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# Winneshiek Creek

### Watershed Resource Inventory and Watershed Plan

**Executive Summary** 

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#### WINNESHIEK CREEK WATERSHED RESOURCE INVENTORY AND PLAN EXECUTIVE SUMMARY

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The Winneshiek Creek Watershed Executive Summary was created to summarize the findings and recommendations of the Winneshiek Creek Watershed Resource Inventory (Inventory) and Watershed Plan (Plan), which are collectively designed to support landowners and the community, helping them to achieve their conservation goals. The Inventory is detailed in Section 1 while Section 2 houses the Plan. The Inventory describes the natural resources and land uses of the watershed, and the Plan provides direction and recommendations to improve the quality of these waters. These efforts were initiated by the Natural Land Institute in connection with the Healthy Land and Water (HLW) Strategy and Olson Ecological Solutions and supported by the Illinois Environmental Protection Agency, funded in part through Section 319 of the Clean Water Act.

#### What is a Watershed?

When a raindrop falls to the ground, it takes the path of least resistance to the nearest stream or lake. It may travel over the land, infiltrate through the soil into the groundwater, or get routed through a drainageway or storm sewer to get there. The entire area that leads into the waterway is a basin called a watershed.

The watershed addressed by this Inventory and Plan is the Winneshiek Creek Watershed. Any rain that falls within the Winneshiek Creek Watershed runs into Winneshiek Creek, which is carried into the Pecatonica River, which flows into the Rock River, which empties into the Mississippi River. Rainwater from the Winneshiek Creek Watershed eventually makes its way into the Gulf of Mexico through this system of rivers.

## Why are residents concerned about the Winneshiek Creek Watershed?

Winneshiek Creek was once a place where locals came to fish, swim, and spend time in nature. Today the creek is unable to support aquatic life as in the past. The water is brown and turbid, and streambank erosion has



Source: US EPA

resulted in damaged aquatic habitat, land loss, and compromised property values. We recognize that healthy, clean water throughout the watershed is fundamental to the health and success of residents and our community and must be restored and protected for future generations.

Residents of the watershed no longer enjoy the physical and mental health benefits of recreation at the creek. Many in the watershed, particularly those living in and around the Village of Dakota, are unaware of the creek or their impact on its health. Reestablishing meaningful connections between local residents, the creek, and surrounding natural areas will create a sense of ownership and pride in Winneshiek Creek. This can lead to widespread stewardship of the area's land and water resources that will complement the conservation efforts made by the majority of the watershed's farmers.

Water quality and clarity in Winneshiek Creek can be restored by limiting total suspended solids, sedimentation, and phosphorus contributions to the creek. Allowing the ecosystem to be made healthy, diverse, and resilient again. Residents may once again enjoy and

#### Watershed Location



Source: Resource inventory, map created by Kristin Adams with **Tallgrass Restoration** 

connect to nature close to home, providing an opportunity to build upon the strong conservation ethic that already exists in the watershed.

In 2021, in order to determine these issues facing the Winneshiek Creek Watershed, a handful of landowners and consultants came together in public meetings to collectively create a plan with goals and action steps to improve water quality in their watershed. The Plan's basic outline, as well as the structure for group involvement, followed the Illinois Environmental Protection Agency's watershed planning process. The process included watershed residents, volunteers, and technical experts in the development of a comprehensive plan that identified locally-driven watershed actions based on input from participating landowners. The Plan contains a detailed inventory of the watershed's natural resources and demographics, and actions designed to address the stakeholder's missions and goals.

#### What does the land and water look like in the Winneshiek Creek Watershed?

The Winneshiek Creek Watershed is an agricultural area located in Stephenson County in north-central Illinois. It lies northeast of Freeport with the Village of Dakota at its headwaters, a town of approximately 500 people. The watershed is 9,728 acres, of which 73% is comprised of tilled crop fields. Other land uses

are mainly hay fields and pasture. Historically, about <sup>3</sup>/<sub>4</sub> of this area was covered by prairie, and the remaining 1/4 was mostly timber with 2% agricultural fields and another 2% in river, sloughs, and thickets. Today, agricultural producers practice conservation methods on crop fields and raise livestock on pastures and in small feed lots. There are no predicted changes in these land uses within the next 20 years.

Considering all of its tributaries and branches, the Winneshiek Creek is 32 miles of stream, 9.7 miles of which holds consistently running water. The other 22.5 miles are intermittent streams that carry water during storm events only. The creek mainly

#### Land Use Map and Key



**Tallgrass Restoration** 

flows through uplands, with floodplain only found within the lower reaches of the creek accounting for 3% of the watershed area and wetlands on a trace seven acres. Soil types that are classified as highly erodible lands represent about 16% of the watershed.

