Todd County there are four designated trout streams by the Department of Natural Resources (DNR). Sauk River Watershed has two designated trout streams, Trout Creek in Round Prairie and Birchdale Townships and Little Sauk Creek in Little Sauk and Kandota Townships.

**Aquatic Invasive Species**
As of 2015 there are several waterbodies within Todd County which have one or more Aquatic Invasive Species (AIS) in them. In the Sauk River Watershed, Little Birch (Eurasian Watermilfoil), Sauk Lake (Eurasian Watermilfoil & Flowering Rush) and the Sauk River (Flowering Rush) from Juergens to Mud lakes.
Todd County has developed an AIS Plan to help slow the spread of invasive species. Two major parts of the program, watercraft inspections and Zebra Mussel veliger monitoring are carried out in the watershed. Lakes were selected by the AIS committee and included lakes which were believed to be more at risk due to their recreational pressure and proximity to surrounding infected lakes. In addition to inspections and monitoring, education and outreach are being carried out within the watershed.

Lakes which were selected for both inspections and monitoring were broken up into zones and in this watershed included: Birch Lake Zone – includes Big and Little Birch Lakes, Bass, Twin, Mary, and Goose Lakes and SW Zone – Lake Osakis, Maple Lake, Fairy Lake, Sauk Lake.

Todd County will continue the AIS program as long as support is continued through the state.

**Groundwater Monitoring**

The Department of Natural Resources (DNR) monitors groundwater levels through observation wells around the county. Their Cooperative Groundwater Monitoring (CGM) information can be found at [http://www.dnr.state.mn.us/waters/cgm/index.html](http://www.dnr.state.mn.us/waters/cgm/index.html). Information presented in the data has been gathered by the Todd County SWCD.

There are three active observation wells located within the Todd County portion of the Sauk River Watershed. The wells vary in depth from 19 to 127 feet deep and some have been monitored since November 1984. An example of Obwell 77036 hydrograph is below. The well is 39 feet deep, is located just west of Fairy Lake and has been monitored since 2002. Monitoring shows a fairly consistent pattern of seasonal groundwater fluctuation over time.

![DNR Obwell Water #77036 Water Level](image)
City Drinking Water
The Sauk River Watershed has two municipalities which provide water services to residents. The City of Osakis has developed a Drinking Waters Supply Management Area (DWSMA) surrounding their city wells. The City of Grey Eagle is in the process of developing a Wellhead Protection Plan (WHPP) and is in both the Sauk River and Mississippi River Brainerd Watersheds. As required by the Minnesota Wellhead Protection Rule every ten years the cities must update their Wellhead Protection Plans. These plans give detailed information on the area surrounding municipal wells and their vulnerability. They also spell out specific goals for protection.

West Union
The City of West Union has just over 100 residents and all are on private wells.

Osakis
The City of Osakis has two wells which provide water to their residents. Well 1 is 92 feet deep and was constructed in 1968 and Well 3 is 86 feet deep and was constructed in 2011. The vulnerability of the DWSMA is classified as low and is mainly outside of Todd County.

Grey Eagle
The City of Grey Eagle provides municipal drinking water to residents. The WHPP is set to begin in March 2016 and will be finished by March 2018. As the city is located in both the Sauk River and Mississippi River Brainerd Watersheds the DWSMA and WHPP will most likely be in both watersheds.

Private Drinking Wells
The Minnesota Department of Agriculture (MDA) will begin a Township Testing program in Todd County starting 2016 to assess the level of nitrates in private wells. Gordon, West Union, Kandota and Round Prairie Township residents will be invited to participate. These townships were selected because at least 30% of the township has vulnerable geology and 20% of the township is in row crop production.

Any person in the county can easily and inexpensively get their well water tested. The Todd County SWCD and Extension Office provide sampling instructions, containers and interpretation of the results.

