Conservation management plan for Fall Creek Watershed

Environmental Studies 972
Conservation Planning
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1. Project Summary

1.1 Project Name

Fall Creek Watershed Conservation Project

1.2 Project Location

The head waters of Fall Creek are located within Pepin County, which is on the western border of the state of Wisconsin (Figure 4.1). This project will be focusing on the Fall Creek Watershed, which is one of the many tributaries that flow into the Chippewa River Delta.

1.3 Project Vision

The riparian habitat and freshwater stream ecosystem in the Fall Creek Watershed are free from excessive nutrient loading, ultimately leading to a healthy and prosperous community in Pepin County into the foreseeable future.

1.4 Contact Names & Address

Chase Cummings, Pepin County Land Conservation and Planning Director
Jessica McMahon, Planner-Technician
Pepin County Government Center, 740 7th Ave West Durand, WI 54736

1.5 Project Start & End Dates

January 2020-December 2030

1.6 Project Description

The purpose of collaborating with the Pepin County Land Conservation and Planning Department (LCPD) is to work to improve the health of the freshwater stream ecosystem and the riparian habitat of the Fall Creek Watershed. This project works to confront the issues that the agricultural industry has caused to the watershed by promoting environmentally sustainable practices. The extensive history of monoculture, both crop and livestock, within Pepin County has caused the health of the soil and stream ecosystems to deteriorate due to the degradation of the soil composition and nutrient loading (Pepin County Farmland Preservation Plan, 2016). The degraded soil composition can partly be attributed to conventional tillage and grazing practices that increase erosion and runoff into Fall Creek. This damaged soil exacerbates the effects that excessive fertilizer use has on nutrient loading because both the soil biogeochemical and biophysical characteristics are altered (Hungate, 2012). The corn, soy, and wheat fields within Pepin County are not the only culprits that contribute to nutrient loading. Dairy farms create immense amounts of manure that must be handled and stored in accordance to a nutrient management plan to reduce its environmental impact (DATCP, 2018). This project aims to address the environmental issues caused by intensive agricultural practices by improving communication, endorsing education, and offering alternatives.

Communication and education opportunities will be improved by increasing the administrative and technical capacity of the LCPD. This action will allow for employees to allocate more time and attention to watershed management while also meeting the other needs of the LCPD. The employees of the LCPD have cultivated relationships with the farmers of Pepin County to improve the communication between the county government and farmers. This project will use this mutualistic relationship to advocate for environmentally sustainable practices that safeguard the economic viability of the agricultural industry,
while also protecting the natural resources for future generations. This will be done through the
distribution of educational materials that are wide in breadth and will inform farmers on new and
improved practices that enhance productivity and sustainability.

Offering feasible alternatives to current unsustainable practices will encourage conservation and
restoration actions by farmers and community members. This project offers a low-cost solution to the
degraded soil composition and nutrient loading by modifying a program that is currently in practice. A
slight alteration to the Nitrogen Use Efficiency (NUE) project, that will be discussed in section 8.4.2.1, has
the possibility to promote best management practices while also boosting the riparian zone. Furthermore,
the partnerships with Discovery Farms, Natural Resources Conservation Service (NRCS), and the University
of Wisconsin Division of Extension will all be utilized to assist farmers and landowners in conservation
endeavors.

In conclusion, the improvement of the Fall Creek Watershed will enrich the life for those who live in Pepin
County by enhancing the overall condition of the watershed for the enjoyment of community members
and for the longevity of the agricultural industry.

2. Introduction

2.1 Conservation Planning for Pepin County: Past and Present

In Pepin County, the LCPD merged with the previously regarded “Land Management Department” to
consolidate natural resource services within the county. This department has many roles in the
community such as: conservation services, zoning ordinances, and emergency management. Despite the
many roles, the LCPD is committed to its four major goals (Pepin County Government Land Conservation
and Planning, [n.d.]):

1. To protect and enhance the quality and quantity of water resources.
2. To preserve and maintain our valuable soil resources.
3. To promote a positive conservation ethic.
4. To protect and enhance diverse wildlife habitat.

The major goals listed above guide the activities and programs that the LCPD implements. The method in
which these goals are met typically comes in the form of financial assistance or conservation incentive
programs. Examples of funding programs utilized are in Table 2.2. The LCPD is not the sole responder to
improving conservation practices within Pepin County; they collaborate with the NRCS and the Wisconsin
Department of Natural Resources (WDNR) to provide aid. Assistance can come in the form of cost-sharing
programs, which are programs that cover a percentage of the cost of a conservation or restoration project
(NRCS, [n.d.]). Another form of assistance can come in the form of technical assistance through the
Conservation Technical Assistance Program (CTAP) and can be in the form of “resource assessment,
practice design, resource monitoring, or follow-up of installed practices.” (NRCS, [n.d.]). These programs
lighten the workload and the cost, of certain conservation projects that occur.

A conservation stewardship example that utilized alternative methods of funding and support by the LCPD
and the NRCS is the trout stream that was remediated on the private land of a Pepin County resident. The
degraded trout stream was present on productive agricultural land that grazing dairy cows would pass
through. Additionally, the previous farm owners were not environmentally focused and would dump trash
into the riparian zone. As a result of manure deposition, grazing mannerisms, and unsustainable personal choices, the freshwater stream ecosystem and riparian buffer suffered from nutrient loading, erosion, and a degraded soil composition. To combat the damaged stream ecosystem, the current farm owner applied for trout stream ecosystem remediation through the WDNR. After the approval of the project the WDNR was able to remediate the riparian habitat and soil composition by improving the diversity and the amount of vegetation. The trout habitat within the stream was improved through the encouragement of a natural stream meander and the creation of brush shelters to protect trout offspring and encourage spawning. Figures of the improvements made to the riparian habitat and trout stream are shown in the Appendix Figures 1-2 (Field visit and personal communication, September 29, 2019).

The landowner is extremely satisfied with the new and improved trout stream because not only has it drastically changed the biological cycles of his land and is aesthetically pleasing but also the stream provides a recreation area for community members. Although it is on private land, there is public access through a conservation easement; community members can utilize this area for personal enjoyment. Additionally, by encouraging recreational fishing practices the LCPD receives payments through trout stamps.

This Pepin County community member not only utilized WDNR to restore his trout stream but also implemented the technical assistance of the NRCS to build a manure storage facility at his dairy farm. A figure of the manure storage is shown in the appendix Figure 3 (Field visit and personal communication, September 29, 2019). The cattle that were present at the trout stream, and many others, were moved to a larger dairy barn that accumulates vast amounts of manure. In accordance with the ordinances by the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP), a farm must have a nutrient management plan; dairy farms specifically use these plans to address manure storage and dispersal (DATCP, 2018). To address the need for a manure storage system on his farm, this community member was offered technical assistance and cost-sharing programs through the programs offered by the NRCS. By implementing the help of the NRCS, farmers can be assured that their farm will meet the specific criteria required to build a physically secure and environmentally sound manure pit (NRCS, [n.d.]).

The completion of these projects is a prime example of the beneficial relationships that have been cultivated between the county government and landowners. By praising the conservation trout stream and the manure storage system it is hoped that other community members will want to implement the same restoration and best management practices on their land.

The LCPD is an all-encompassing department that wears a variety of hats in order to serve their community. Cost-sharing and technical assistance programs are vital to support individuals; however, education and outreach programs bring a sense of community and teach younger generations. Some examples of youth and education programs are (Pepin County Government Land Conservation and Planning, [n.d]):

- Conservation field days
- Smokey Bear
- Conservation Poster Contest
- Conservation & Environmental Awareness Speaking Contest
- Land Judging Contest
Additional programs involve citizen science, which includes the Water Action Volunteers Stream Monitoring Program (WAV). This program involves educated volunteers to measure six parameters of stream health. In Pepin County, this volunteer event occurs every third Sunday and the assessment of stream flow, water temperature, dissolved oxygen, aquatic insects, water clarity and habitat is entered into a web-based data base (Pepin County Government Land Conservation and Planning, [n.d]) (Water Action Volunteers, 2007).

The activities listed above illustrate conservation and restoration projects that the LCPD has been involved with for numerous years. Employees continue to support their community and natural resources each day through a variety of actions; it is the intention of this conservation plan to further promote these practices while also offering new, viable options that can improve conservation.

*Figure 2.1. An aerial image provided by the LCPD of the Fall Creek Watershed. Red, yellow and green circles indicate water wells that are being monitored.*
2.2 Legislation, Orders, & Documents

The LCPD is a department within the county government of Pepin County and works under the Land Conservation and Planning Committee. This department offers a variety of cost-share services, educational programs, and volunteer services in order to reach the goals listed in section 2.1. Additional help comes from the working relationships the LCPD has with the UW Division of Extension, Wisconsin Department of Natural Resources (WDNR), Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP), and USDA National Resources Conservation Services (NRCS) (Land Conservation and Planning, [n.d.]). Table 2.2 displays the diversity of cost-sharing programs used within Pepin County; however, additional practices and standards can be found through NRCS (Natural Resource Conservation Service, [n.d.]). The variety of affiliations provides crucial benefits to advocate community members to be proper stewards of the land, however, none of these partnerships are required by the state.

In addition to providing services, the LCPD also upholds state standards for soil and water quality. Currently, LCPD is monitoring phosphorus and nitrate levels in the surface water and groundwater; this data collection is crucial for understanding current trends and predicting future benchmarks for improvement. Locations of water wells that are being monitored are cited in Figure 2.1. Other state standards that affect Pepin County are administered by the Wisconsin DATCP as cited in their Chapter ATCP50. The Wisconsin DATCP provides a variety of administrative codes; specifically, chapter ATCP50 on soil and water resource management, to implement WDNR performance standards (DATCP, 2018). This is of interest to Pepin County due to the requirement for all farms to have nutrient management plans for the storage of manure and for those farms who spread manure.

*Table 2.2. Cost-sharing programs offered by Pepin County. Programs in bold are in conjunction with the National Resources Conservation Service (NRCS) or Department of Agriculture, Trade and Consumer Protection (DATCP).*

<table>
<thead>
<tr>
<th>Cost Share Programs</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Conservation Stewardship Program (CSP)</td>
<td>Improvement and maintenance of conservation activities with payment for performance</td>
</tr>
<tr>
<td>Agricultural Management Assistance (AMA)</td>
<td>Risk management through natural resource conservation</td>
</tr>
<tr>
<td>Environmental Quality Incentives Program (EQIP)</td>
<td>Technical and financial support to install and manage infrastructure or conservation techniques that promote environmental stewardship</td>
</tr>
<tr>
<td>Land and Water Resource Management</td>
<td>Cost-share program focused on reduction of soil erosion and preservation of water quality</td>
</tr>
<tr>
<td>Wetlands Reserve Program (WRP)</td>
<td>Restoration of former wetlands from agricultural and production lands</td>
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<tr>
<td>Conservation Reserve Enhancement Program (CREP)</td>
<td>Payment to landowners who install filter strips or return continually flooded fields into wetlands. Can be in the form of easements or 15-year lease agreements</td>
</tr>
<tr>
<td>Pepin County Buffer Incentive Program (PCBIP)</td>
<td>The Pepin County conservation Planner Technician will design a buffer for appropriate candidate properties that have been cropped or pastured within five years. Buffers are designed to improve water quality and remove excess nutrient runoff</td>
</tr>
<tr>
<td>Pepin County Coldwater Stream Program</td>
<td>Similar to PCBIP but with the agreement of a stream access easement for the allowance of public access fishing</td>
</tr>
<tr>
<td>Pepin County Invasive Species Program</td>
<td>Assistance to landowners for the removal of targeted invasive species</td>
</tr>
</tbody>
</table>
3. Methods

3.1 Project Team

Table 3.1. Team members list and roles in the project.

<table>
<thead>
<tr>
<th>Team Members Name</th>
<th>Organization</th>
<th>Role in the Project</th>
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<tbody>
<tr>
<td>Chase Cummings</td>
<td>Pepin County Land Conservation &amp; Planning</td>
<td>Project Advisor</td>
</tr>
<tr>
<td>Jessica McMahon</td>
<td>Pepin County Land Conservation &amp; Planning</td>
<td>Project Advisor</td>
</tr>
<tr>
<td></td>
<td>University of Wisconsin-Madison</td>
<td>Project Facilitator</td>
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**Project Advisors**

Chase Cummings and Jessica McMahon are the project advisors for Pepin County Fall Creek Watershed project, and project representatives for Pepin County Land Conservation & Planning Department. Chase Cummings is the Pepin County Conservation & Planning Director and has worked at the site for over 11 years. Chase is the project primary contact. Jessica McMahon is the Planner-Technician for the Land Conservation & Planning Department.

**Project Facilitators (Core Members)**

... are students of the Environmental Conservation Program of Nelson Institute of University of Wisconsin-Madison. This conservation plan is part of Conservation Planning Course (Environmental Studies 972) at the University of Wisconsin-Madison.

**Project Facilitators (Process Trainers)**

Arlyne Johnson is the professor of the Conservation Planning course (Environmental Studies 972), and is the Teaching Assistant of the Conservation Planning course. They provide project team members additional assistance and technical support.

3.2 Conservation Planning Approach

The Pepin County Fall Creek Watershed conservation plan was developed with use of the Conservation Measures Partnership’s *Open Standards for the Practice of Conservation* (Conservation Measures Partnership, 2013). The project team designed an adaptive management plan by using the Open Standards (OS) five-step, management cycle (Figure 3.2). The conservation plan presented focuses primarily on Steps 1 and 2: assessing the problem and making a plan. The plan touches on Step 3: developing a work plan, timeline, and budget. The LCPD will be responsible for implementing Steps 3, 4 and 5 of the Open Standards framework. These steps involve: implementing the plan, analyzing results, adaptive management, and sharing information.
The OS framework homogenizes concepts, approaches, and terminology, allowing conservation planners to communicate more effectively and share project designs and management experiences with others.

According to the Foundations of Success (FOS) Training Manual (2018, p. 15), the OS consists of following five steps:

1. Conceptualize what you will achieve in the context of where you are working.
2. Plan both your Actions and Monitoring.
3. Implement both your Actions and Monitoring.
4. Analyze your data to evaluate the effectiveness of your activities. Use your results to adapt your project to maximize impact.
5. Capture and Share your results with key external and internal audiences to promote learning.