#### What is the condition of the watershed's streams, ponds, and lake?

Winneshiek is documented as an impaired stream according to the Illinois Environmental Protection Agency because it does not support aquatic life to its fullest capacity. This impairment is caused by sedimentation, elevated levels of total suspended solids and phosphorus, and other unknown causes, with the known source being the municipal wastewater treatment ponds discharging treated wastewater into the streams that is polluted above the acceptable levels.

A stream survey, conducted on private lands with the cooperation of landowners, revealed severely eroded streambanks along about 21% of Winneshiek Creek's length, including its tributaries. Most of the stream flows naturally, and about 7% is highly channelized and another 10.5% moderately channelized. The majority of streambanks (54%) do not have adequate vegetation buffering the stream, and only 9% of these buffer areas are in good condition with naturalized vegetation within 50 feet of the streambank. The severely eroded banks contributed an estimated 79% of the sediment and erosion from all streambanks, while those less eroded contributed significantly less.



#### Severe Erosion Along Winneshiek Creek

Source: Winneshiek Resource Inventory, taken during stream survey with landowner permission

Land uses send nutrients, solids, and other pollutants into the stream with runoff. With a little bit originating from each land use, these are called non-point source pollutants, because you cannot point to one source like a pipe. When considering pollutant loading into the creek by land use on a per-acre basis, developed areas such as residential and commercial areas of Dakota and the road system create the greatest amount of runoff carrying nutrients, suspended solids, and bacteria into the stream. However, crop production is the most common land use in the watershed; therefore, it is predicted to contribute the most pollutants, including 65% of the phosphorus, 71% of the nitrogen, and 72% of the sediment in Winneshiek Creek. The developed areas of Dakota and the road system add another 24% of the phosphorus, 19% of the nitrogen, and 22% of the solids into the creek. The remaining various land uses make up the rest.

#### What is in the Winneshiek Creek watershed plan?

Watershed plans are valuable because they create a plan of action for the community to make improvements to their watershed. After inventorying the area for natural resources, concerns, and opportunities, stakeholders determined what needed to be accomplished to improve their waters. These desires were encompassed in a community driven, watershed plan as an important first step in improving water quality in Winneshiek Creek and downstream waterbodies, such as the Pecatonica River. These actions will have positive impacts on the local economy, property values, and recreational opportunities, and they preserve the local heritage for future generations. In addition, they provide benefits downstream for the greater good of the people and wildlife of the Mississippi River and Gulf of Mexico.

During a three-year planning process (delayed due to Covid-19), stakeholders, consultants, and technical advisers came together to plan vision and direction toward better stewardship of the area's land and water. The resulting watershed plan used the group's feedback combined with the results of the watershed resource inventory to address concerns, put in place goals and objectives with measurable milestones, decide which best management practices would be most applicable to the watershed and acceptable to stakeholders, determine how the chosen projects and practices would positively affect the area's streams and lakes, decide how and when to implement the practices and educate stakeholders, weigh costs and benefits of chosen activities, and put in place monitoring efforts. It also provided guidance toward appropriate local financial and technical resources.

#### What do we want to see in our community?

Other than to preserve their cultural heritage as an agrarian community, the primary motive of stakeholders was to confront the causes of non-point source pollution impairing Winneshiek Creek, namely sediment and excessive nutrients. Goals and specific recommendations were created to make the community's vision a reality. The Planning Participants developed a vision statement, shown below, to put this vision into words.



We envision Winneshiek Creek as a healthy aquatic ecosystem with clean, clear water that enhances the watershed's wildlife habitat and the beauty of the rural landscape. We see a community connected to the watershed's natural resources through fishing and outdoor recreation and acting as stewards of land and water resources for the health and benefit of future generations



~Vision of the Winneshiek Creek Planning Participants.

#### Eight overarching goals to achieve this vision were:

Goal 1: Reduce total suspended solids and nutrient loading into surface waters from runoff.

Goal 2: Limit sedimentation and streambank erosion.

Goal 3: Protect the quality of ground and drinking water.

Goal 4: Improve habitat in the stream for aquatic plants and animals.

Goal 5: Adopt sustainable land use practices and policies that protect ground and surface water.

Goal 6: Protect, enhance, and manage wildlife habitat.

Goal 7: Evaluate and enhance the recreational opportunities of the watershed.

Goal 8: Promote stewardship across the community through outreach and engagement.