Irrigation Wells
Irrigation wells are permitted through the DNR through a system called MPARS. This is done in an effort to prevent well interference with private domestic well owners. The Sauk River Watershed has the second highest amount of active permitted irrigation in the county at 19,960 gallons per minute permitted on 30 wells which encompass 14.6% of the total use within Todd County. The main current use is for agricultural irrigation accounting for 96% of total usage. Municipal water accounts for the rest.

Irrigation water management primarily aims to control the volume and frequency of irrigation water applied to crops, so as to meet crop needs while conserving water resources. Recommendations on irrigation water Best Management Practices (BMPs) are provided by the Minnesota Department of Agriculture. Todd County also works in partnership with Hubbard and Wadena counties to provide an Irrigator Scheduler Program to local irrigators. One technician out of the Wadena SWCD office manages this program.

There is not enough data to know how additional irrigation permits may change groundwater supply or the potential impacts to nearby lakes, streams or rivers. Currently the MNDNR has three pilot groundwater management areas in the state to look closer at these issues. See Appendix III for more information on well locations and surficial aquifers within this watershed.
**Land Cover and Use**

General land cover in the county can be divided into four primary categories: Agriculture, Woodland, Water and Wetlands and Other including urban and built up areas. Watersheds are composed of groundwater recharge and storm water runoff generation areas. As far as water quality is concerned, forests and impervious surfaces typically found in urban areas represent the two ends of that spectrum, with other land covers falling in between. In addition to forests, wetlands and native grasslands also serve a special role in water quality. Wetlands offer flood protection, shoreline erosion control and help to filter and improve water quality. Native grasslands offer similar benefits as wetlands and forested areas such as water filtration and erosion control. All three offer the additional benefits of harboring wildlife habitat, building resilient ecosystem communities and are more robust during extreme weather conditions.

Agriculture presents many opportunities and challenges. Most watersheds within Todd County have substantial agricultural land cover with areas next to lakes and streams posing the highest risk to clean water. Through conservation minded principals and best management practices in cropping fields, grazing operations and feedlots these areas can add a greater awareness to our role of protecting and preserving natural resources. The Water Plan Task Force Committee felt strongly that run-off from fields be clean and that excess water from drainage not impact neighbors.

Minor or subwatersheds were assessed by the Todd County SWCD and GIS Department in order to determine a protection approach to water conservation using current land cover data. Depending on the amount of wetland and forested area within a minor watershed determined the amount of water quality protection which exists. Surface water was not included in the overall calculation as it was based on percent disturbed land cover. Disturbed land cover included agricultural (cropped and pasture), urban and built up areas (barren and quarries included) as identified by 2012 Landfire data.

As mentioned above there are 22 minor watersheds in this area. They range in percent disturbed from 41% to 93% and protection classifications vary from Protect to Restore. For a more detailed view of each minor watershed maps will be available on the Todd County website as they are developed.

**Agriculture**

*Crop*

The Sauk River Watershed has a significant portion which is rated as Prime Farmland or Farmland of Statewide Importance. See Appendix VII for maps pertaining to this land cover. Not only do these soils produce rich agricultural land but it also protects the quality of drinking water and supports wildlife habitat. Preserving agricultural land in the county is a high priority. In the 2015 Water Plan Survey over fifty percent of county residents responded that the destruction of healthy soils was one of the greatest threats to Todd County’s agricultural community. Installing and adhering to crop BMPs is the watersheds best effort at protecting soil for the future of farming.

There are many in field best management practices (BMPs) which can reduce erosion, build soil and manage water to enhance soils performance and profitability. Below is a table from the 2015 University of Minnesota Extension Fields to Streams, Managing Water in Rural Landscapes.