The goal of this adaptive management process is to provide a framework that allows conservation management planners to actively update their management plan as new information becomes available (Foundations of Success, 2018). The project team conducted the following activities in accordance to the OS process and steps to develop this conservation plan:

1. Define the project team, facilitators and advisors. (Step 1. Assess) (Methods: Section 3)
2. Define the plan geographic scope, develop a vision of what this project aims to achieve in 10 years, and identify the biodiversity targets and human well-being targets. (Step 1. Assess) (Scope, Vision and Conservation Targets: Section 4)
3. Assess the current health and future goals for each biodiversity target in terms of KEAs. (Step 1. Assess) (Viability Assessment: Section 5)
4. Identify and rate direct threats to biodiversity targets (Step 1. Assess) (Threat Assessment: Section 6);
5. Develop a conceptual model illustrates the casual relationship between biodiversity targets and the direct threats and opportunities. (Step 1. Assess) (Situation Analysis: Section 7)
6. Develop an action plan to identify the goals, strategies, activities, result chain and results-orientated threat-reduction objectives. (Step 2. Plan) (Action Plan: Section 8)
7. Develop indicators for monitoring the conservation goals and objectives. (Step 2. Plan) (Monitoring Plan: Section 9)
8. Develop a feasible strategy timeline and budget. (Step 3. Implement) (Strategy Timeline and Budget: Section 10)

4. Scope, Vision, & Biodiversity Targets

4.1 Scope & Maps

The geographic scope (see glossary) of this project is focused on the Fall Creek Watershed within Pepin County, Wisconsin. Located on the western border of Wisconsin, this county is separated from Minnesota by the Mississippi River. More than half, 62 percent, of the 161,300 acres that make up this county are utilized for agriculture (Pepin County Land & Water Resource Management Plan, 2011). Of that crop land, approximately 3,583 acres are irrigated and characterized by numerous groundwater wells. The land consists of highly productive, permeable soil with portions of the county within the Wisconsin Driftless area. The watershed also consists of rolling hills, which in conjunction with the permeable soil, contribute to much of the runoff and leaching of nutrients into the stream system (Pepin County Farmland Preservation Plan, 2016). There are approximately 270 farmers in Pepin County, for this project the 20 farms that are positioned adjacent to riparian zones and streams of the watershed are the focus.

The geographic scope is focused on the riparian zone, surface water, and groundwaters of the Fall Creek Watershed. In this context, a watershed is defined as an area of land that drains or "sheds" its water to a lake, river, stream, or wetland (Pepin County Multi-Hazard Mitigation Plan, 2017-2022). The Fall Creek watershed runs into the Mississippi river. The 13 miles that comprise Fall Creek run through the towns of Durand and Lima; Figure 4.1 displays the location of these towns. Surface water in Pepin County accounts for 2,962 total acres and includes 18 miles of valuable trout streams, several small lakes, and rivers. Pepin County is comprised of 16 different HUC-12 (see glossary) surface watersheds. The source of the water for these streams is primarily supplied by groundwater and runoff within the watershed (Pepin County Land & Water Resource Management Plan, 2011). Groundwater wells, in the form of sandstone and gravel aquifers, supply approximately 20 percent of the drinking water supply for Pepin County. The county’s groundwater resources are contained within topographical sediment terraces that comprise the floodplains of the Mississippi River Valley and the Chippewa River Valley (Pepin County Land & Water Resource Management Plan, 2011).
4.2 Project Vision

OS defines a project vision as the description of the desired state or ultimate condition that a project is hoping to achieve. A project vision is general, visionary, inspirational, and brief (Conservation Measures Partnership, 2013).

The project vision for the Fall Creek watershed is that the riparian habitat and freshwater stream ecosystem in the Fall Creek Watershed are free from excessive nutrient loading, ultimately leading to a healthy and prosperous community in Pepin County into the foreseeable future.

4.3 Targets

4.3.1 Biodiversity Targets

As defined by OS, biodiversity targets are the species, communities or ecosystems that best represent the biodiversity and purpose of a given geographic region and are the focus of natural resource management. The FOS training manual recommends selecting a limited number of biodiversity targets, between 8 to 10. In the case of this project, the team chose ecosystem-based targets that would encompass the full geographic scope of the region. Keeping this in mind, the team chose to put these ecosystems into two broad categories: freshwater stream ecosystems and riparian habitat (Figure 4.2). These groupings were created based on similarities in critical ecological processes, ecosystem services, and threats associated with each target.
4.3.1.1 Freshwater Stream Ecosystems

Due to their complex topography and proximity to farmland, these waterways are heavily reliant on seasonal hydrologic processes to maintain water levels and nutrient loading. For this reason, the team has chosen freshwater stream ecosystems as the first biodiversity target. Total phosphorus and nitrate levels in sediments are the most prominent contaminants in local streams (Pepin County Land & Water Resource Management Plan, 2011). While both nutrients are highly pervasive in surface waters, phosphorus typically has a lower leaching level than nitrate. This means that phosphorus attaches more readily to soil particles that run-off the landscape into the stream leading to harmful algal blooms, also known as cyanobacteria (Moratorium on Large Scale Livestock Facilities Report, 2018). Because of increased surface algal blooms, brook trout populations are currently at risk due to low levels of dissolved oxygen and fluctuating temperatures in surface water caused by low light availability (Pepin County WAV Stream Monitoring Report, 2016). Fall Creek is currently ranked as a Class II trout stream by the Wisconsin DNR, with several fisheries easements having been purchased on the stream (DNR Fish and Habitat Recommendations, 2009).

4.3.1.2 Riparian Habitat

Several farms throughout Pepin County are adjacent to surface waters. For this reason, the team has chosen riparian habitat as its second biodiversity target. Riparian habitats are the floodplains that surround croplands adjacent to the rivers and streams of watersheds, providing a natural filtering barrier for nitrates and phosphates which helps to reduces surface run-off. Therefore, stream bank stability is the most important ecosystem service provided by the riparian habitat. Stable stream banks reduce the amount of excess nutrients going into the surface waters which decreases harmful blue, green algal blooms in the system (Pepin County Land & Water Resource Management Plan, 2011).

4.3.2 Human Well-Being Targets

As defined by OS, human well-being targets “focus on those components of human well-being affected by the status of conservation targets” (Conservation Measures Partnership, 2013). When the status of the two biodiversity targets is between the Fair to Good range the three human well-being targets for this project will benefit from the ecosystem services that are illustrated below (Figure 4.3.2).
4.3.2.1 Trout Fishing Access

Pepin County is home to 18 miles of trout streams; these streams provide habitat for both brook and brown trout, which are seasonally stocked for recreation. These trout streams are important to the residents of Pepin County, both culturally and economically. Culturally by reinvigorating an appreciation for natural systems and by fostering relationships between community members and private landowners. Economically, trout streams are a resource for funding. Individuals must purchase trout stamps in order to fish, and this income goes to the LCPD that can contribute to restoration projects. Due to the cultural and economic benefits trout fishing access is our first human well-being target.

4.3.2.2 Economic Health of the Community

The economic viability of agriculture in Pepin County is a vital component to the livelihood of county residents, therefore, making it a human well-being target. Improvements, specifically within the agricultural community, must be made to ensure the future of the agricultural industry. Reducing excess nutrient run-off and strengthening riparian zones will lead to improved stream bank stability. This will be achieved by increasing communication and comprehension of cost-share incentives, improving sustainable practices, and advocating for economic incentives that promote the agriculture industry and assist community members.

4.3.2.3 Improved Water Quality

Pepin County’s topography allows for the existence of several underground aquifers allowing nearly half of county residents to own some form of private groundwater well on their property. Groundwater accounts for nearly all of Pepin Counties municipal drinking water access. When present, elevated nutrient levels pose a serious threat to public health. According to the Pepin County Land and Water Resource Management Plan, having access to clean groundwater reduces the risk of food and water borne illness among county residents. It also reduces the risk of infant mortality, although records in Pepin County are low. Therefore, access to clean, potable drinking water is among the highest priority for the region.
5. Viability Assessment

A viability assessment was performed to determine the current health and future goals for each biodiversity target. In order to determine the current status of each biodiversity target, key ecological attributes (KEAs) were identified. A KEA is defined as “an aspect of a target’s biology or ecology that, if missing or altered, would lead to the loss of that target over time” (Foundations of Success, 2009). Each KEA has a specific indicator that helps assess the acceptable range of variation for that specific KEA, the scale values ranging from Poor, Fair, Good, and Very Good. The management requirements for these scale values are as follows:

- *Poor* levels indicate restoration becoming increasingly difficult and may result in extirpation.
- *Fair* levels indicate that the level is outside of the acceptable range of variation and requires human intervention.
- *Good* levels display that the indicator is within an acceptable range of variation with some intervention required for maintenance.
- *Very Good* levels display that the indicator is at an ecologically desirable status and requires little intervention for maintenance.

Sections 5.1 and 5.2 provide viability assessments for each conservation target.

5.1 Fall Creek Freshwater Ecosystem

The health of the Fall Creek Watershed is indicated by the condition of the freshwater stream ecosystem. A key indicator of health are the levels of nitrates and phosphates. By measuring these nutrients in the groundwater and surface water the source of inputs and the subsequent effects may be determined (Kalbus, 2006). Several bodies of water within Pepin County are listed on the Department of Natural Resources 303(D) list of impaired waters. These include the Harvey Creek, Eau Galle River, Silver Birch Lake, Bear Creek, Lake Pepin, the Mississippi River, and the Chippewa River (Pepin County Land & Water Resource Management Plan, 2011). Two of these impaired waterways are among the most prominent in Pepin County: the Mississippi River and Chippewa River. To monitor the health of the freshwater stream ecosystem within Fall Creek Watershed in Pepin County, the following key ecological attributes (KEA) and indicators are considered:

5.1.1 Condition KEA: Condition of Water Quality in Freshwater Stream Ecosystem – Groundwater Nitrate Levels

Groundwater is the water that moves through the soil and rocks below the earth’s surface. As the water moves downward, it passes through the soil particles until it reaches a depth where the ground is filled with water. Eventually, the water will reach an impermeable rock layer, where the water will create a layer called an aquifer. Well water is extracted from the aquifer. Well water is the prominent way Pepin residents receive their drinking water.

According to Wisconsin Department of Health Service, nitrates are one of the most common groundwater contaminants in the state and that at least 10 percent of private wells in Wisconsin have high levels of nitrates (Wisconsin Department of Health Services, 2019). Considering the potential health impacts on the residents of Pepin, the level of nitrates found in the groundwater was chosen as an indicator of freshwater stream ecosystem health. Depending on the level of nitrates, the water status can be designated into four distinct categories; *Poor, Fair, Good,* and *Very Good,* measuring at >10 mg/L, 5-9.9 mg/L, 2-4.9 mg/L and 0-1.9 mg/L respectively (Reference Table 5.1.1). These levels were established by Chase Cummings, focusing on nitrate levels in accordance with human drinking capacity. Nitrate levels that are greater than 10 mg/L are dangerous for human consumption. Nitrate levels between 2-9.9 mg/L
are relatively safe for consumption but have unknown long-term effects. Lastly, nitrate levels less than 2 mg/L are naturally occurring and proven safe to human consumption.

The current groundwater nitrate level of the Fall Creek freshwater stream ecosystem is 12.61 mg/L. This value was calculated by taking the average of nitrate groundwater levels measured in 2019 throughout Pepin County (C. Cummings, Personal Communication, September 6, 2019). This level is within the Poor indicator rating and is considered unsafe for human consumption. For Pepin County to have potable water, the nitrate levels must fall below 10 mg/L for all samples taken. The long-term goal for Pepin County’s freshwater stream ecosystem is to eventually reach nitrate levels found within the groundwater to be measured low enough for safe human consumption, however this will take some time. With the limited employees and resources currently available at Pepin County LCPD, reaching an indicator level of Good or Very Good is beyond the 10-year projection of this conservation plan. However, the team would like to see improvements in the water quality in the next 10 years. The overall goal in respects to this plan, is to see a 10 percent decrease in groundwater nitrate levels within the next 10 years, expecting to remain at an indicator level of Poor, with average nitrate levels measuring at 11.35 mg/L by 2030. This goal does not display a change in indicator rating within the 10-year timeframe, however, a 10 percent decrease in groundwater nitrate levels is desired and is the most feasible improvement in water quality at this time.

*Table 5.1.1. Viability assessment for groundwater nitrate levels for the freshwater stream ecosystem biodiversity target.*

<table>
<thead>
<tr>
<th>Target</th>
<th>Category</th>
<th>KEA</th>
<th>Indicator</th>
<th>Indicator Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshwater Stream Ecosystem</td>
<td>Condition</td>
<td>Condition of water quality in the freshwater stream ecosystem</td>
<td>Groundwater Nitrate Levels</td>
<td>Poor: &gt;10 mg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fair: 5-9.9 mg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Good: 2-4.9 mg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very Good: 0-1.9 mg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Current Status</strong></td>
<td>12.61 mg/L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Desired Future Status</strong></td>
<td>2030 average nitrate levels should be 11.35 mg/L</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.1.2 Condition KEA: Condition of Water Quality in Freshwater Stream Ecosystem – Groundwater Phosphorus Levels

Groundwater is the water that moves through the soil and rocks below the earth’s surface. As the water moves downward, it passes through the soil particles until it reaches a depth where the ground is filled with water. Eventually, the water will reach an impermeable rock layer, where it the water will create a layer called an aquifer. Well water is extracted from the aquifer, which is where the drinking water in Pepin County is obtained from. Pepin County has suffered surplus agriculture practices, thus the high phosphorus levels detected in groundwater may be due to historic phosphorus loading in sediments caused by decades of evolving agricultural practice in the area.
The level of phosphorus found in the groundwater is used as an indicator for the condition of freshwater stream ecosystem. Depending on the amount of phosphorus detected, the water status can be designated into four distinct categories; Poor, Fair, Good, and Very Good, measuring at >0.2 mg/L, 0.15-0.2 mg/L, 0.075-0.14 mg/L and 0-0.074 mg/L respectively (Reference Table 5.1.2). Although phosphorus consumption itself does not have any notable adverse health effects, phosphorous levels greater than 1 mg/L may interfere with treatments and decrease ability to remove potential harmful microorganisms in the water source (Wisconsin Department of Natural Resources, 2017). The Wisconsin state criteria for stream phosphorus levels is equivalent to 0.075 mg/L. This criterion, created by the EPA is a numeric phosphorus water quality standard adopted by the Wisconsin Department of Natural Resources (Wisconsin Department of Natural Resources, 2017). Phosphorus levels between 0.14-0.075 mg/L and 0.15-0.2 are still safe for human consumption but have unknown long-term effects. Phosphorus levels over 0.2 mg/L are considered excessive and need human intervention to help see future decreases in phosphorus levels.

The current phosphorus levels detected in the groundwater of the Fall Creek freshwater stream ecosystem measure 0.196 mg/L. This value was calculated by taking the average of the phosphorus groundwater levels measured in 2019 throughout Pepin County well water data (C. Cummings, Personal Communication, September 24, 2019). The current level of phosphorus falls within the Fair indicator rating. The currently is not a criterion for safe levels of phosphorus for human consumption, so the team’s goal is to coincide with the goal for nitrate levels, thus looking for a 10 percent decrease in phosphorus levels over the next 10 years. The long-term goal would show the groundwater phosphorus levels to reach an indicator of Good or Very Good, however, with the limited employees and resources currently available at Pepin County LCPD, it is beyond the 10-year projection of this conservation plan. However, the team would like to see improvements in the water quality in the next 10 years. Thus, the desired status of groundwater phosphorus levels in Fall Creek would fall within our indicator level of Fair, measuring at 0.15-0.2 mg/L. The overall goal in respects to this plan, is to see a 10 percent decrease in groundwater phosphorus levels within the next 10 years, expecting to remain at an indicator level of Fair, with average phosphorus levels measuring at 0.167 mg/L in 2030. This goal does not display a change in indicator rating within the 10-year timeframe, however, a 10 percent decrease in groundwater phosphorus levels is desired and is the most feasible improvement in water quality at this time.
Table 5.1.2. Viability assessment for the groundwater phosphorus levels for the freshwater stream ecosystem biodiversity target.