**Executive Summary** 

The community agreed upon meaningful targets in order to reduce the amount of nutrients and sediment entering Winneshiek Creek and other water sources in the watershed. The Illinois Nutrient Loss Reduction Strategy (Illinois NLRS) was considered in the creation of objectives. These objectives are consistent with the Illinois NLRS in reducing total phosphorus and nitrate-nitrogen by 25% and 15%, respectively, within 10 years. Although the Illinois NLRS focuses on nitrate-nitrogen, we focus on the total nitrogen due to the availability of computer modeling. We feel that reducing total nitrogen by the same amount is a comparable target.

Specifically, the proposed priority BMPs would reduce total phosphorus non-point source pollution by 25% and total nitrogen by 15% in the watershed.

The planning participants chose targets for suspended solids and fecal coliform reduction that correlate with the nutrient reduction targets. While reducing the nutrients, we aim to simultaneously reduce total suspended solids by 34% and bacteria counts by 14%.

In order to meet these goals and targets, stakeholders chose projects and practices appropriate for their area that they were willing and excited to implement.

#### What conservation practices are already in place?

There are a variety of ongoing conservation practices the watershed's farmers and landowners are proud of. After driving through the watershed, it's easy to spot these practices and land uses. Of the long list of activities, some highlights include:

#### Agricultural Producer Efforts

- No till is likely practiced on 31% of crop fields, or 2,118 acres in the watershed.
- Cover crop is likely applied to 11% of crop fields, or 751 acres in the watershed.
- Nutrient management plans are being practiced, although the amount is not public information.
- Hay production as a land use is beneficial for water quality and is found on 763 acres in the watershed.
- Pasture is a land use that is beneficial for reducing nutrients and suspended solids flowing into the creek. It covers 532 acres in the watershed.
- There are 470 acres left in natural forests, grasslands, and wetlands in the watershed, which produce the least amount of runoff and help to filter the runoff of nearby land uses.
- There are an estimated 30,630 feet of streambank buffered by natural areas, filtering stormwater from adjacent agricultural, commercial, and residential land uses.

#### What more can landowners and homeowners do?

There are many ways to meet the goals of this watershed plan and improve the water quality of Winneshiek Creek. Planning participants decided which best management practices, of a list of possibilities, would be most likely to be accepted and implemented within the Winneshiek Creek watershed. The results were

various choices specific for certain situations within the watershed: the village and roads, the rural area, along the streambanks, and within the stream. Many of these practices also protect groundwater and provide wildlife habitat, and some are specific to groundwater protection and wildlife habitat. The priority practices are listed below, followed by other available practices that are highly applicable to the watershed.

#### Village and Roads

Within the village and along the roads where pavement is abundant, the planning participants chose to focus on three practices:

- Vegetated Filter Strips
- Stormwater Wetlands
- Bioretention Area (Incl. Rain Gardens)

Constructing projects such as these will address Goal 1 by effectively filtering the total suspended solids and nutrients within the runoff coming from developed lands. They will also address Goal 3, protecting the quality of ground and drinking water by recharging the groundwater aquifer. Each of these projects has the potential to also address Goal 6 if the plant selection attracts wildlife such as migratory songbirds, pollinators, and beneficial insects in all areas plus amphibians in the wetlands.

#### Filter Strip Between Crop Rows



Source: Iowa State University

#### Rural Areas

Within the rural watershed, planning participants chose to focus on six practices:

- Stormwater Wetlands
- Grassed Waterways (for gully stabilization)
- No Till
- Cover Crop
- Nutrient Management Plans
- Ponds and Basins (Dry Detention, Wet Retention, and Extended Wet Retention)
- Gully Stabilization

Constructing projects such as these will address Goal 1 by effectively filtering the total suspended solids and nutrients carried by the runoff coming from agricultural lands. Grassed waterways and gully stabilization will additionally address Goal 2 by limiting sediment erosion. Stormwater wetlands, ponds, and basins will also address Goal 3 by recharging the groundwater aquifer and Goal 6 by providing wildlife habitat.

#### Along Streambanks

- Streambank Stabilization
- Wetland Scrapes
- Reconnection to Floodplain

Creating wetland scrapes and reconnecting streams to their floodplain will address Goals 1, 4, and 6 by

filtering nutrients and solids from runoff and providing habitat for in-stream and shoreline plants and animals. Stabilizing streambanks will address Goal 2 by limiting streambank erosion.

#### In-Stream

- Rock Weirs
- Log and root wad weirs

Creating weirs of rock, wood, or plant material will address Goal 2 by limiting streambank erosion. These features also address Goal 4 by creating in- stream wildlife habitat, such as shelter for small fish and macroinvertebrates. The root wad weirs provide the most benefit followed by the log weirs and lastly rock weirs (such as bendway weirs).