In addition, the Minnesota Department of Agriculture (MDA) works to monitor nutrients and pesticides in Minnesota’s waters. The MDA has partnered with East Otter Tail SWCD and Todd County to offer basal stalk
nitrate testing to area corn farmers. Results are used to offer nitrogen management changes where appropriate.
<table>
<thead>
<tr>
<th>PRACTICES</th>
<th>EFFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. IN-FIELD: CROP AND SOIL MANAGEMENT</strong></td>
<td></td>
</tr>
<tr>
<td>Perennial crops, and crop rotations with perennials or winter annuals</td>
<td>✓</td>
</tr>
<tr>
<td>Cover crops</td>
<td>✓</td>
</tr>
<tr>
<td>Reduced tillage, contour cropping and residue management</td>
<td>✓</td>
</tr>
<tr>
<td>Compaction management</td>
<td>✓</td>
</tr>
<tr>
<td>Manure application</td>
<td>✓</td>
</tr>
<tr>
<td><strong>2. IN-FIELD: DRAINAGE WATER MANAGEMENT</strong></td>
<td></td>
</tr>
<tr>
<td>Alternative drainage design (depth, spacing, capacity)</td>
<td>✓</td>
</tr>
<tr>
<td>Controlled drainage</td>
<td>✓</td>
</tr>
<tr>
<td>Alternative tile inlets</td>
<td>✓</td>
</tr>
<tr>
<td><strong>3. IN-FIELD AND EDGE-OF-FIELD: SURFACE FLOW MANAGEMENT</strong></td>
<td></td>
</tr>
<tr>
<td>Grassed waterways</td>
<td>✓</td>
</tr>
<tr>
<td>Filter strips, contour buffer strips</td>
<td>✓</td>
</tr>
<tr>
<td><strong>4. IN-FIELD AND EDGE-OF-FIELD: WATER STORAGE AND INFILTRATION</strong></td>
<td></td>
</tr>
<tr>
<td>Saturated buffers</td>
<td>✓</td>
</tr>
<tr>
<td>Restored and constructed wetlands</td>
<td>✓</td>
</tr>
<tr>
<td>WASCOBs, terraces, and detention basins</td>
<td>✓</td>
</tr>
<tr>
<td>Ponds and irrigation reservoirs</td>
<td>✓</td>
</tr>
<tr>
<td>Large retention basins</td>
<td>✓</td>
</tr>
<tr>
<td><strong>5. DITCH CHANNEL: WATER RETENTION</strong></td>
<td></td>
</tr>
<tr>
<td>Structures for water control, including weirs and restricted size culverts</td>
<td>✓</td>
</tr>
<tr>
<td>Two-stage ditch with restricted size culverts</td>
<td>✓</td>
</tr>
<tr>
<td><strong>6. RIPARIAN AREA: RESTORATION AND PROTECTION</strong></td>
<td></td>
</tr>
<tr>
<td>Riparian vegetation</td>
<td>✓</td>
</tr>
<tr>
<td>Streambank, bluff, and shoreline protection</td>
<td>✓</td>
</tr>
<tr>
<td>Restore channel meanders</td>
<td>✓</td>
</tr>
</tbody>
</table>

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37: 2015 University of Minnesota Extension Fields to Streams, Managing Water in Rural Landscapes- Best Management Practices (BMPs) and Effects
**Livestock**

Animal agriculture is a necessary and important part of our lives. Minnesota’s livestock and poultry producers help support communities by generating tax revenue and creating jobs. As of 2011 Todd County ranks within the top ten counties for turkey production, cattle and calves, beef and milking cows according to the Minnesota Department of Agriculture (MDA).

As of 2014 there were 55 feedlots in shoreland areas and 675 feedlots which were required to be registered. Owners which are required to be registered include animal feedlots which are capable of holding 50 or more animal units or the manure for those animals or within shoreland, an area with ten or more but now greater than 50 animal units or the manure for those animals.

There are over 25,000 animal units within the Sauk River Watershed with two of the minors having over 2,000 animal units, 16074 and 16068.

Feedlots can be a water quality concern because of three of the most common pollutants to surface and groundwater: phosphorus, nitrates and pathogenic bacteria. While not all bacteria are pathogenic or found in livestock manure contamination by pathogens is a health hazard.