<table>
<thead>
<tr>
<th>Target</th>
<th>Category</th>
<th>KEA</th>
<th>Indicator</th>
<th>Indicator Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshwater Stream Ecosystem</td>
<td>Condition</td>
<td>Condition of water quality in the freshwater stream ecosystem</td>
<td>Groundwater Phosphorus Levels</td>
<td>Poor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;0.2 mg/L</td>
<td>0.15-0.2 mg/L</td>
</tr>
<tr>
<td><strong>Current Status</strong></td>
<td></td>
<td></td>
<td>0.196 mg/L</td>
<td></td>
</tr>
<tr>
<td>Desired Future Status</td>
<td></td>
<td></td>
<td>2030 average phosphorus levels should be 0.167 mg/L</td>
<td></td>
</tr>
</tbody>
</table>

5.1.3 Condition KEA: Condition of Water Quality in Freshwater Stream Ecosystem – Surface Water Nitrate Levels

According to the Pepin County LCPD there is an important distinction to make between nutrient levels in surface waters and in groundwater. Groundwater and surface water are interconnected through inflow and outflow. Depending on the location and elevation between stream and water table, the water will flow from the stream down to the groundwater or vice versa. The water table itself has large variations and thus as the water moves between groundwater and surface water, the water continuously mixes. High quantities of nutrients in the surface water can be transferred to the groundwater. Therefore, it is critical to incorporate both the groundwater and surface water nutrient levels as indicators of the health of the freshwater stream ecosystem.

The level of nitrates found in the surface water is an indicator of freshwater stream ecosystem health. Groundwater can carry nutrients to surface waters, and vice versa, highlighting the importance in considering the nitrate levels at the various recorded levels of water within Fall Creek Watershed (Wisconsin Department of Natural Resource, 1999). So, although the focus of nitrate levels is detected at the groundwater level, it is important to consider the nitrate levels found within the surface waters. Depending on the level of nitrates detected, the water status can be designated into four distinct categories; Poor, Fair, Good, and Very Good, measuring at >10 mg/L, 5-9.9 mg/L, 2-4.9 mg/L and 0-1.9 mg/L respectively (Reference Table 5.1.3). This criterion falls within the same range as the groundwater nitrate levels due to the fact the Fall Creek Watershed’s shallow depth and emphasizes the importance of reaching nutrient levels within safe drinking levels.

The current surface water average nitrate level of the Fall Creek freshwater stream ecosystem is 11.78 mg/L (C. Cummings, Personal Communication, September 6, 2019). Nutrient loading found within the surface water is a major threat to water quality and habitat of a waterbody. Excessive nutrients, like nitrates, can cause algal blooms, which reduces the level of dissolved oxygen in the water below the required levels for local trout species to survive (Wisconsin Department of Natural Resources, 1999). The long-term goal for Pepin County’s freshwater stream ecosystem is to eventually reach a nitrate levels
found within the surface water to be measured low enough for safe human consumption, however this will take some time. With the limited employees and resources currently available at Pepin County LCPD, reaching an indicator level of *Good* or *Very Good* is beyond the 10-year projection of this conservation plan. However, the team would like to see improvements in the water quality in the next 10 years. The desired status of surface water nitrate levels in freshwater stream ecosystem in Fall Creek Watershed would fall within our indicator level of *Poor*, measuring greater than 10 mg/L. The overall goal in respects to this plan, is to see a 10 percent decrease in surface water nitrate levels within the next 10 years, expecting to remain at an indicator level of *Poor*, with average nitrate levels measuring at 10.6 mg/L in 2030. This goal does not display a change in indicator rating within the 10-year timeframe, however, a 10 percent decrease in surface water nitrate levels is desired and is the most feasible improvement in water quality at this time.

*Table 5.1.3. Viability assessment for surface water nitrate levels for the freshwater stream ecosystem biodiversity target.*

<table>
<thead>
<tr>
<th>Target</th>
<th>Category</th>
<th>KEA</th>
<th>Indicator</th>
<th>Indicator Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Freshwater Stream Ecosystem</strong></td>
<td>Condition</td>
<td>Condition of water quality in the freshwater stream ecosystem</td>
<td>Surface Water Nitrate Levels</td>
<td>Poor: &gt;10 mg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fair: 5-9.9 mg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Good: 2-4.9 mg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very Good: 0-1.9 mg/L</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current Status</th>
<th>11.78 mg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desired Future Status</td>
<td>2030 average nitrate levels should be 10.6 mg/L</td>
</tr>
</tbody>
</table>

**Table 5.1.3. Viability assessment for surface water nitrate levels for the freshwater stream ecosystem biodiversity target.**

5.1.4 Condition KEA: Condition of Water Quality in Freshwater Stream Ecosystem – Surface Water Phosphorus Levels

According to the Pepin County LCPD, there is an important distinction to make between nutrient levels in surface waters and in groundwater. Groundwater and surface water are interconnected through inflow and outflow. Depending on the location and elevation between stream and water table, the water will flow from the stream down to the groundwater or vice versa. The water table itself has large variations and thus as the water moves between groundwater and surface water, the water continuously mixes. High quantities of nutrients in the surface water can be transferred to the groundwater. Therefore, it is critical to incorporate both the groundwater and surface water nutrient levels as indicators of the health of the freshwater stream ecosystem.

The level of phosphorus found in the surface water is an indicator of freshwater stream ecosystem health. Groundwater can carry nutrients to surface waters, and vice versa, highlighting the importance in considering the phosphorus levels at the various recorded levels of water within Fall Creek Watershed (Wisconsin Department of Natural Resource, 1999). Depending on the level of phosphorus detected, the
water status can be designated into four distinct categories; Poor, Fair, Good, and Very Good, measuring at >0.2 mg/L, 0.15-0.2 mg/L, 0.075-0.14 mg/L and 0-0.074 mg/L respectively (Reference Table 5.1.4).

The current surface water average phosphorus levels of the Fall Creek freshwater stream ecosystem is 0.205 mg/L (C. Cummings, Personal Communication, September 6, 2019). Nutrient loading found within the surface water is a major threat to water quality and habitat of a waterbody. Excessive nutrients, like phosphorus, can cause algal blooms, which reduces the level of dissolved oxygen in the water below the required levels for local trout species to survive (Wisconsin Department of Natural Resources, 1999). The long-term goal would show the surface water phosphorus levels to reach an indicator rating of Good or Very Good, however, with the limited employees and resources currently available at Pepin County LCPD, it is beyond the 10-year projection of this conservation plan. However, the team would like to see improvements in the water quality in the next 10 years. The desired status of surface water phosphorus levels in freshwater stream ecosystem in Fall Creek Watershed would fall within our indicator level of Fair, measuring at 0.15-0.2 mg/L. The overall goal in respects to this plan, is to see a 10 percent decrease in surface water phosphorus levels within the next 10 years, hoping to reach an indicator level of Fair, with average phosphorus levels measuring at 0.184 mg/L in 2030. This goal will demonstrate a change in indicator rating with the 10-year timeframe of this plan, hoping to see greater changes beyond the restricted timeframe of this plan.

Table 5.1.4. Viability assessment for surface water phosphorus levels for the freshwater stream ecosystem biodiversity target.

<table>
<thead>
<tr>
<th>Target</th>
<th>Category</th>
<th>KEA</th>
<th>Indicator</th>
<th>Indicator Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshwater Stream Ecosystem</td>
<td>Condition</td>
<td>Condition of water quality in the freshwater stream ecosystem</td>
<td>Surface Water Phosphorus Levels</td>
<td>Poor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Current Status</td>
</tr>
<tr>
<td>Desired Future Status</td>
<td></td>
<td></td>
<td></td>
<td>2030 average phosphorus levels should be 0.184 mg/L</td>
</tr>
</tbody>
</table>

5.2 Fall Creek Riparian Habitat

Riparian habitats are not only habitat for many plants and animals, they also help protect streams from excess pollutants. Riparian habitats found in Pepin County act as a buffer zone between agriculture land and open water. Riparian buffer zones can catch sediment, nutrients, pesticides and other materials found in surface runoff to help reduce pollutants from entering a waterway. Improper, unregulated and limited agricultural practice has led to the degradation of the riparian habitat within the Fall Creek Watershed. Many of the farms that surround the streams are in a monoculture rotation and in some cases, farmers till to the edge of the riparian buffer zone. This practice can accelerate erosion and break apart microbial communities that support a healthy soil system (Refer to Section 6 for further details). The size of this
buffer is critical in assessing the health of the Fall Creek Watershed because the larger the buffer zone, the greater distance there is between the agriculture practices and the watershed. In Pepin County, there is a Buffer Incentive Program. As part of this program, riparian buffer zones must be evaluated by a Conservation Planner Technician and restoration efforts will range from 20-150 feet wide, depending on soil type, slope steepness, vegetation, etc. (Pepin County Buffer Incentive Program, 2014). The team believes that through economic incentive, in combination with positive outreach and education to farmers on no-till techniques, the outlook for this target is positive. In order to monitor the health of the riparian habitat within the Fall Creek Watershed in Pepin County, the following key ecological attribute (KEA) and indicator are considered:

5.2.1 Size KEA: Extent of Riparian Buffer Zone Between Agriculture Land and Stream – Width of Riparian Buffer Zone Bordering Fall Creek

The extent, or size, of the riparian habitat is an important indicator of the Fall Creek Watershed. More specifically, the width of the riparian buffer zone bordering Fall Creek is used as an indicator for the condition of the riparian habitat. Depending on the size of the riparian buffer zone, the area can be designated into four distinct categories, Poor, Fair, Good, and Very Good, measuring at <9 feet, 10-29 feet, 30-49 feet, and >50 feet respectively (Reference Table 5.2.1).

The current width of buffer zones along Fall Creek measures anywhere between 5 feet and 150 feet. According to Chase Cummings, the average riparian buffer zone along Fall Creek measures 30 feet. This means that the riparian habitat indicator would fall within the Good indicator rating, meaning the buffer zone extent falls within the Pepin County Buffer Incentive Program requirements. Although this indicator rating is at a desired level, there are still riparian buffer zones along Fall Creek that measure at an extent below this average. Not all farms have a riparian buffer zone within the program requirements, therefore there is room for improvement that needs to be addressed. The long-term goal would consist of reaching an indicator rating of Very Good, meaning all riparian buffers in the Fall Creek Watershed would be greater than 50 feet. However, with the limited employees and resources currently available at Pepin County LCPD, along with the long timeframe required for these restoration projects, this goal is beyond the 10-year timeframe of this plan. The overall goal for riparian buffer zones along Fall Creek is a 30-foot buffer zone between the stream and in productive agricultural land, the riparian habitat remaining at an indicator of Good by 2030. This goal does not display a change in indicator rating within the 10-year timeframe, however, establishing a minimum buffer zone width in accordance with the Pepin County Buffer Incentive Program to all farms bordering Fall Creek is desired and is the most feasible improvement in riparian habitat extent at this time.
Table 5.2.1. Viability assessment for extent of riparian buffers between agriculture land and stream of riparian habitat biodiversity target.

<table>
<thead>
<tr>
<th>Target</th>
<th>Category</th>
<th>KEA</th>
<th>Indicator</th>
<th>Indicator Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riparian Habitat</td>
<td>Size</td>
<td>Extent of riparian buffers between agriculture land and stream</td>
<td>Width of riparian buffer zone bordering Fall Creek</td>
<td>Poor: &lt;9 feet</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fair: 10-29 feet</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Good: 30-49 feet</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very Good: &gt;50 feet</td>
</tr>
</tbody>
</table>

Current Status: Average of 30 feet (Buffer zones ranging from 5-150 feet)

Desired Future Status: All farmers bordering streams/lakes to have 30 feet of Riparian Buffer

6. Direct Threat Assessment

6.1 Threat Rating

![Figure 6.1. Completed threat table rating exported from Miradi.](image.png)
The purpose of performing a threat rating analysis is to assist project representatives and researchers to understand the combined effects of multiple threats across all biodiversity targets. A summary threat rating indicates how threatened targets receive the combined rating of all threats. In the case of Pepin County, many factors are interrelated and affect more than one aspect of the entire agricultural system (e.g. agricultural practices affect the local ecosystem and bodies of water which ultimately impact the public health of the community in the form of unpotable water) – thus, a threat rating analysis is the optimal method for understanding the combined impacts in a system. In Pepin County, four direct threats have been identified that affect two biodiversity targets. A direct threat is defined as a human-induced action that degrades one or more conservation targets and is typically tied to one or more stakeholders. Direct threats can also be referred to as a “pressure”. Direct threats should not be confused with “stresses,” which are defined as attributes of a conservation target’s ecology that are impaired directly or indirectly by human activities (e.g. sedimentation, habitat destruction, or habitat fragmentation). The four direct threats that directly impact the freshwater stream ecosystem and/or the riparian habitat are monoculture, excessive soil tillage, excessive use of agricultural fertilizer, and greenhouse gas (GHG) emissions as a result of human-induced climate change. All four direct threats have been identified based on information gathered at a Pepin County site visit in September of 2019, as well as through communication with Chase Cummings and analysis of Pepin County LCPD data and documents.

In terms of the threat rating itself, each direct threat is considered in terms of each biodiversity target using three criteria: scope, severity, and irreversibility. In this case, scope refers to the spatial proportion of a biodiversity target affected within 10 years if current circumstances and trends continue. For this plan, the freshwater stream ecosystem scope refers to the proportion of a target’s occurrence. Whereas, species scope refers to the proportion of the target’s population. Severity refers to the level of damage a threat would cause to a target within the scope if current circumstances and trends continue. Irreversibility is defined as the degree to which the effects of a threat can be reversed and the target can be restored if the direct threat no longer existed. Each criterion may be ranked to fall under four categories: Low, Medium, High, and Very High.

When considering scope, a Low rating signifies that the threat is very narrow in scope, affecting 1-10 percent of a target’s occurrence or population, Medium constitutes an effect of 11-20 percent, High falls within the 31-70 percent range, and Very High indicates that 71-100 percent of a target’s occurrence or population has been affected. In the case of severity, a Low rating indicates that within the scope, the threat is likely to only slightly degrade/reduce the target or its population by 1-10 percent within 10 years or three generations. Medium indicates that the threat is likely to moderately degrade/reduce the target by 11-30 percent, High refers to a target that is seriously degraded by 31-70 percent within the same timeframe, and Very High alludes to the destruction or elimination of a target or reduction in its population by 71-100 percent. Finally, a Low irreversibility means that the effects of the threat are easily reversible, and the target can be easily restored at a relatively low cost and/or within 0-5 upon the removal of the threat. A ranking of Medium for irreversibility indicates that the effects of the threat can be reversed, and the target restored with a reasonable commitment of resources and/or within 6-20 years. A High irreversibility ranking signifies that the effects of a threat can technically be reversed, and the target restored, but it is not practically affordable, and/or would take 21-100 years to achieve this. A Very High ranking for irreversibility means that the effects of the threat cannot be reversed, and it is very unlikely the target can be restored, and/or it would take more than 100 years to achieve this. It is important to understand the criteria for a threat assessment under the Open Standards framework so that the information may be easily transferred among organizations, and more importantly, so that
project representatives may understand the thought process behind decisions and alter information as they see fit.

6.1.2 Threat Rating Table Explanation

**Greenhouse Gas Emissions:** Greenhouse gas emissions are considered under the umbrella of climate change vulnerability, which refers to the degree to which an ecosystem or species is likely to experience harm due to changes in climate. Climate change vulnerability is a function of three primary components – exposure, sensitivity, and adaptive capacity. Exposure is how much of a change in climate and associated consequences a biodiversity target is likely to be exposed to. Sensitivity is a measure of whether and how a biodiversity target is sensitive to changes in climate. Adaptive capacity is a measure of the ability of an ecosystem or species to adjust to climate change impacts with minimal disruption. Many of the conclusions about climate change are assumptions about what will occur in the future. Nonetheless, Pepin County is beginning to see effects of climate change on their local ecosystems; according to communication with Chase Cummings, the frequency and intensity of precipitation events and flash flooding has increased over recent years. Due to an expected impact on agricultural lands and the watershed ecosystem, the scope of both the freshwater stream and riparian habitat targets was determined to be *High* (expected impact of 31-70% of the targets). The expected increase in flash flooding events, increased temperature, and increased precipitation over the coming years, the severity of climate change will likely be *High* for both biodiversity targets (targets are seriously degraded by 31-70% within the next 10 years). An assumption has been made based off the information gathered from Chase Cummings that the effects of climate change will persist into the foreseeable future in Pepin County. Thus, both biodiversity targets have been ranked as *Very High* in terms of irreversibility. It is unlikely that the targets can be restored and it would take more than 100 years to achieve this.

**Freshwater Stream Target Ratings:**
- Scope: High
- Severity: High
- Irreversibility: Very High

**Riparian Habitat Target Ratings:**
- Scope: High
- Severity: High
- Irreversibility: Very High

**Monoculture Crop and Livestock Production:** A monoculture an agricultural practice where one crop is cultivated, or one species of livestock is raised in a given area. Market pressures, government subsidies, and the necessity of high yielding corn, soy, and wheat production result in a monoculture landscape in Pepin County. Additionally, Pepin County has the monoculture of dairy production, which results in a heavy yield of manure that must be managed properly to avoid negative environmental and health impacts. The monocultures present contribute to a degraded riparian zone and freshwater stream ecosystem by way of conventional practices that are used to manage these systems.

Monoculture crop and livestock production is a human-induced direct threat toward both the freshwater stream ecosystem and the riparian habitat in the Fall Creek Watershed. In terms of the scope criteria, the monoculture trend consumes the vast majority of farms in Pepin County (71-100% of farms), consequently projecting all effects of this threat on the riparian habitat and freshwater stream ecosystem targets. As a result, the scope threat rating for both targets have been deemed very high. In terms of severity, the impact on the riparian habitat is assumed to be greater than the impact on the freshwater stream.
ecosystem since the former is designed to serve as a buffer zone between the farmland and stream ecosystem. The erosion and nutrient runoff as a result of monoculture crop production is meant to be filtered through the riparian zone in order to prevent harm to the stream ecosystem. However, impacts are dependent on the specific agricultural practices of individual farmers. Taking these factors into consideration, the severity of the monoculture threat on the freshwater stream ecosystem target is Medium (moderately degraded/reduced by 11-30 percent within 10 years) while the riparian habitat target has been ranked as High (seriously degraded by 31-70 percent within 10 years). Finally, assuming the threat of monoculture has been removed, the irreversibility of both biodiversity targets has been ranked Medium (the effects of the threat can be reversed, and the target restored with a reasonable commitment of resources within 6-20 years). This has been determined because soil quality and structure would respond positively if the threat of monoculture is removed. The soil would not be continuously depleted of nutrients, subsequently allowing for a regeneration of nutrients at a natural rate over a period of years without a large investment in human or financial capital.

**Freshwater Stream Target Ratings:**
- Scope: Very High
- Severity: Medium
- Irreversibility: Medium

**Riparian Habitat Target Ratings:**
- Scope: Very High
- Severity: High
- Irreversibility: Medium

**Excessive Use of Conventional Tillage:** Conventional tillage is an agricultural practice used for a variety of reasons. Conventional tillage can control weeds and pests present in a system by stirring and overturning the soil to destroy plant debris while also exposing pests to sun. Additionally, conventional tillage prepares a field by breaking up soil to form a uniform aspect while processing residual plant biomass back into the soil. The result is an open seedbed for that can be easily planted. The process ultimately degrades the soil structure because it breaks down the microbiome that is present in the root systems of plants. Additionally, conventional tillage releases the carbon and nitrogen that are being sequestered in the soil system, therefore altering the nutrients that are available to the crops that will be planted in the future (Rosenzweig and Hillel, 1998). Indirectly causing farmers to apply more fertilizer. Conventional tillage is an optional choice for farmers. Some farmers in Pepin county have productive agricultural fields that extend into the riparian zone; as a result, the buffers zones are subject to conventional tillage practices. This affects both the scope and severity criterion for this direct threat. Depending on whether farmers till their cropland, till their cropland and riparian zone, or refrain from tilling altogether will determine the impact on the freshwater stream ecosystem and riparian habitat targets. Due to the lack of data and information on this topic, it is difficult to discern the exact proportion of farmers who till the riparian zone, which subsequently determines that farmer’s relative impact on the freshwater stream ecosystem. Therefore, the assumption is that some farmers till the riparian zone and some do not. For that reason, the scope for both biodiversity targets are rated as Medium. For those who till the riparian zone, it is expected that a greater negative impact will occur to both the riparian buffer zone and freshwater stream system. The relative severity of the threat increases because tillage leads to a degraded soil structure, which reduces the integrity of the riparian soil and will increase erosion into the freshwater stream. Oppositely, for those farmers who refrain from tilling the riparian zone, the riparian buffer zone will retain its integrity and will prevent further runoff into the freshwater stream. In both cases, the impact on the freshwater stream ecosystem is expected to be lower compared to the riparian buffer zone because the
buffer zone serves as a barrier between the agricultural land in production and the freshwater stream ecosystem. Therefore, the severity of excessive soil tillage on the freshwater stream biodiversity target has been denoted as low and the riparian habitat target is Medium (a low severity is likely to only slightly degrade or reduce the target by 1-10 percent in 10 years, and a medium severity is likely to moderately degrade or reduce the target). Assuming the threat of excessive soil tillage is removed, the impacts on the soil are likely to persist following the change. Soil structure would be expected to take years to recover through natural processes but could be accomplished with proper resources and abilities. Therefore, the irreversibility of the riparian habitat target has been deemed Medium. Assuming extensive harm has not been done to the freshwater stream (excessive erosion, sedimentation, nutrient pollution, etc.), the flowing water is likely to more easily remove impurities. Riparian buffer zone management plans and nutrient management plans are already established in Pepin County, including budget allocation for these programs, so the recovery of this aspect is within the resource and technical means of the Pepin County LCPD. For that reason, the irreversibility of the freshwater stream target is deemed to be low.

Freshwater Stream Target Ratings:
- Scope: Medium
- Severity: Low
- Irreversibility: Low

Riparian Habitat Target Ratings:
- Scope: Medium
- Severity: Medium
- Irreversibility: Medium

Excessive Use of Agricultural Fertilizer: Agricultural fertilizers play a key role in farmers’ practices and are necessary to reach the yield potential of a crop. In order to achieve necessary crop yields many farmers utilize fertilizer in the form of manure and/or dry nitrogen spray. The rate and time at which fertilizer is applied plays a crucial role in the crop’s uptake ability. If applied too often the crop cannot utilize the nutrients adequately and the nitrogen will return to the atmosphere or the soil system. If applied in scant quantities the farmer will not achieve adequate yields. Time plays a critical role as well; if applied during rainfall events runoff is more likely to occur and then additional fertilizer will need to be applied to make up for what was lost to the stream ecosystem (Cassman, 2002).

For this project, the focus is on the excessive use of agricultural fertilizers or manure by farmers. It is a human-induced direct threat to both the riparian habitat and the freshwater stream ecosystem. With that, the precise amount of fertilizer applied by farmers depends on many factors: personal preference, level and timing of precipitation, the presence or absence of zero-N plots, desired crop yields, among many others. A singular trend cannot be concluded with utmost confidence, thereby affecting the certainty of this threat rating. It is assumed, that most farmers apply some amount of nitrogen-based fertilizer on their crops over the course of a growing season. When considering the scope criteria, both the freshwater stream ecosystem target and riparian habitat target were designated as High because of the pervasiveness of fertilizer use in Pepin County (31-70% of farms) while also taking into consideration the lack of organized data on fertilizer quantities that would rather suggest a Very High rating. In terms of severity, the fragility of the freshwater stream ecosystem warrants a higher likelihood that this system will be negatively impacted by a dramatic change in nutrient levels. It would be expected that the freshwater stream ecosystem would be seriously degraded (High threat rating) over a period of 10 years. Data suggests that this is already the case with water quality levels within dangerous margins in terms of nitrate and phosphorus concentrations. As for the riparian habitat target, its role as a buffer between the
cropland and the freshwater stream means that it is being impacted over time by the influx of nutrients. The precise degree is unknown because the riparian habitat is not being monitored for ‘health’ by the LCPD. It can be reasonably concluded that the impact on the riparian habitat target is Medium (moderately degraded/reduced by 11-30% over 10 years). In terms of irreversibility, if the threat of excessive agricultural use is removed, both conservation targets would be expected to recover with moderate input of human and financial capital since other factors such as monoculture and soil tillage, would be unproductive without the input of fertilizer. The irreversibility rating for both biodiversity targets are deemed Medium (the effects of the threat can be reversed, and the target restored with a reasonable commitment of resources and/or within 6-20 years).

**Freshwater Stream Target Ratings:**
- Scope: High
- Severity: High
- Irreversibility: Medium

**Riparian Habitat Target Ratings:**
- Scope: High
- Severity: Medium
- Irreversibility: Medium

### 6.2 Threat Description & Details

#### 6.2.1 Threat 1: Monoculture Crop Production

**Affected Conservation Targets:** Freshwater Stream Ecosystem and Riparian Habitat

**Threat Description:** Threats from rotating corn and soy on an intensive basis are linked to a degraded soil composition and require an increase in fertilizer use to sustain yields. With the reduction of individual dairy farmers in Pepin County, hay and alfalfa are taken out of crop rotation, thereby increasing the prevalence of corn and soy monocultures.

**Threat Details:** Monocultures may be considered harmful to the natural environment when comparing them to polyculture crop production or natural systems because they require high amounts of inputs and management that do not allow the soil to recover between seasons. When combining the effects of increased fertilizer use, degraded soils, and climate change impacts, the result is increased erosion and soil runoff that eventually accumulates in the riparian zones and freshwater stream habitats. Moreover, Pepin County is witnessing crop production that either cuts into the riparian habitat or borders against it – reducing the resiliency and buffer ability of the native vegetation against the agricultural fertilizer.

**Threat Impact on Conservation Targets & Rating:** Monoculture crop production is harmful to both the freshwater stream ecosystem and the riparian habitat because of its tendency to degrade soil structure and the requirement of fertilizers. In addition to, other factors such as flash flooding events caused by climate change and soil tillage that further degrades soil structure, monoculture production leads to increased erosion and soil runoff into the riparian habitat and freshwater stream systems. A constant influx of excess nutrients and sedimentation decreases the water quality of both surface and groundwater reserves. The summary threat rating for the monoculture direct threat is Medium.
6.2.2 Threat 2: Excessive Use of Agricultural Fertilizer

**Affected Conservation Targets:** Freshwater Stream Ecosystem and Riparian Habitat

**Description:** Threats from excessive use of agricultural fertilizer may be the main contributing factor to the overabundance of phosphorus and nitrates in the groundwater and surface water in Pepin County. When cultivating nitrogen-intensive crops that deplete the soil of its nutrient content, nitrogen-based fertilizer is applied to the land in order to sustain or increase crop yields.

**Details:** Through a combination of factors, such as: crop choice, market prices, and precipitation levels; farmers in Pepin County are applying excessive amounts of dry and liquid fertilizers onto their crops.

**Impact on Conservation Targets & Rating:** Excessive use of agricultural fertilizers by Pepin County farmers directly impacts the freshwater stream ecosystem when fertilizers runoff into the stream or leach into the groundwater, thereby resulting in dangerous levels of nitrate and phosphorus in surface and groundwater reservoirs (i.e. stresses – high nutrient loading and degraded soil composition). Similarly, although the impact of fertilizers on riparian habitat are not well-understood or currently measured by Pepin County, a concentration of nutrients in the riparian zone decreases its capacity to efficiently filter and prevent more nutrients from entering the freshwater stream ecosystem. The summary threat rating for the agricultural fertilizer direct threat is Medium.

6.2.3 Threat 3: Excessive Soil Tillage

**Affected Conservation Targets:** Freshwater Stream Ecosystem and Riparian Habitat

**Description:** Threats from excessive soil tillage on farmland in Pepin County may lead to degraded soil composition and may exacerbate the effects of nutrient pollution in the freshwater stream ecosystem, as well as degrading the integrity of the riparian habitat that serves as a buffer between the productive farmland and the natural stream ecosystem.

**Details:** Soil tillage is a common practice performed by farmers to aerate, kill weeds, and incorporate residual crop biomass into the soil. A side effect of this practice is soil degradation and loss of soil organic matter, thereby contributing to increased erosion and runoff in instances of extreme precipitation (i.e. stresses – degraded soil composition).

**Impact on Conservation Targets & Rating:** Excessive soil tillage impacts the freshwater stream ecosystem when the degraded soil contributes to erosion and nutrient runoff into the stream or leach into the groundwater, thereby resulting in increased sedimentation in the stream and increased levels of nitrate and phosphorus in surface and groundwater reservoirs. Similarly, an increased concentration of erosion and nutrients flowing into the riparian zone decreases its capacity to efficiently filter and prevent more sediment and nutrients from entering the freshwater stream ecosystem. The summary threat rating for the excessive soil tillage direct threat is Low.

6.2.4 Threat 4: Greenhouse Gas Emissions – Human-Induced Climate Change

**Affected Conservation Targets:** Freshwater Stream Ecosystem and Riparian Habitat

**Description:** Threats from long-term climatic changes may directly impact Pepin County and its residents over time, more specifically taking the form of increased temperature and extreme precipitation events that may manifest as flash flooding. Through the impact of climate change is still largely unknown, its impacts are predicted to intensify over the next few decades.
Details: In Pepin County, the increased global greenhouse gas emissions have begun manifesting as increased temperature and precipitation over time (i.e. climate change exposure). Through these changes, additional stress is placed upon the natural systems which takes the form of increased erosion and fluctuation of natural nutrient levels (i.e. stresses). These stresses directly contribute to both the freshwater stream ecosystem and riparian habitat targets in negative manners and exacerbate the effects of other aforementioned threats.

Impact on Conservation Targets & Rating: The impacts of climate change and increased greenhouse gas emissions will affect the freshwater stream and the riparian habitats through increased anomaly events. As frequency and intensity of extreme precipitation events increase, an overwhelming amount of soil and nutrient runoff in a short period of time will occur, thereby saturating both systems beyond their filtration capacities. Furthermore, another result of climate change is an increase in temperature. Depending on the number and successive number of days that measure record high temperatures, crop production may be hindered, requiring further irrigation and fertilization to sustain yields (Ramankutty, 2002). Both biodiversity targets may be negatively impacted by an increase in temperature through the increased likelihood of evaporation of the freshwater stream, as well as the fact that some riparian plant species may be unable to survive under increased temperature conditions. The summary threat rating for the greenhouse gas direct threat is Very High.