Water quality is protected through the Minnesota State Feedlot Rules by limiting subsurface and surface water discharges as well as restricting the location of new feedlots to set distances from private wells, shoreland and community or school water supply areas. Discharges include animal manure, manure contaminated runoff or process wastewater produced by milk house wastes or flush canals.

**Drainage**

In order to enable and enhance agricultural production, transportation and economic development drainage ditches were built. Water from previously unconnected depressions of saturated soil could then be conveyed to streams. Many streams and rivers were also straightened and widened for these reasons. All of the public ditch systems within the Sauk River Watershed were constructed between 1904 and 1921. Within the watershed there are over 52 miles of county or jurisdictional ditches. Currently it is unknown how many miles of private ditches are in the watershed.

Subsurface drainage or tiling have historically been installed to drain wet areas which were not connected to ditch systems. More recently pattern tiling has been popular as it can remove water from entire fields. Todd County does not keep records of the amount or locations of tile as they are primarily on private lands and it is not regulated.

Agricultural drainage ultimately alters hydrology as its sole purpose is to reduce storage of excess moisture in the soil to accommodate air in the root zone to grow crops. The impact ultimately depends on the field conditions, precipitation, type of drainage, system design and the scale in relation to the watershed. Potential impacts include: Reduced time that water is being stored in soil, change of water pathways over land, decreased evaporation, increase in annual transpiration, increase in the amount of water to streams and rivers, reduction, delay or extension of peak flow within a stream or river and reduction in overland flow.

Concerns with agricultural drainage within the county include increased flows in rivers and streams, sediment transport, chemical transport and the uncertain effect on groundwater aquifer levels. High crop and land prices have the potential of increasing conversion of pasture and forage land to row crops, which in turn may lead to
the installation of new drainage systems or drainage improvements to existing systems. Todd County has
developed a Drainage Management Plan as well as updated its culvert inventories. More could be done to
mitigate water from drainage by constructing or restoring wetlands within the county.

Adequate drainage can be a critical component of a successful farm operation while at the same time new
drainage and drainage improvements represent an opportunity to design and install systems in ways that help
reduce nutrient losses into surface water and positively affect the timing and flows of drainage water into
surface waters. These efforts combined with wetland restoration and water retention initiatives can have
positive impacts upon water quality in agricultural landscapes. The Minnesota Department of Agriculture (MDA)
has several recommendations regarding agricultural drainage and should be consulted when these opportunities
arise. Conservation drainage or the use of drainage practices that are designed to provide the benefits of
drainage while minimizing negative impacts on the environment should be the norm within the watershed.

Dams
Dams maintain lake levels and impound water for flood control, power production and water supply. Within
Todd County there are 17 active dams. Dams also present the challenge of aquatic connectivity meaning
organisms may not be able to move upstream or downstream. Barriers such as dams and road crossings alter
flows in ways that can increase temperature, floods and cause erosion leading to increased sediment loads. This
watershed has eight listed dams seven of which are active: Lake Osakis 3 (Todd County), Groschel Pond,
Berscheid Pond (DNR-Wildlife), Fry Pond (DNR-Fisheries), Peschel Pond, Big Birch Lake (Birchdale Township) and
Glockzin Pond. Lake Osakis 2 located off County 10 no longer functions as a dam. Big Birch Lake WPA dam was
replaced by weirs in two 8 x 8 box culverts in 1992.

Forested Land
The Sauk River Watershed is almost 15% forested with it mainly being classified as Deciduous Closed forest.
Forested land in the watershed comprises just over 20,000 acres. See Appendix VII for maps pertaining to this
land cover.

Wetlands
The U.S. Corps of Engineers regulates wetlands according to Section 404 of the Clean Water Act. Additionally,
the Minnesota Wetland Conservation Act regulates all wetlands in MN and is administered by Local Government
Units. Regulated activities include draining, filling or excavating a wetland. Local permission can be obtained by
contacting the Todd County Wetland Conservation Act (WCA) Technician. They will determine wetlands within
the site and give recommendations as to avoid impacting the wetland. If disturbance is unavoidable the
landowner will be required to minimize impacts to the wetland and finally mitigate those impacts to replace the
loss of the wetland’s functions and values, in Todd County the minimum is a 2 to 1 acre replacement.

Wetlands serve many purposes and their preservation and restoration is a priority. Loss of wetlands can affect
water quality, ground water quantity, floodwater retention, wildlife and many other environmental and societal
benefits. A wetland inventory has not been developed within Todd County but would help identify, prioritize
and restore wetland areas to help mitigate excess nutrient and water issues.

The Redeye River Watershed is 23% wetland with most being classified as emergent wetland (10.62%). Wetland
in the watershed comprises just over 32,000 acres. See Appendix VII for maps pertaining to this land cover.
Native Plant Communities
A native plant community is a group of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. The Minnesota Department of Natural Resources (MNDNR) has identified several areas within the watershed which fall into this category.

Within the watershed over half of the minor watersheds contain native plant communities. The largest concentrations are found east of Sauk Lake around Long, Bunker, Zager and unnamed lakes 77024700 and 77024600 and on the south sides of Maple and Mud lakes. A significant sized Red Oak and Basswood community also extends into the watershed from the neighboring Mound Lake in the Mississippi River Brainerd Watershed.

Municipalities
Osakis, Grey Eagle and West Union are all within this watershed and all have waterbodies within them. All have impervious surfaces and therefore stormwater runoff. All maintain city sewers, have holding ponds and provide public water to residents except for West Union.

Grey Eagle
The City of Grey Eagle has just under 700 residents. Trace Lake is on the northwestern boundary of the city limits. There are very few wetlands within the city. Bass Lake is just east of the city.

Osakis
The City of Osakis has just over 1,700 residents. Lake Osakis and Faille Lake are within the boundaries of the city. Several wetland complexes also exist within the Todd County portion of the city.

West Union
The City of West Union has just over 100 residents. West Union Lake is on the western side of the city and County Ditch #12 runs through the city into the lake. Several wetland complexes are also located within the city.

Recreational & Public Land
Private recreational land makes up a significant portion of land within Todd County. Both non-homestead lakeshore and non-homesteaded seasonal recreation consisting mostly of forested and wetlands fall in this category. In a survey conducted as part of the Priority Concerns Scoping Document (PCSD) hunting and fishing (59.8%) and swimming, canoeing, boating or jet skiing (35.9%) were the top two responses to the question, "When you think about Todd County Water what comes to mind for you?" The highest number of respondents also rated “Wildlife Habitat” as seeing some improvements within the county.

For the purposes of this plan public land within Todd County falls within four main categories listed below. Exact locations of local parks can be obtained from the Todd County Planning & Zoning office. Federal and state managed areas are shown on the Minnesota Public Recreation Information Maps (PRIM maps) online.

City, Township or County Parks
Established for various reasons but can provide excellent recreational opportunities. Battle Point Park is located on the east side of Lake Osakis and the Lake Wobegon Trail are located in this watershed. The City of Osakis and West Union also have parks. Fairy Lake has a Lions Park next to the DNR landing.

Wildlife management areas (WMAs)
Consist of wetlands, uplands, or woods owned and managed for wildlife by the Department of Natural Resources (DNR). Hunting and various recreational opportunities are open to the public. There are several
WMA’s in the watershed including Hollister, Platt Lake, Santer, Owen-Hinz, Randall, Osakis, Spohn, Quistorff, West Union, Aurzada Prairie, Elgin Woods and Grey Eagle. Two other WMAs are just outside inside Douglas County west of West Union, Herberger Lake WMA and Kuhtz Lake WMA.

**State forests/Parks/Landings**
The Birch Lakes State Forest is on the Stearns County side of the watershed. DNR public landings are on Osakis, Maple, Fairy, Guernsey, Little Sauk, Fairy, Sauk, Long Little Birch, Big Birch (2), Bass and Goose lakes. There are no state parks.