6.3 Threat Summary by Target

In terms of the freshwater stream ecosystem target, the direct threat of greenhouse gas emissions and climate change are the most severe threat in the long-term due to their ubiquity and predicted intensity over time. In terms of the short-term, however, the threat of excessive agricultural fertilizer use is the greatest human-induced threat that has a recorded linkage to the increased nutrient levels in the stream. A conservation plan that extends one decade should focus on the most immediate return in investment while also considering resiliency against climate change into the future. In terms of the riparian habitat target, climate change has a similar level of severity into the long-term as GHG emissions has on the freshwater stream ecosystem target. In the short-term, however, the threat of monoculture crop production is the most detrimental to riparian health and resiliency because farmers are harvesting crops and adding agricultural fertilizers directly adjacent to the riparian zone, which is one of the defense mechanisms against the excessive nutrients. This threat is the least feasible to change so it is not the focus of the riparian target. The summary threat rating for the Pepin County Fall Creek Watershed Conservation Plan is Very High, indicating that the issues presented require serious, organized action and are of great concern. In any case, feasibility in terms of financial, ethical, and technical capacities should be considered in order to determine the best course of action for addressing these threats against the riparian habitat and freshwater stream ecosystem.
7. Overall Situation Analysis

7.1 Diagram

Figure 7.1. Situation model diagram exported from Miradi.
7.2 Narrative

The scope of the project is the Fall Creek Watershed and the surrounding farmland within the boundaries of Pepin County in Wisconsin. Considering the importance of the land and water in Pepin County, the biodiversity targets chosen to represent the biodiversity in the region are the freshwater stream ecosystem and riparian habitat. The viability assessment for the freshwater stream ecosystem exhibits a rating of *Fair*, meaning the nutrient levels detected within the groundwater and surface water of Fall Creek are outside the acceptable range of variation and requires of human intervention. The viability assessment of the riparian habitat exhibits a rating of *Good*, meaning the extent of the riparian buffer zone is within the acceptable range of variation but requires some intervention for maintenance.

The freshwater stream ecosystem consists of both the groundwater and surface water of Fall Creek. Nutrients, including phosphorus and nitrates, have been measured throughout Fall Creek and are the main indicators of the freshwater stream health. These nutrients are causing high nutrient loading in the stream and degraded soil composition. By protecting and enhancing the freshwater stream ecosystem, surface and groundwater quality will improve, which would furthermore improve the viability of the freshwater stream ecosystem (C. Cummings, personal communication, Oct 2, 2019) Reductions in nutrient levels will enhance stream bank stability and trout fishing access opportunities along Fall Creek. In addition, as nutrient levels decrease, the stream will have better filtration, which will not only improve the water quality by removing excess nutrients but will furthermore improve the economic health of the community by supplying local farmers with potable water. Monitoring the phosphorus and nitrate levels is critical in protecting the freshwater stream ecosystem and its corresponding ecosystem services and human well-being targets.

The second biodiversity target is the riparian habitat, which is further defined as the land between the agricultural farmland and Fall Creek. Increasing the extent of the riparian habitat will further separate the agriculture land practices from the waters of Fall Creek. Farms that currently do not have sufficient riparian buffer zones established suffer from high nutrient loading and degraded soil composition (C. Cummings, personal communication, Sept 18, 2019). Reducing conventional tillage and fertilizer use will minimize the amount of nutrients leaching directly into the stream banks, which will further improve the degraded soil composition. Meeting the minimum requirements for the Buffer Incentive Program in Pepin County will enhance stream bank stability, soil filtration capabilities, and nutrient regulation in the Fall Creek Watershed. Supporting these ecosystem services will not only improve the economic health of the community and water quality but it will also increase trout fishing access opportunities.
A few of these direct threats are excessive use of monoculture, agricultural fertilizers, excessive soil tillage, and greenhouse gas emissions (C. Cummings, personal communication, Sept 18, 2019). Fertilizers and monoculture have been listed as Medium threat, excessive soil tillage is assessed as a Low threat, and greenhouse gas emissions have been evaluated to be a Very High threat. These are the main contributors harming the water quality and farmland in Pepin County. If these threats are addressed, the health of the watershed should improve, while promoting the sustainable agriculture practices in Pepin County.

Each direct threat towards the biodiversity targets has an indirect contributing factor that exacerbates the degradation of the Fall Creek Watershed. For starters, the practice of monoculture is largely the result of the farmers’ lack of economic flexibility/opportunities, price of commodities and the crop choices made by the farmers. Monoculture is an intensive method of farming that requires inorganic inputs into the land in order obtain high yields. The time and extent to which inorganic fertilizers are added to fields can lead to nutrient loading, which is a stress on the freshwater stream ecosystem and affects the viability of both biodiversity targets (C. Cummings, personal communication, Sept 18, 2019). Additionally, monoculture practices degrade soil compositions through conventional tillage that disrupts the soil biome and intensive row cropping leave the soil deprived on nutrients.

The other threats, excessive use of fertilizers and soil tillage, lead back to poor farming practices. Fertilizers are used by farms to provide and enhance the nutrients necessary for crop growth. This helps increase farm productivity and yield, however certain fertilizers contain phosphorus and nitrogen. If not absorbed by the plant, the excess nutrients will leach into the soil or be released into the atmosphere (Rosenzweig and Hillel, 1998). Nutrient runoff is a major concern and is one of the key contributors in the damage of water quality (C. Cummings, personal communication, Sept 11, 2019). In conjunction with the excessive use of fertilizer that overloads the crop’s absorption ability, the excessive use of soil tillage will exacerbate the soils inability to absorb nutrients due to a degraded microbe biome.

These two direct threats, excessive use of fertilizers and soil tillage, are the result of insufficient agricultural policies, a lack of knowledge from the farmers, and a lack of enforcement (C. Cummings, personal communication, Sept 11, 2019). If the policies of using these techniques were addressed, if farmers were informed about the effects of excessive fertilizer use and tillage, and there was an attempt to enforce this strategy, progress can be made to reduce the amount of runoff to further protect the freshwater stream ecosystem and riparian habitat. Taking care of these farming concerns in the county could potentially go a long way in improving water quality in Pepin County, which is a key focus in this conservation plan.

Another threat that is relevant to the project is the increase in greenhouse gas emissions. When greenhouse gases are emitted and the earth’s climate changes, it often leads to different weather patterns, such as increased temperature and precipitation. Increased precipitation can lead to erosion and degraded soil composition, which hurts the riparian habitat. The increased temperature creates a seasonal fluctuation in nutrient levels in the soil, which also damages both the riparian habitat and the freshwater stream ecosystem (C. Cummings, personal communication, Sept 18, 2019). This is an issue that is much bigger than the county and therefore much more difficult to address. Ultimately, it will require less greenhouse gases, mainly CO2, being emitted into the atmosphere as well as attempting to capture more CO2 that is already in the air. This problem can also be dealt with by addressing the monoculture threat by rotating crops and using cover crops that are more likely to sequester carbon and for a larger portion of the year (C. Cummings, personal communication, Sept 11, 2019). Additionally, the release of
carbon into the atmosphere will be reduced if the excessive use of conventional tillage is addressed (Roberston, 2002). These crops will also help the soil composition and the riparian buffer zone, which will in turn reduce the amount of pollution into the stream and groundwater. These crop rotations can also benefit farmers economically, which is ultimately the incentive that they will be willing to respond to.

The next steps in this plan is to use the above situation model analysis to consider the threats and stresses that are causing problems for the biodiversity and human well-being targets, and to come up with strategies that will address these issues. It is important to consider the threat rating of each of these threats in order to be able to properly prioritize them. Some strategies that could help limit these threats are implementing zero-N plots, improving administrative and technical capabilities, and providing an education and communication program for the farming communities (C. Cummings, personal communication, Oct 2, 2019).

8. Action Plan

8.1 Introduction of Action Plan

The action plan presents the defining goals, strategies, activities, result chains and objectives of this management plan. The action plan contains the following information:

- **Goals**: goals for each of the biodiversity targets, goals need meet the Open Standards principles of being linked to targets, impact oriented, measurable, time-limited and specific.
- **Strategies**: three strategies that are designed to reduce the threats to the biodiversity targets, strategies need meet the Open Standards principles of being linked, focused, feasible and appropriate.
- **Activities**: actions to be undertaken by LCPD or partners to reach the objectives.
- **Result Chain**: steps by step assumptions for project strategies that helps make explicit the logical relationship between strategies and biodiversity target.
- **Objectives**: objectives are designed statement for reducing threats and intermediate results to make sure keep track the management progress, objectives need meet the Open Standards principles of being outcome oriented, time limited, measurable, specific and practical.

8.2 Conservation Goals

8.2.1 Target 1: Ideal Groundwater Nutrient Levels

**Goal 1.1**: By 2030, the groundwater nutrient levels will have nitrate levels measuring 11.35 mg/L, improving the viability of the freshwater stream ecosystem.

**Goal 1.2**: By 2030, the average phosphorus levels measured in the groundwater will measure 0.167 mg/L, improving the viability of the freshwater stream ecosystem.

8.2.2 Target 2: Ideal Surface Stream Water Nutrient Levels

**Goal 2.1**: By 2030, the surface water nutrient levels will have nitrate levels measuring 10.6 mg/L, improving the viability of the freshwater stream ecosystem.

**Goal 2.2**: By 2030, the average phosphorus levels measured in the surface water will measure 0.184 mg/L, improving the viability of the freshwater stream ecosystem.
8.2.3 Target 3: Ideal Riparian Buffer Zone Size

**Goal 3.1:** By 2030, all farmers bordering Fall Creek will have a minimum of 30 feet of riparian buffer zone between productive agricultural farmland and Fall Creek, improving the viability of the riparian habitat.

8.3 Threat Reduction Objectives

Threat reduction objective is a formal statement that describes the desired changes needed to reduce the direct threats towards the biodiversity target. The desired future state of a threat is a milestone that gives conservation managers a reference to help them know if they were on the right path, in another words, it lets decision makers know if they have achieved the desired outcomes or results. Below are threat reduction objectives for two direct threats. The agriculture and water quality are the most concerned management problem in Pepin County Fall Creek Watershed according to the project representatives.

8.3.1 Direct Threat 1: Excessive Use of Agricultural Fertilizer

**Objective 1:** By 2025, 75 percent of farmers will conduct a soil sample tests on their land.

**Objective 2:** By 2025, 100 percent of farmers will submit a nutrient management plan with DATCP.

**Objective 3:** By 2028, 50 percent or more of farmers who have implemented the zero-N plots by 2025 will maintain their zero-N plots adjacent to the riparian zone.

8.3.2 Direct Threat 2: Excessive Soil Tillage

**Objective 4:** By 2025, 100 percent of farmers have been educated about the benefits of no till farming.

8.4 Management Strategies to Achieve Goals and Threat Reduction Objectives

8.4.1 Strategy Summary

Strategies are a group of actions that work together to reduce threats in order to restore the health of both conservation targets. The project team used the conceptual model to identify opportunities where the project representatives could intervene (opportunity to reduce a threat) and brainstormed possible management strategies. Both potential impact and feasibility are rated in 4 scales (Low = 1, Medium = 2, High = 3, Very High = 4). Miradi gives a roll-up rating of Not Effective, Less Effective, Effective, or Very Effective for each strategy. According to the Foundations of Success (FOS) Training Manual (2018, p. 77), the Open Standards defines and rates potential impact and feasibility as follow:

- **Potential Impact** – Degree to which the strategy (if implemented) will lead to desired changes in the situation at your project site
  - Very High – The strategy is very likely to completely mitigate a threat or restore a target.
  - High – The strategy is likely to help mitigate a threat or restore a target.
  - Medium – The strategy could possibly help mitigate a threat or restore a target.
  - Low – The strategy will probably not contribute to meaningful threat mitigation or target restoration.

- **Feasibility** – Degree to which your project team could implement the strategy within likely time, financial, staffing, ethical, and other constraints
- Very High – The strategy is ethically, technically, AND financially feasible.
- High – The strategy is ethically and technically feasible but may require some additional financial resources.
- Medium – The strategy is ethically feasible, but either technically OR financially difficult without substantial additional resources.
- Low – The strategy is not ethically, technically, OR financially feasible.

Table 8.4. Pepin County Fall Creek Watershed Conservation Plan strategies and corresponding rating for impact, feasibility and summary rating.

<table>
<thead>
<tr>
<th>Strategy Name</th>
<th>Potential Impact</th>
<th>Feasibility</th>
<th>Summary Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero-N Plots</td>
<td>Medium</td>
<td>High</td>
<td>5</td>
</tr>
<tr>
<td>Improved Administrative and Technical Capacity</td>
<td>Very High</td>
<td>Medium</td>
<td>6</td>
</tr>
<tr>
<td>Education and Communication Program for Farmers and Community Members</td>
<td>High</td>
<td>High</td>
<td>6</td>
</tr>
<tr>
<td>New Sources of Income</td>
<td>High</td>
<td>Low</td>
<td>4</td>
</tr>
<tr>
<td>Riparian Restoration</td>
<td>Medium</td>
<td>Medium</td>
<td>4</td>
</tr>
<tr>
<td>Trout Easements</td>
<td>Low</td>
<td>Medium</td>
<td>3</td>
</tr>
</tbody>
</table>

The project team ranked the strategies by summing up the numbers of potential impact and feasibility ranks to get the summary rating. The strategy with the largest number is the highest priority strategy and is the one should be chosen, while the strategy with the lowest number is a less ideal choice due to its limited resources available. Due to limited resources, the overall strategy rating helps the team prioritize the strategies in order to make a decision. Zero-N plots, Improved Administrative and Technical Capacity, and Education and Communication Program for Farmers and Community Members are three strategies LCPD will be focus within the 10-year scope of this plan.
Figure 8.4. Brainstorm mode of draft strategies diagram exported from Miradi.
8.4.2 Strategies and Intermediate Objectives

8.4.2.1 Strategy: Zero-N Plots

8.4.2.1.1 Strategy Description

This strategy is a modification of the current Nitrogen Use Efficiency (NUE) project that has been implemented in Pepin County since 2018 and will continue until 2021. The NUE project is done in partnership with the Discovery Farms Program of the UW Division of Extension. This on-farm project was incepted in Pepin County as a method of monitoring NUE in productive corn grain and silage fields. The monitoring method used by Discovery Farms compares standard fields that have nitrogen (N) applied in the form of fertilizer, and intensive fields that incorporate a zero-N test strip. This test strip has no application of fertilizer throughout the monitoring season as well as no more than 30 lb. N/ac applied in the fall prior to monitoring. N management practices are evaluated by using the ratio of the field’s crop yield and the amount of nitrogen applied to field (Discovery Farms Wisconsin, [n.d.]). This ratio is the Partial Factor Productivity (PFP) and measures the productivity of a crop system in comparison to N applied. The PFP of a field can be compared to the Wisconsin-State benchmarks for NUE, which allows farmers to make necessary decisions regarding N inputs to the field (Discovery Farms Wisconsin, 2018).