**Wildlife protection areas (WPAs)**
Most of these federally managed wetlands and surrounding uplands are open to hunting and various recreational opportunities. There are several WPAs in the watershed including Geroy, Faber, Sogge, Terfehr, West Union and Twin Lakes.

**Regulated Development**

**County Zoning**
Todd County has had a land use ordinance since March 18, 1976 and a shoreland ordinance in effect since July 1, 1972. The last comprehensive update was in May 2012 and it will continue to be modified with zoning requirements as necessary. The county has no jurisdiction over municipalities with land use or shoreland ordinances. If new ordinances are developed in Todd County or the municipalities as a result of the Comprehensive Water Plan the Planning and Zoning Department, County Attorney, County Commissioners and any other necessary agency to ensure the new ordinances are compatible with existing ordinances.

**Municipal Zoning**
The cities of Grey Eagle and Osakis enforce their own local zoning ordinances and permits can be obtained by contacting the city office.

**Township Zoning**
West Union has special feedlot restrictions within the township and permits can be obtained by contacting the township clerk.

**Additional Zoning Entities**
The Sauk River Watershed District (SRWD) has additional rules in the area of storm water management, erosion control, drainage and water uses. District permits can be obtained through the SRWD based out of Sauk Centre.

**Pollution**

**Permitted Pollution**
The Sauk River Watershed has several sites which have obtained permits to discharge effluent. The permit controls water pollution by regulating point source pollution. Point sources are discrete conveyances such as pipes or man-made ditches. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. To find out more about permitted facilities and different permit types in the Sauk River Watershed see Appendix IX for more information.

**Non-Point Source Pollution**
Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many discrete sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As
the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands and ground waters.

The major source of NPS in the watershed is exposed soil leading to wind and water erosion, groundwater withdrawal, internal loading, upstream lake loading, stormwater runoff, livestock overgrazing, fertilizer and manure runoff, eroding shorelines and fecal waste matter through both leaky septic systems and animal facilities without proper water control measures. For more information of NPS refer to Appendix X.

**Individual Sewage Treatment System Inspections**

Todd County requires Individual Sewage Treatment System (ISTS) inspections to be completed before finalizing a sale on a home. In addition the Todd County Planning and Zoning department have systematically been conducting ISTS inspections around several lakes around Todd County. Within the watershed there have been several lakes sampled as part of this program. Big Birch (2011), Fairy (2014), Guernsey (2015), Juergens (2015), Lily (2014), Little Birch (2014), Little Osakis (2014), Little Sauk (2015), Long (2015), Maple (2011), Osakis (2011-2012) and Sauk (2013-2014). Many which were originally found out of compliance have since been upgraded. In 2017 the lakes of Cedar, Higgins and Pauley will be inventoried.

**Watershed Restoration and Protection Areas**

**Restoration Areas**

**Impaired Surface Waters**

To help surface waters recover, nonpoint conservation best management practices (BMP) such as stormwater retention and diversion, feedlot abatements, shoreland restoration, septic system upgrades and vegetative buffers have been implemented in the Sauk River Watershed from 1994 to the present day. Continued efforts are needed to achieve water quality standards in impaired water bodies and protect other water resources from becoming impaired.

**Lake Osakis**

The headwaters of Lake Osakis are predominately low gradient in nature. Lake Osakis is fed by several channelized streams, of poor habitat quality and biological integrity, draining nutrient impaired lakes. Impaired for both dissolved oxygen, E. coli and M-IBI, Crooked Lake Ditch (JD 2) enters Lake Osakis at its western shores. The ditch has shown little improvement in biological condition or habitat in recent surveys. In 2003, sediment retention ponds were constructed near the outlet of Crooked Lake Ditch to reduce TSS readings in Osakis. After periodic cleanings and the completion of an enhancement project, 2006/2007 SRWD results show signs of TSS reduction. A water quality improvement project beginning in 2011 to restore the integrity of Crooked Lake may improve downstream conditions of both Crooked Lake Ditch and Lake Osakis.