For this project, the location of the zero-N plots is at the discretion of the farmer whose field will be monitored. The strategy designed for Pepin County would have LCPD intervene in the location of the zero-N test strips. It would be suggested that farmers place zero-N plots adjacent to the riparian zone. By using strategic placement, the additional N inputs into the freshwater stream ecosystem, that are a result of soil erosion and runoff, could potentially be mitigated

The size of the zero-N test strips are 500 feet in length with a width of three combine heads. Figure 4 in the appendix displays and example field. Therefore, this project would not extend the entire extent of the riparian zone. Additionally, it is not a natural riparian buffer; corn will still be planted, and tillage and tractor work would still be permitted. This strategy will not solve the entirety of the erosion and soil degradation problems the freshwater ecosystem and riparian zone face, however, there will still be nutrient loading mitigation through reduced fertilizer use. Another benefit of this strategy is that it promotes education by tangibly displaying the differences in crop yield due to the rate of nitrogen application. The ratio from the PFP calculation will help farmers understand how synchronizing the amount of N supplied to a system and the N crop demand will optimize yield, profit, and environmental protection. Best management practices will help farmers avoid “added N effects,” which is the alteration

<table>
<thead>
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<th>Color and Shape</th>
<th>Description</th>
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<tr>
<td>Yellow Rectangle</td>
<td>Contributing Factors/Indirect Threats</td>
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<tr>
<td>Red Rectangle</td>
<td>Direct Threats</td>
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<tr>
<td>Olive Rectangle</td>
<td>Biophysical Factors (Stress)</td>
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<td>Biodiversity Targets</td>
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<td>Draft Strategies</td>
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Table 8.4. Key for brainstorm mode for Figure 8.4.
of the roots system’s ability to acquire organic N from the soil due to the application of inorganic N (Cassman, 2002).

This strategy is suggested because of the relationship that farmers in Pepin County already have with Discovery Farms. In 2018, Pepin County partnered with Discovery Farms at eight different farms, that each implemented one zero-N field. In 2019, the same eight farms implemented zero-N plots on two fields. Therefore, this is a low-cost adjustment in an already practiced behavior. Beside the change in placement of zero-N plots the funding of this program would need to cross hands. This project has been funded by Discovery Farms and the labor is done by participants who establish test-strips themselves. The partnership Pepin County has with Discovery farmers will end in 2021; after this year the LCPD will have to cover the cost of implementation, which is $4,000 each year (C. Cummings, personal communication, Nov. 4, 2019). Our strategy extends into 2025 for proper monitoring and mitigation, which results in the LCPD having to obtains $16,000 for this strategy. The cost of implementation is justified because each year this project is in action valuable data is collected and distributed. This data can be used for individual fields as well as the greater watershed area. In conclusion, this strategy poses many benefits for the agricultural industry of Pepin County as the practicality of data becomes more necessary when making economic decisions on a farm (Wolfert, 2017).

8.4.2.1.2 Biodiversity and Human Well-Being Targets

**Biodiversity Targets:**

- Freshwater Stream Ecosystem
- Riparian Habitat

**Human Well-Being Targets:**

- Improved Water Quality
- Economic Health of the Community
- Trout Fishing Access

8.4.2.1.3 Direct Threats Addressed

- Excessive Use of Agriculture Fertilizer
8.4.2.1.4 Results Chain

Figure 8.4.2.1. Results Chain diagram for zero-N plot strategy exported from Miradi.
Table 8.4. Key for results chain for zero-N plot strategy.

<table>
<thead>
<tr>
<th>Color and Shape</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Strategy</td>
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<td>Activity</td>
</tr>
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<td>Monitoring Activity</td>
</tr>
<tr>
<td>Purple Rectangle</td>
<td>Threat Reduction Result</td>
</tr>
<tr>
<td>Purple Rectangle</td>
<td>Biophysical Result</td>
</tr>
<tr>
<td>Green Oval</td>
<td>Biodiversity Target</td>
</tr>
<tr>
<td>Turquoise Rectangle</td>
<td>Intermediate Result</td>
</tr>
<tr>
<td>Gray Oval</td>
<td>Human Well-Being Target</td>
</tr>
</tbody>
</table>

8.4.2.1.5 Narrative of Results Chain

If the Pepin County LCPD continues with the NUE project independent of Discovery Farms, then the information about zero-N plots will be further distributed to both farmers who currently implement zero-N plots and those who do not. Once information is adequately distributed to farms, those without N plots will be educated about the program and see the benefits that the NUE project has. When willing farmers agree to place zero-N plots on their land then the LCPD will visit the fields and evaluate the land to determine the most strategic placement for environmental benefits. It will be encouraged to place the zero-N plots adjacent to the riparian zone in order to further reduce inputs to the riparian zone and the freshwater stream ecosystem. Once the zero-N plots are implemented then there will be a reduced use of agricultural fertilizer because farmers will not be permitted to place fertilizer on this zone for a whole season. Therefore, reducing the use nutrient loading within the freshwater stream ecosystem as well stabilizing the soil composition.

8.4.2.1.6 Intermediate Objectives

LCPD leads zero-N project without Discovery Farms contact:

- By 2021, $5,000 has been secured by LCPD to fund the first year of zero-N plot implementation without Discovery Farms

All farmers contacted and informed about zero-N plots and preferred placement (No current N monitoring):

- By 2022, 100 percent of Pepin County farmers that do not utilize zero-N plots (as of 2019) will be informed about zero-N plots, specifically those adjacent to the riparian zone.

Zero-N plot farms evaluated for strategic placement of zero-N plot adjacent to riparian zone:

- By 2022, 100 percent of farmers that possess zero-N plots in 2019 will have their land evaluated to determine if their zero-N plot could be strategically placed adjacent to the riparian zone.

Implementation of zero-N plots on farmers’ land adjacent to riparian zone:

- By 2025, 25 percent of farmers that did not have zero-N plot monitoring in 2019, will have implemented zero-N plots adjacent to their riparian zones.
Reduced use of agricultural fertilizer:

- By 2028, 50 percent or more of farmers who have implemented the zero-N plots by 2025 will maintain their zero-N plots adjacent to the riparian zone.

8.4.2.1.7 Activities Implemented

- Apply for grants or funds to support LCPD implementing zero-N plots
- LCPD will visit farms and discuss implementation of zero-N plots
- LCPD will visit farms to evaluate strategic placement of zero-N plots
- Visit farms for proof of zero-N plot implementation
- LCPD will educate farmers on the benefits of zero-N plots
- Review data submitted by LCPD

8.4.2.2 Strategy: Improved Administrative and Technical Capacity

8.4.2.2.1 Strategy Description

The main challenge Pepin County LCPD faces is lack of personnel and funding. Lacking numerous full-time staff members creates high workloads for the current full-time staff employed. LCPD has developed many opportunities within their department to help protect Fall Creek Watershed, but without more staff, they will not be able to achieve these tasks. Personnel LCPD would like to hire include both interns as well as full-time staff. Additional staff is needed to help assist with the wide array of tasks the employees at LCPD are responsible for. But in order to hire additional staff, there needs to be funding available. Therefore, the first step in our strategy is to increase the budget. This will be done through further research on alternative funding opportunities and applying for funding (i.e. applicable grants). Currently, staff salaries come directly from county tax dollars, thus LCPD must search alternative funding opportunities to fund projects to protect the Fall Creek Watershed. Additional funding has been obtained through grants, private entities, and other funding opportunities outside of the county. One of the largest struggle/hardships within limited funding is that many grants LCPD receives does not include staff dollars, meaning the grant is solely for the task and/or materials, not calculating the staff hours and labor pay.

Once an increase in budget is recorded, a yearly summer internship can be designed, and funds received can be allocated for the internship program. LCPD has had a summer internship in the past but did not hire any interns for the summer of 2019. Reestablishing an internship program will help gain an additional summertime staff and will create a position for students within the University of Wisconsin system gain professional hands-on experience with Pepin County LCPD. In order to find potential interns starting summer 2020, LCPD will need to reach out to the University of Wisconsin schools (i.e. Stout, Eau Claire, Madison, Stevens Point) to advertise for the internship opportunity and to further establish a partnership with the local universities. Once all of this has been accomplished, a summer intern will be hired and recorded.

The budget will also have allocated funds for a full-time staff position. Additionally, a Watershed Management Specialist position will be designed and established. An individual will be hired and recorded as a full-time staff member at LCPD. The Watershed Management Specialist position will enhance LCPD’s monitoring capabilities by increasing the total staff members at Pepin County LCPD. The position will help establish a monitoring plan, design criteria for the plan, make site visits to local farms and help assess site visit data. The nutrient levels of phosphorus and nitrates within the groundwater and surface waters of Fall Creek are the indicators of the health of the freshwater ecosystem, thus it is critical to establish a full-
time position to focus on monitoring the stream nutrient levels to enhance monitoring data and increase consistency in data collection. Ultimately, this will provide strong evidence on the changes in water quality to help design future management strategies in the future.

Water samples are taken from the freshwater stream ecosystem to establish the changing qualities within the surface waters and groundwater in Fall Creek. As part of this monitoring project, our strategy seeks to improve the monitoring capacity through increase in personnel (i.e. summer internship and Watershed Management Specialist), as well as updating the monitoring criteria for the current monitoring plan. Once these criteria are established, more frequent site visits to farms bordering Fall Creek can be done, acquiring more consistent and up to date records of the nutrient levels and overall quality of both the surface water and groundwater.

With updated records, the design and creation of an education and communication program with the local farmers in Pepin County. Funds from the budget will be allocated for the program. Additional educational materials (pamphlets, flyers, fact sheets, etc.) will be developed to help provide information regarding sustainable agriculture practices, cost-sharing programs, and other related topics farmers are interested in. These educational materials will be distributed amongst all farmers to establish resources available through LCPD. This will also open more communication opportunities between LCPD staff and farmers, in hopes of increasing farmer’s awareness to what LCPD does and what opportunities are available to increase the success of their farm. Farmers will have an increase awareness to the resources available to them in hopes of increasing their knowledge of how they can improve the livelihood of their farm without being at the expense of the health of Fall Creek Watershed.

As a monitoring plan is created, the data assessed will better inform LCPD of the current problems and successes farmers and the environment are facing. Educational materials will pass this information along to Pepin County farmers, keeping them informed as changes are noted. Increased enforcement will also be established as greater staff can create more consistent follow up visits with farmers. Enforcement is important to keep farmers in check with the effects of their practices on the Fall Creek Watershed and LCPD can evaluate and suggest alternative actions needed to be taken to see improvements. This enforcement will create pressure on local farmers to be in accordance with local regulations.

With everything considered, the team hopes to see threat reductions in proper manure storage and fertilizer use and responsible soil tillage. These threat reductions can be measured through further communication with farmers, making site visits to locations and discussing changes that are being observed. Recording efforts made by farmers, such as nutrient management plans and overall agricultural practices will help provide evidence and measure out how these changes are altering the surrounding landscape. Biophysical results the team hopes to achieve include reduced nutrient loading and stabilized soil composition for both the Fall Creek freshwater stream ecosystem and riparian habitat. Once nutrient levels decrease and soil composition is stabilized, that will encourage stabilized stream banks, adequate filtration and nutrient regulation. As a result of our strategy, improving the viability of the Fall Creek freshwater ecosystem and riparian habitat, it will improve the human well-being targets addressed, which include trout fishing access, economic health of the community, and improved water quality.

8.4.2.2. Biodiversity and Human Well-Being Targets

Biodiversity Targets:

- Freshwater Stream Ecosystem
- Riparian Habitat
Human Well-Being Targets:

- Trout Fishing Access
- Economic Health of the Community
- Improved Water Quality

8.4.2.2.3. Direct Threats Addressed

- Excessive Soil Tillage
- Excessive Use of Agriculture Fertilizer
- Monoculture
8.4.2.2.4. Results Chain

Figure 8.4.2.2. Results Chain diagram for improved administrative and technical capacity strategy exported from Miradi.
Table 8.4. Key for results chain for improved administrative and technical capacity strategy.

<table>
<thead>
<tr>
<th>Color and Shape</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow Hexagon</td>
<td>Strategy</td>
</tr>
<tr>
<td>Turquoise Rectangle</td>
<td>Intermediate Result</td>
</tr>
<tr>
<td>Yellow Rectangle</td>
<td>Activity</td>
</tr>
<tr>
<td>Purple Rectangle</td>
<td>Monitoring Activity</td>
</tr>
<tr>
<td>Purple Rectangle</td>
<td>Threat Reduction Result</td>
</tr>
<tr>
<td>Purple Rectangle</td>
<td>Biophysical Result</td>
</tr>
<tr>
<td>Green Oval</td>
<td>Biodiversity Target</td>
</tr>
<tr>
<td>Turquoise Rectangle</td>
<td>Intermediate Result</td>
</tr>
<tr>
<td>Gray Oval</td>
<td>Human Well-Being Target</td>
</tr>
</tbody>
</table>

8.4.2.2.5. Narrative of Results Chain

If Pepin County LCPD obtains a grant to support one summer internship, a yearly summer internship program will be designed and created. This internship will be in collaboration with the University of Wisconsin schools, seeking students to fulfill the intern position. If LCPD acquires a large grant to support a full-time employee, a full-time Watershed Management Specialist position will be created, and one individual will be hired for the position. If an intern and full-time staff member is hired, that will result in increased personnel and monitoring capabilities. The hired staff member will help the Pepin County LCPD staff develop a monitoring plan and criteria. If a full-time staff member is hired and a monitoring plan is developed and clear criteria is established, then more site visits will occur, and updated information will be acquired. As more data is recorded, educational programs and materials can be designed and created. Updated educational material will better communicate with farmers, resulting in more educated farmers. More informed farmers will result in better decision making by farmers regarding their agricultural practices as well as increased enforcement of rules and regulations on farmers. Increase in budget, personnel, monitoring, education, communication, and enforcement will result in proper manure storage and fertilizer use, as well as responsible soil tillage. These threat reductions will result in reduced nutrient loading and stabilized soil composition, which will ultimately improve the viability of the Fall Creek freshwater ecosystem and riparian habitat.

8.4.2.2.6. Intermediate Objectives

**Increased Budget:**

- By 2020, at least $6,000 has been raised to fund year 1 of the internship program.
- By 2022, at least $40,000 has been raised to fund year 1 of full-time Watershed Management Specialist position.

**Increased Personnel and Resources at Pepin County LCPD:**

- By 2020, a recurring internship program is established that contains at least 1 intern per year.
- By 2022, have hired full-time Watershed Management Specialist to increase capacity at LCPD.

**More informed farmers:**

- By 2025, 100 percent of farmers have been contacted and informed about ongoing education programs and are invited to program events on a regular basis.
Proper manure storage and fertilizer use:

- By 2025, 75 percent of farmers will conduct a soil sample tests on their land.
- By 2025, 100 percent of farmers will submit a nutrient management plan with DATCP.

Responsible Soil Tillage:

- By 2025, 100 percent of farmers have been educated about the benefits of no till farming.