This lake has been identified as a Lake of Biological Significance by the Department of Natural Resources with the highest rating of Outstanding. Sixty-six percent of the 88,736 acre watershed is disturbed. A 24% load reduction of phosphorus would have to be met in order to reach the lakes threshold limit for potential impairment. Of the 2,194 lakes within the priority ranking Osakis was placed in the highest category.

**Faille Lake**

Faille Lake is a 58 acre lake just south of Lake Osakis. Water inlets on the west side near Highway 27 and outlets at the culvert on 27 near Osakis Lake. Seventy-nine percent of the 14,745 acre watershed is disturbed. A 25% load reduction of phosphorus would have to be met in order to reach the lakes threshold limit for potential impairment. Of the 2,194 lakes within the priority ranking Faille was placed in the high category.
**Maple Lake**
The inlet is on the east end of the lake and it outlets on the opposite end into the Owen-Hinz WMA. Fifty-nine percent of the 6,407 acre watershed is disturbed. An 18% load reduction of phosphorus would have to be met in order to reach the lakes threshold limit for potential impairment. Of the 2,194 lakes within the priority ranking Maple was placed in the highest category.

**Sauk River**
The Sauk River emanates from nutrient rich Lake Osakis. The river’s fish community degrades moving downstream, dropping just below standards at the pour point site. Downstream there are several impaired riverine lakes including: Gurnsey, Little Sauk, Jurgens and Sauk Lake. Here the river is also impaired for turbidity. Interestingly, macroinvertebrate and habitat quality slightly improve moving downstream in the watershed. This lake has been identified as a Lake of Biological Significance by the Department of Natural Resources with the highest rating of High.

**Ashley Creek & Silver Creek**
Westport Lake, the source of Ashley Creek, is a shallow, excessively fertile lake, with frequent winter fish kills. Placed on the impaired waters list in 2010, its TMDL is scheduled for completion in 2016. Below Westport Lake, the 27.53 mile long Ashley Creek’s low gradient nature coincides with poor habitat, low dissolved oxygen and biological conditions observed upstream in the watershed. County Ditch 6 feeds into Ashley Creek downstream of Westport. Historical fish and macroinvertebrate impairments circa 2000 show no improvement from biological and stream habitat monitoring completed in 2007 and 2008. Fish communities improve moving downstream on Ashley Creek coinciding with an increase in stream gradient and exceptional habitat conditions observed downstream. However, biological communities reside on the cusp of impairment and tolerant taxa dominate the local fish population. Silver Creek, a tributary in the downstream reach of Ashley, was assessed as non-support for aquatic life. Westport Lake’s nutrient impairment, along with upstream low gradient conditions may be factors that contribute to the present aquatic life impairments observed in the watershed. Additional monitoring is recommended for dissolved oxygen in order to better define the impairment.

**Disturbed Areas**
Sauk River Watershed has minor watersheds with the highest amount of land disturbance in the county. It also has several others which also maintain high percentages. Minors which were classified as Restore with their percentage land disturbance include 16001 (93%), 16068 (82%), 16002 (82%), 16067 (71%), 16071 (69%), 16079 (66%), 16035 (66%), 16069 (62%), 16061 (62%) and 16031 (61%). These minors include such waterbodies as Silver Creek, West Union Lake, Ashley Creek, Sauk River, Osakis, Faille, Fairy and Little Birch Lakes amongst others.

**Protection Areas**
**Little Birch Lake**
Good water quality conditions and aquatic biological diversity are seen in Little Birch Lake. A deep basin, the presence of several upstream lakes, or heavily forested catchments may be factors contributing to the superior conditions observed in this lake. This lake is also identified as a Biologically Significant Lake by the Minnesota Department of Natural Resources (MNDNR).

This lake has been identified as a Lake of Biological Significance by the Department of Natural Resources with the highest rating of High. Sixty-one percent of the 44,504 acre contributing watershed is disturbed. The predicted total phosphorus load is below the threshold for the lake but still 872 pounds above the target total.
phosphorus lake concentration, which is a goal for improving water quality. Of the 2,194 lakes within the priority ranking Little Birch Lake was placed in the highest category.

**Big Birch Lake**
This lake has been identified as a Lake of Biological Significance by the Department of Natural Resources with the highest rating of Outstanding. Forty-one percent of the 13,961 acre contributing watershed is disturbed. The predicted total phosphorus load is below the threshold for the lake but still 506 pounds above the target total phosphorus lake concentration, which is a goal for improving water quality. Of the 2,194 lakes within the priority ranking Big Birch Lake was placed in the highest category.

**Fairy Lake**
Fairy Lake, just West of Sauk Lake, is in particularly good condition considering other impaired lakes in the watershed. TSI indicators are well below CHF standards.

This lake has been identified as a Lake of Biological Significance by the Department of Natural Resources with the highest rating of High. Sixty-five percent of the 4,651 acre contributing watershed is disturbed. The predicted total phosphorus load is below the threshold for the lake but still 31 pounds above the target total phosphorus lake concentration, which is a goal for improving water quality. Of the 2,194 lakes within the priority ranking Fairy Lake was placed in the highest category.

**Adley Creek**
Historical channelization on Adley Creek along with the low gradient character and riparian wetlands along its upstream reaches likely equate to its mediocre stream habitat quality. Despite the remarkably high diversity observed in the fish community in Adley Creek, it is dominated by an abundance of tolerant taxa, resulting in an overall poor fish IBI score. In contrast, MIBI scores are exceptional. Nearly all stream water chemistry collection in the watershed has occurred at the outlet of Adley Creek. More investigation is needed further upstream in the watershed to better understand the E. coli impairment. The abundance of forested acreage in the watershed is potentially benefiting the lake quality in Cedar, Silvia and Little Birch lakes. That in combination with the excellent condition of the macroinvertebrate community, the high diversity seen in the fish community and the presence of a self-sustaining brook trout population in Trout Creek, all warrant protection measures to maintain the current level of resource quality in the watershed. The section of Adley Creek in Stearns County which runs from Lake Sylvia to Sauk River is currently impaired for E.coli.

**Priority Concern 1: Drainage**
Many areas within the watershed have already been drained and tiled which although has enabled large areas to become very productive agriculturally has led to water quality impairments. Provide technical assistance and cost-share dollars to write Drainage Water Management Plans for individuals and to incorporate conservation drainage and Best Management Practices (BMPs) as recommended by the Minnesota Department of Agriculture (MDA) to areas which are disturbed. Incorporating and designing systems to accommodate rainfall intensity patterns during the growing season as they impact drainage flows.

Work to develop a wetland inventory within the watershed to help identify, prioritize and restore wetland areas to help mitigate excess nutrient and water issues. Install retention structures such as wetlands to maintain and improve surface and groundwater quantities and quality as well as protects private assets. Educate landowners about the influence tiling has on the amount of water into ditch networks.
Priority Concern 2: Chemical and nutrient contributions
Work with producers to control feedlot runoff with BMPs. Work with applicators and landowners to meet setbacks and timing requirements of manure and chemical fertilizer applications. Control cattle access to streams by encouraging rotational grazing and flash grazing practices. Encourage conservation practices on upland areas to limit sediment, nutrients and other chemicals.

Priority Concern 3: Aquatic Invasive Species
Slow the spread of Aquatic Invasive Species (AIS) within the county by effectively informing citizens and lake users about the impacts of AIS. Monitor lakes for early detection of AIS. Provide cost-share assistance to Lake Associations to improve lake access sites, control AIS and educate residents. Conduct watercraft boat inspections with the help of the Department of Natural Resources (MNDNR).
The author has done her best to represent the desires of the citizens of Todd County as well as to respect the guidance and information provided by partner agencies.

The End.