8.4.2.7 Activities Implemented

- Research funding opportunities
- Apply for funding
- Design internship program
- Allocate funds for internship program
- Reach out to universities for partnership
- Establish partnership with universities
- Design Watershed Management Specialist position
- Allocate funds for Watershed Management Specialist position
- Hire intern(s)
- Hire Watershed Management Specialist
- Record of hired full-time staff member
- Establish monitoring criteria
- Site visits
- Site visit data assessed
- Allocate funding for educational program
- Design educational materials
- Create education program(s)
- Distribute information based on individual status
- Follow up with farmers about agriculture practices
- Assess farmer’s land for proper nutrient management plan
- Supply soil testing kits for farmers
- Follow up with farmers about agricultural practices

9. Monitoring Plan

9.1 Purpose of the Monitoring Plan

The purpose of the monitoring plan is to explain how the target goals and objectives will be achieved. The team developed the following monitoring plan to track the objectives and goals of the conservation plan. This monitoring plan will be used to identify and document the continued progress of the strategies as they are to be implemented.

9.2 Project Goals

Table 9.2 through 9.2.4 show the monitoring plan for each biodiversity target for both the zero-N plot strategy and the improved administrative and technical capacities strategy.
### Table 9.2. Monitoring plan for conservation goal for freshwater stream ecosystem pertaining to ideal groundwater nitrate levels.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater nitrate levels (mg/L)</td>
<td>Water quality monitoring</td>
<td>Every four years</td>
<td>LCPD</td>
<td>Groundwater wells</td>
<td>Next samples will be taken in summer 2023</td>
</tr>
</tbody>
</table>

**Monitoring Approach:** Time Series

**Goal 1:** By 2030, the average nitrate levels in the groundwater will measure 11.35 mg/L, improving the viability of the freshwater stream ecosystem.

---

### Table 9.2.1. Monitoring plan for conservation goal for freshwater stream ecosystem pertaining to ideal groundwater phosphorus levels.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater phosphorus levels (mg/L)</td>
<td>Water quality monitoring</td>
<td>Every four years</td>
<td>LCPD</td>
<td>Groundwater wells</td>
<td>Next samples will be taken in summer 2023</td>
</tr>
</tbody>
</table>

**Monitoring Approach:** Time Series

**Goal 2:** By 2030, the average phosphorus levels in the groundwater will measure 0.167 mg/L, improving the viability of the freshwater stream ecosystem.

---

### Table 9.2.2. Monitoring plan for conservation goal for freshwater stream ecosystem pertaining to ideal surface water nitrate levels.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface water nitrate levels (mg/L)</td>
<td>Water quality monitoring</td>
<td>Every four years starting in 2020</td>
<td>LCPD</td>
<td>Surface water sampling sites</td>
<td>Samples take four times during sampling year</td>
</tr>
</tbody>
</table>

**Monitoring Approach:** Time Series

**Goal 3:** By 2030, the average nitrate levels measured in the surface water will measure 10.6 mg/L, improving the viability of the freshwater stream ecosystem.
Table 9.2.3. Monitoring plan for conservation goal for freshwater stream ecosystem pertaining to ideal surface water phosphorus levels.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface water phosphorus levels (mg/L)</td>
<td>Water quality monitoring</td>
<td>Every four years starting in 2020</td>
<td>LCPD</td>
<td>Surface water sampling sites</td>
<td>Samples take four times during sampling year</td>
</tr>
</tbody>
</table>

**Goal 4:** By 2030, the average phosphorus levels in the surface water will measure 0.184 mg/L, improving the viability of the freshwater stream ecosystem.

**Monitoring Approach:** Time Series

Table 9.2.4. Monitoring plan for conservation goal for riparian habitat pertaining to ideal extent of riparian buffer zone.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width of the riparian buffer zone</td>
<td>Site visits to measure width of riparian buffer zone</td>
<td>Once per year starting in May 2020</td>
<td>LCPD</td>
<td>Farms with riparian habitat</td>
<td>Ideal size of buffer zone is specified as a minimum of 30 feet by Chase</td>
</tr>
</tbody>
</table>

**Goal 4:** By 2030, all farmers bordering Fall Creek will have a riparian buffer zone with the minimum width of 30 feet.

**Monitoring Approach:** Time Series

9.3 Project Threat Reduction Objectives

Table 9.3 Shows the monitoring plan for the threat reduction objectives for the zero-N plots strategy

**Objective 5:** By 2028, 50 percent or more of farmers who have implemented the zero-N plots by 2025, will maintain their zero-N plots adjacent to the riparian zone.

**Monitoring Approach:** Time Series

<table>
<thead>
<tr>
<th>What (Indicators)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of farmers implementing zero-N plots</td>
<td>Farm surveys, site visits, and communication</td>
<td>Twice per year starting in May 2025</td>
<td>LCPD</td>
<td>Zero-N plots along riparian habitat</td>
<td>Ideal size of buffer zone is specified as a minimum of 30 feet by Chase</td>
</tr>
</tbody>
</table>
Tables 9.3.1 through 9.3.3 show the monitoring plans for the threat reduction objectives for the improved administrative and technical capacities strategy and education and communication program for farmers and community members strategies.

Table 9.3.1. Monitoring plan for objective for proper manure storage and fertilizer use pertaining to soil sampling.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective: By 2025, 75 percent of farmers will conduct a soil sample test on their land.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring Approach: Time Series</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of farmers who conduct soil samples</td>
<td>Soil data collected from farmers</td>
<td>Once per year starting in 2020 after fall harvest</td>
<td>DATCP</td>
<td>Pepin County farms</td>
<td>Focus on farms adjacent to surface waters with riparian habitat</td>
</tr>
</tbody>
</table>

Table 9.3.2. Monitoring plan for objective for proper manure storage and fertilizer use pertaining to nutrient management plan adherence.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective: By 2025, 100 percent of farmers will submit a nutrient management plan with DATCP.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring Approach: Time Series</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of farmers who have nutrient management plan</td>
<td>Record of farmers who have turned in DATCP approved Nutrient Management Plan</td>
<td>Check starting in 2020 to ensure plan is turned in beginning of each season</td>
<td>DATCP</td>
<td>Pepin County farms</td>
<td>Focus on manure producing farm and farms adjacent to watershed</td>
</tr>
</tbody>
</table>

Table 9.3.3. Monitoring plan for objective for responsible soil tillage.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective: By 2025, 100 percent of farmers have been educated about the benefits of no till farming.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring Approach: Time Series</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of farmers that have been educated on no till practices</td>
<td>Communication with farmers</td>
<td>Every three months beginning in May 2020</td>
<td>LCPD</td>
<td>Pepin County farms</td>
<td>Focus on farms adjacent to surface waters with riparian habitat</td>
</tr>
</tbody>
</table>
9.4 Intermediate Objectives

Table 9.4 through 9.4.9 show the monitoring plans for the intermediate objectives in the zero-N plot strategy.

Table 9.4. Monitoring plan for objective for zero-N plot information pertaining to Pepin County LCPD taking over implementation of zero-N plots from Discovery Farms.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective: By 2021 $5,000 has been secured by LCPD to fund the first year of zero-N plot implementation without Discovery Farms.</td>
<td>Amount of money raised</td>
<td>Assess budget and check amount of funding available</td>
<td>December 31, 2021</td>
<td>LCPD</td>
<td>LCPD</td>
</tr>
</tbody>
</table>

Table 9.4.1. Monitoring plan for objective for zero-N plot information pertaining to farms that currently do not utilize zero-N plots.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective: By 2022, 100 percent of Pepin County farmers that do not utilize zero-N plots as of 2019 will be informed about the benefits of implementation, specifically adjacent to the riparian zone.</td>
<td>Percent of farmers contacted and informed</td>
<td>Record of distributed education material</td>
<td>Every 3 months beginning in May 2020</td>
<td>LCPD</td>
<td>Farms without zero-N plots</td>
</tr>
</tbody>
</table>

Table 9.4.2. Monitoring plan for objective for zero-N plot implementation pertaining to farms that did not previously implement zero-N plots on their land.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective: By 2025, 25 percent of farmers that do not use zero-N plots as of 2019 will have implemented zero-N plots adjacent to their riparian zones.</td>
<td>Percent of farmers who implement new zero-N plots</td>
<td>Site visits, communication, and record of Discovery Farms data regarding plot status</td>
<td>Once per year prior to field preparation</td>
<td>LCPD</td>
<td>Farms without zero-N plots</td>
</tr>
</tbody>
</table>
Table 9.4.3. Monitoring plan for objective for zero-N plot information pertaining to farms that currently do utilize zero-N plots.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Farmers that have moved their plots</td>
<td>Site visits, communication, record of Discovery Farms data regarding plot status</td>
<td>Once per year prior to field preparation</td>
<td>LCPD</td>
<td>Farms with zero-N plots</td>
<td></td>
</tr>
</tbody>
</table>

**Monitoring Approach**: Time Series

**Objective**: By 2022, 100 percent of farmers that possess zero-N plots as of 2019 will have their land evaluated to determine the most strategic placement adjacent to the riparian zone.

Table 9.4.4. Monitoring plan for objective for the zero-N plot implementation pertaining to farms that currently utilize zero-N plots.

<table>
<thead>
<tr>
<th>What (Indicators)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of farmers who move zero-N plots</td>
<td>Site visits and communication, record of Discovery Farms data regarding plot status</td>
<td>Once per year prior to field preparation</td>
<td>LCPD</td>
<td>Farms with zero-N plots</td>
<td>LCPD will collect data and establish contact with farmers</td>
</tr>
</tbody>
</table>

**Monitoring Approach**: Time Series

**Objective**: By 2025, 25 percent of farmers that have zero-N plots as of 2019 will have moved their zero-N plots to be located adjacent to the riparian zone.

Table 9.4.5 through 9.4.8 show the monitoring plans for the intermediate objectives in the improved administrative and technical capacities strategy.

Table 9.4.5. Monitoring plan for objective internship budget pertaining to amount of funds needed for internship program.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount of money raised to fund intern</td>
<td>Assess budget and check balance/source of funding</td>
<td>January 1, 2020</td>
<td>LCPD</td>
<td>LCPD</td>
<td></td>
</tr>
</tbody>
</table>

**Objective**: By 2020, at least $6,000 has been raised to fund year one of the internship program.

**Monitoring Approach**: Time Series
Table 9.4.6. Monitoring plan for objective internship pertaining to establishing a recurring internship program.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective:</td>
<td>Monitoring Approach: Time Series</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of interns</td>
<td>Visits and outreach to UW schools</td>
<td>By June 1, 2020</td>
<td>LCPD</td>
<td>LCPD</td>
<td></td>
</tr>
</tbody>
</table>

Table 9.4.7. Monitoring plan for objective Watershed Management Specialist budget pertaining to amount of funds needed to hire full-time staff.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Objective:</td>
<td>Monitoring Approach: Time Series</td>
<td></td>
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<tr>
<td>Amount of money raised to fund full-time staff member at LCPD</td>
<td>Assess budget and allocate available funds to hire full-time staff member</td>
<td>January 1, 2022</td>
<td>LCPD</td>
<td>LCPD</td>
<td>The Watershed Management Specialist will have a salary of $40,000</td>
</tr>
</tbody>
</table>

Table 9.4.8. Monitoring plan for objective full-time staff member pertaining to hiring a full-time staff member for LCPD.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
<th>Where</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Objective:</td>
<td>Monitoring Approach: Time Series</td>
<td></td>
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<tr>
<td>Full-time staff member hired</td>
<td>Post job listing and establish hiring process</td>
<td>By January 31, 2022</td>
<td>LCPD</td>
<td>LCPD</td>
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</table>

Table 9.4.9. Monitoring plan for the intermediate objective in the education and communication program for farmers and community members strategy.
Table 9.4.9. Monitoring plan for objective for more informed farmers pertaining to establishing ongoing contact and education for farmers.

<table>
<thead>
<tr>
<th>What (Indicator)</th>
<th>How (Methods)</th>
<th>When</th>
<th>Who</th>
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<tr>
<td>Objective:</td>
<td>Monitoring Approach: Time Series</td>
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<tr>
<td>Percent of farmers contacted</td>
<td>Farm surveys and site visits, communication</td>
<td>Check-in every 5 months beginning in May 2020</td>
<td>LCPD</td>
<td>Pepin County farms</td>
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### 10. Strategy Timeline and Budget

#### Figure 10.1. Work plan and budget for improved administrative and technical capacities strategy from Miradi.

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<tbody>
<tr>
<td>Peplin County (WI) Fall Creek Watershed Project (v0.85)</td>
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<tr>
<td>Improved administrative and technical capacities</td>
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<td>- Education and communication program for farmers and</td>
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<tr>
<td>- Research funding opportunities</td>
<td>Chase, Jessica,</td>
<td>877</td>
<td>14,010</td>
<td>13,860</td>
<td>47,820</td>
<td>47,820</td>
<td>123,510</td>
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<tr>
<td>- Apply for funding</td>
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<td>- Acquire grants</td>
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<td>- Improve partnership with universities</td>
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<tr>
<td>- Design internship program</td>
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<td>- Reach out to universities for partnership opportunities</td>
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<td>- Design educational materials</td>
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<tr>
<td>- Follow up with farmers about agricultural practices</td>
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<td>- Site visits</td>
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<td>- Create education program(s)</td>
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<td>- Allocate Funds for Internship Program</td>
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<td>- Establish Monitoring Criteria</td>
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<td>- Site Visit Data Assessed</td>
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<td>- Distribute information based on individual status</td>
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<td>- Hire Watershed Management Specialist</td>
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<td>- Hire full-time staff position</td>
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<td>- Design Watershed Management Specialist Position</td>
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<td>- Publish/Advertise for Job Opening</td>
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<td>- Follow up with farmers about agricultural practices</td>
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<tr>
<td>- Asses farmer's land for proper nutrient management plan</td>
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<tr>
<td>- Supply soil testing kits for farmers</td>
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</tbody>
</table>

Chase, Jessica, Watershed

Chase, Jessica, NRCS Staff

Chase, Jessica

Chase, Jessica, Bois Esculape

Chase, Jessica

Chase, Jessica, Bois Esculape

Chase, Jessica

Chase, Jessica, Bois Esculape

Chase, Jessica

Chase, Jessica, Bois Esculape

Chase, Jessica

Chase, Jessica, Bois Esculape

Chase, Jessica
A budget has been designed for the strategy of improve administrative and technical capacity. This strategy was selected because actions in the zero-N plot strategy, as well as the entire conservation plan, depend on Pepin County’s LCPD to acquire greater financial and human resources to perform these actions. For instance, under current conditions, LCPD is unable to perform monitoring activities to the extent that is necessary because of the lack of personnel and funding. As a result, Chase and Jessica are required to take on multiple roles that prevent them from allocating time and energy into “extra” activities. The funding for this strategy requires Pepin County LCPD to acquire new financial resources because their current funding is paid for by county tax dollars that are generally fixed and are allocated for programs already in practice. According to personal communication with Chase Cummings in October of 2019, the LCPD’s secured budget can be divided into the following categories: $30,000 per year toward monitoring and buffer program, $5,000 per year for groundwater testing (the remainder of which is allocated toward stream monitoring), $125,000 per year that pays for half of LCPD’s staff salary (funded by a Wisconsin state grant), $60,000 per year for cost-sharing programs (e.g. stream restoration, barnyard controls, roof gutters, etc.), and $40,000 per year for future management plans that cover roughly 1000 acres/year. As previously mentioned, much of this funding is accounted for over the course of a year. In other words, little to none is left over for other programs, thereby requiring the expansion of funding sources and amounts in order to complete the various activities that are being recommended in this conservation plan.

As part of this 10-year plan, the first four years have been mapped out in terms of budget beginning in 2020 and extending to 2023. The year 2023 is significant because it marks the halfway point in LCPD’s current plan where they are expecting to participate in monitoring and analysis to determine whether their current course of action is effective or not. It is apparent that additional personnel will be needed to complete this stage in their current plan, therefore part of the improved administrative and technical capacities strategy includes the addition of an internship program and the eventual hiring of a full-time staff member.

Pepin County has had experience with an internship program that was funded through state grants but has since discontinued it in 2019. According to Chase Cummings, the grants were very specific in their terms and tended to limit what an intern could focus on – such as Arc-GIS-specific grants that did not fulfill the diverse needs of the LCPD. The implementation of a new internship program, one that is more generalized, would allow for greater assistance in daily activities under Chase and Jessica. Pepin County pays their interns $12.60/hour, and it would be assumed that an intern would work for 8 hours per day for 60 workdays during the summer (12 weeks x 5 days/week). Therefore, the LCPD would need to allocate $6040 per year for each summer intern ($12.60 x 8 x 60 = $6040). This program would ideally be implemented in the summer of 2020 and would occur again in the summer of 2021. Training for this intern would be expected to cost $0 of additional funds but would require the time of Chase and Jessica, which indirectly effects the amount of time they have to work on other projects. Establishing partnerships, interviewing potential applicants, and advertising the internship program are necessary steps, therefore, $50 per year has been allocated in the budget to travel to and from the nearest universities two times per year (e.g. UW-Stout, Eau Claire) for a total of $200 for gas money. The program would be discontinued after the summer of 2020 because a full-time Watershed Management Specialist is hired.

A Watershed Management Specialist is of great need in Pepin County to carry out data collection, analysis, and monitoring activities throughout the Fall Creek Watershed in order to determine the sources of anthropogenic impacts on the freshwater stream ecosystem and groundwater and the best methods for
remediation. Currently, data is collected intermittently, and little funding is set aside for stream monitoring activities. It has been assumed that a base salary of $40,000 per year would be required for a Watershed Management Specialist that would be set to begin in 2022 and continue for subsequent years. A start date in 2022 allows Pepin County to secure funding through state grants or other means to fund this position, while also having someone hired the year leading up to the halfway point in Pepin County’s current management plan in 2023. This individual would be expected to work full-time, which equates to roughly 260 workdays per year. The total value of this position for the 2020-2023 budget would be $80,000.

Part of the Watershed Management Specialist’s responsibility would be to interpret water quality data and to assist farmers in their management programs. Pepin County has currently allocated $6,000 per year for water quality testing equipment and lab fees. Farmers may pick up a free testing kit from the LCPD, take a sample of the water from Fall Creek that runs through their property, and request various tests to be performed in the lab at UW-Steven’s Point. Private water testing for private wells is paid for by the farmers themselves, of which funds go specifically toward Pepin County LCPD’s water testing and sampling budget. Therefore, for the four years of this budget, $24,000 is required for water quality testing equipment and lab fees (already secured funding). Furthermore, the Watershed Management Specialist would be expected to travel on site visits to farms to test water quality, evaluate sites, and follow up and discuss courses of action with farmers. Currently $1,500 per year is set aside by the Pepin County LCPD for site visits, of which this activity would fall under. For the four years, $6,000 is required for this activity.

Another aspect of the improved administrative and technical capacities strategy includes an education program for farmers. This facet is expected to include the development of educational materials that may take the form of newsletters, brochures, pamphlets, and workshops that would require an input of paper, ink, and printing abilities. Although the LCPD currently possesses a printer, in case of malfunction or the need for a replacement, one printer could be purchased throughout the four-year budget at the cost of roughly $150. Paper would need to be purchased annually – at $30 per pack of paper (value generated by research on office paper on officemax.com) that would be expected to be purchased five times throughout the year, a sum of $150 per year for office paper for educational materials has been calculated ($600 total for four years). A basic ink cartridge would also need to be purchased at $40, which might need to be replenished three times per year – resulting in a sum of $120 per year for ink for educational materials ($480 total for four years). In terms of developing the materials themselves, the total cost of labor would equate to $0 as it would be deducted from the total salary of LCPD staff members.

Finally, as part of the education program there is an option for farmers to solicit advice and expertise from the NRCS and UW-extension. The LCPD has a full-time extension agent and NRCS employee that provide technical assistance. These individuals are available full-time (260 workdays) at the LCPD office with an open-door policy. Farmers are encouraged to participate in NRCS workshops and programs at their leisure. This aspect of the budget would cost $0 in additional funding over the course of four years.

In total, the budget for the improved administrative and technical capacities strategy equates to $123,510 over the course of the first four years (2020-2023). Out of the total budget for this strategy, 3 items, or $110,000, are required for monitoring activities. These items include: a full-time Watershed Management Specialist, water quality testing equipment and lab fees, and travel for site visits. In order to obtain this funding, researching, applying to, and acquiring various grants will be a critical component.
11. Recommendations for Adaptive Management: Analyze and Adapt

According to the Foundations of Success Training Manual, adaptive management is defined as “the incorporation of a formal learning process into conservation action. Specifically, it is the integration of project design, management, and monitoring, to provide a framework to systematically test assumptions, promote learning, and supply timely information for management decisions” (Foundations of Success, 2018). Below is a list of recommendations the project should use to complete Step 4 of the Open Standards in order to regularly analyze and monitor results to make corrections in their project management.

- If farmers who do not currently have zero-N plots do not wish to participate in the implementation program on the riparian zone, suggest that they implement a zero-N plot at their discretion.
- If farmers are generally against zero-N plots on their farm, suggest other cost-sharing programs or conservation programs offered by Pepin County, NRCS, and the USDA (Reference Table 2.2).
- If farmers are unresponsive to updated communication methods (newsletter, flyer, etc.), reevaluation of methods will be necessary – such as switching to primarily emails, phone calls, and site visits. Conversely, if farmers are responsive to the flyers and newsletters, an added emphasis should be placed on these methods. We will work until the team is able to find an effective communication method for each individual farmer.
- If LCPD is unable to raise sufficient funds to pay an intern, we suggest that local universities are contacted to help set up a program that would allow for students to receive class credit for their work as an intern. If local universities are not interested or unable to fulfill this request, local high schools will be contacted to see if potential class credits are available for high school students.
- In 2023, Pepin County Land Management Department is planning to perform stream monitoring for all of Fall Creek. 2023 should be used as a benchmark, or “halfway point,” to determine whether current management practices are working. If data indicates otherwise, this halfway point will be a good indication that management practices should be analyzed and altered. Potential practices that could be altered are but are not limited to increasing the size of riparian zone, investigating farmer practices, emphasizing the reduction and time of fertilizer applications.
12. Literature Cited


Pepin County Buffer Incentive Program. (2014). Durand, WI, USA.

Pepin County Farmland Preservation Plan. (2016). Durand, WI, USA.


Wisconsin Department of Natural Resources. (2009). *Fish and Habitat Recommendations for Pepin County.*


13. Glossary of Terms

**Action Plan** – A description of a project’s goals, objectives, and strategies that will be undertaken to abate identified threats and make use of opportunities.

**Activity** – A specific action or set of tasks undertaken by project staff and/or partners to reach one or more objectives. Sometimes called an action, intervention, response, or strategic action. (See relationship to strategies below.)

**Adaptive Management** – The incorporation of a formal learning process into conservation action. Specifically, it is the integration of project design, management, and monitoring, to provide a framework to systematically test assumptions, promote learning, and supply timely information for management decisions.

**Assumption** – A project’s core assumptions are the logical sequences linking project strategies to one or more targets as reflected in a results chain diagram. Other assumptions are related to factors that can positively or negatively affect project performance – see also risk factor.

**Audit** – An assessment of a project or program in relation to an external set of criteria such as generally accepted accounting principles, sustainable harvest principles, or the standards outlined in this document. Compare to evaluation.

**Biodiversity Target** – A synonym for conservation target.

**Community of Practice** – A group of practitioners who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis.

**Conceptual Model** – A diagram that represents relationships between key factors that are believed to impact or lead to one or more conservation targets. A good model should link the conservation targets to threats, opportunities, stakeholders, and intervention points (factors – threats, opportunities, or targets – in a conceptual model where a team can develop strategies that will influence those factors. It should also indicate which factors are most important to monitor.

**Conservation Target** – An element of biodiversity at a project site, which can be a species, habitat/ecological system, or ecological process that a project has chosen to focus on. All targets at a site should collectively represent the biodiversity of concern at the site. Synonymous with biodiversity target.

**Critical Threat** – Direct threats that have been prioritized as being the most important to address.

**Direct Threat** – A human action that immediately degrades one or more conservation targets. For example, “logging” or “fishing.” Typically tied to one or more stakeholders. Sometimes referred to as a “pressure” or “source of stress.” Compare with indirect threat.

**Enabling Condition** – A broad or high-level opportunity within a situation analysis. For example, the legal or policy framework within a country.

**Evaluation** – An assessment of a project or program in relation to its own previously stated goals and objectives. See monitoring and compare to audit.
Factor – A generic term for an element of a conceptual model including direct and indirect threats, opportunities, and associated stakeholders. It is often advantageous to use this generic term since many factors – for example tourism – could be both a threat and an opportunity.

Goal – A formal statement detailing a desired impact of a project, such as the desired future status of a target. A good goal meets the criteria of being linked to targets, impact oriented, measurable, time limited, and specific.

Indicator – A measurable entity related to a specific information need such as the status of a target/factor, change in a threat, or progress toward an objective. A good indicator meets the criteria of being: measurable, precise, consistent, and sensitive.

Indirect Threat – A factor identified in an analysis of the project situation that is a driver of direct threats. Often an entry point for conservation actions. For example, “logging policies” or “demand for fish.” Sometimes called a root cause or underlying cause. Compare with direct threat.

Information Need – Something that a project team and/or other people must know about a project. The basis for designing a monitoring plan.

Intermediate Result – A specific benchmark or milestone that a project is working to achieve en route to accomplishing a final goal or objective (in this case, “intermediate” typically refers to a temporal dimension).

Key Intervention Point – A factor in your conceptual model where you could develop a strategy to ultimately improve the conservation status of one or more targets.

Learning Questions – Questions that define what you want to learn based on the implementation of your project. Learning questions drive the identification of information needs, and thus, your monitoring plan.

Logical Framework – Often abbreviated as ‘logframe’. A matrix that results from a logical framework analysis that is used to display a project’s goals, objectives, and indicators in tabular form, showing the logic of the project.

Monitoring – The periodic collection and evaluation of data relative to stated project goals and objectives. (Many people often also refer to this process as monitoring and evaluation, abbreviated M&E).

Monitoring Plan – The plan for monitoring your project. It includes information needs, indicators, and methods, spatial scale and locations, timeframe, and roles and responsibilities for collecting data.

Method – A specific technique used to collect data to measure an indicator. A good method should meet the criteria of accurate, reliable, cost-effective, feasible, and appropriate.

Objective – A formal statement detailing a desired outcome of a project such as reducing a critical threat. A good objective meets the criteria of being: results oriented, measurable, time limited, specific, and practical. If the project is well conceptualized and designed, realization of a project’s objectives should lead to the fulfilment of the project’s goals and ultimately its vision. Compare to vision and goal.
Operational Plan – A plan that includes analyses of: funding required; human capacity and skills and other non-financial resources required; risk assessment and mitigation; and estimate of project lifespan and exit strategy.

Opportunity – A factor identified in an analysis of the project situation that potentially has a positive effect on one or more targets, either directly or indirectly. Often an entry point for conservation actions. For example, “demand for sustainably harvested timber.” In some senses, the opposite of a threat.

Practitioners – All people involved in designing, managing, and monitoring conservation projects and programs.

Program – A group of projects which together aim to achieve a common broad vision. In the interest of simplicity, this document uses the term “project” to represent both projects and programs since these standards of practice are designed to apply equally well to both.

Project – A set of actions undertaken by a defined group of practitioners – including managers, researchers, community members, or other stakeholders – to achieve defined goals and objectives. The basic unit of conservation work. Compare with program.

Project Area – The place where the biodiversity of interest to the project is located. It can include one or more “conservation areas” or “areas of biodiversity significance” as identified through ecoregional assessments. Note that in some cases, project actions may take place outside of the defined project area.

Project Team – A specific core group of practitioners who are responsible for designing, implementing, and monitoring a project. This group can include managers, stakeholders, researchers, operations staff and other key implementers.

Result – The desired future state of a target or factor. Results include impacts which are linked to targets and outcomes which are linked to threats and opportunities.

Results Chain – A graphical depiction of a project’s core assumption, the logical sequence linking project strategies to one or more targets. In scientific terms, it lays out hypothesized relationships.

Risk Factor – A condition under which the project is expected to function, but which can cause problems for the project. Often, a condition over which the project has no direct control. Killer risks are those that when not overcome, will completely stop the project from achieving its goals and objectives.

Scope – The broad geographic or thematic focus of a project.

Stakeholder – Any individual, group, or institution that has a vested interest in the natural resources of the project area and/or that potentially will be affected by project activities and have something to gain or lose if conditions change or stay the same. Stakeholders are all those who need to be considered in achieving project goals and whose participation and support are crucial to its success.

Strategic Plan – The overall plan for a project. A complete strategic plan includes descriptions of a project’s scope, vision, and targets; an analysis of project situation, an Action Plan, a Monitoring Plan, and an Operational Plan.
**Strategy** – A group of actions with a common focus that work together to reduce threats, capitalize on opportunities, or restore natural systems. Strategies include one or more activities and are designed to achieve specific objectives and goals. A good strategy meets the criteria of being: linked, focused, feasible, and appropriate.

**Target** – Shorthand for biodiversity/conservation target.

**Task** – A specific action in a work plan required to implement activities, a Monitoring Plan, or other components of a Strategic Plan.

**Threat** – A human activity that directly or indirectly degrades one or more targets. Typically tied to one or more stakeholders. See also direct threat and indirect threat.

**Vision** – A description of the desired state or ultimate condition that a project is working to achieve. A complete vision can include a description of the biodiversity of the site and/or a map of the project area as well as a summary vision statement.

**Vision Statement** – A brief summary of the project’s vision. A good vision statement meets the criteria of being relatively general, visionary, and brief.

**Work plan** – A short-term schedule for implementing an action, monitoring, or operational plan. Work plans typically list tasks required, who will be responsible for each task, when each task will need to be undertaken, and how much money and other resources will be required.
14. Appendix

Figure 1. Restored trout stream at site visit of Pepin County, Sept. 29, 2019.

Figure 2. Restored trout stream at site visit of Pepin County, Sept. 29, 2019.
Figure 3. Manure storage facility taken at site visit of Pepin County, Sept. 29, 2019.

Figure 4. Example of field with zero-N strip is in red and example of standard field is in blue, courtesy of Discovery Farms.
UniverCity Year is a three-phase partnership between UW-Madison and one community in Wisconsin. The concept is simple. The community partner identifies projects that would benefit from UW-Madison expertise. Faculty from across the university incorporate these projects into their courses, and UniverCity Year staff provide administrative support to ensure the collaboration’s success. The results are powerful. Partners receive big ideas and feasible recommendations that spark momentum towards a more sustainable, livable, and resilient future. Join us as we create better places together.