#### Groundwater Protection

- Seal Old Wells
- Septic System Maintenance
- Overburden Soils Management
- Storage Tank Management
- Chemical Storage and Disposition
- Land Fill Management



Log Weirs

**Source: Trout Unlimited** 

In addition to groundwater protection gained by implementing the projects and practices above, the activities listed above are prioritized to ensure groundwater protection, addressing Goal 3.

- Layer Habitat Enhancements onto BMPs addressing other goals
- Restore and protect native habitat for target species
- Focus efforts in Primary and Secondary Priority Project Areas Green Infrastructure Network (GIN)

Wildlife habitat should be considered with every project and practice put into place. Depending on the best management practice providing the habitat, these efforts meet Goals 4 or 6. The planning participants also recognize wildlife habitat needs beyond the boundaries of the best management practices. A Green Infrastructure Network, focused on various watershed needs including wildlife habitat, has been developed for northwestern Illinois by Applied Ecological Services (now R.E.S.) as part of the Healthy Land and Water initiative. The Winneshiek Creek watershed is included within its boundaries.

#### Other Applicable Practices

Efforts of the community to implement this watershed plan will focus on the practices mentioned above. However, there are many available practices to choose from that are similarly effective as the focal practices. If a landowner or agency within the watershed would like to implement a practice that is different than the focus, we encourage and support all effective practices. Below are some examples that were also considered by planning participants but not selected to receive outreach and implementation focus:

- Vegetated Filter Strips (in rural areas)
- Vegetated Swales

- Floating Treatment Wetlands
- Water and Sediment Control Basins
- Livestock Exclusion
- Manure Handling Systems Management
- Lawn Care Practices

#### Modeled Practices

Of the above practices of focus chosen by the planning participants, five were used to quantify the objectives needed to meet the nutrient reduction targets. If the following practices were implemented, this watershed would be on track to meeting the 10-year interim standards set by the Illinois Nutrient Loss Reduction Strategy. These targets are to reduce phosphorus loads by 25% and nitrate-nitrogen by 15% within 10 years.

Although these practices were chosen to quantify the benefits of conservation, any of the practices listed above could be substituted to achieve similar results as desired by the landowners.

#### Site Specific Practices

- 1. Bioretention Area Runoff from 135 acres of Dakota and 40 acres of roads serviced
- 2. Filter Strip Runoff from 39 acres of Dakota serviced
- 3. No-till -2,391 acres of crop fields serviced
- 4. Wet Detention/Pond Runoff from 5.6 acres of feed lots serviced
- 5. Cover Crop 2,391 acres of crop fields serviced
- 6. Streambank Stabilization along 400 feet of streambank
- 7. Gully Stabilization along 1,300 feet of gullies

Total area serviced by BMPs = 2,572 - 5,042 acres (due to potential overlapping acres)

Anyone who is willing and able is encouraged to implement the practices listed above. The Village of Dakota and a couple of landowners have already wished to voluntarily implement a practice on their properties. Dakota sits at the top of the watershed and feeds into Winneshiek Creek. Residents experience flooding issues in localized areas of town, and there are open areas suitable to help release the pressure on the creek during storms. Furthermore, the Village's wastewater treatment plant is overworked, and taxpayers would benefit along with the creek if measures were put into place to relieve the treatment system. Landowner A's home overlooks a severely eroded stream that runs through their property before entering a neighbor's pasture. The eroded sections of the stream deposit sediment and nutrients into the stream during storm events, thus degrading the water quality and aquatic life. Landowner B raises goats and chickens on their 25-acre farm, which contains prairie meadows and forest. Eroded gullies have developed on the edge of the woodland where it meets the adjacent cropland, which deposits stormwater into the gullies that run through the forest. The runoff flowing through the gullies perpetuates erosion and carries sediment and excess nutrients downstream.

In order to address these issues, the Village of Dakota could implement bioretention within swales carrying water to Winneshiek Creek by incorporating check dams and native vegetation to slow and filter stormwater. They could create a larger bioretention basin with a filter strip within an open area in the

southeast corner of town. At the wastewater treatment plant, they would like to deter geese and add floating treatment wetlands to limit the amount nutrients and bacteria out letting into the creek. Landowner A would like to implement a streambank stabilization project and Landowner B would like to implement a canopy opening and gully stabilization project, both of which will reduce erosion and non-point source pollutants in the watershed and into Winneshiek Creek. In Section 4.2, we provide a more detailed explanation of the issues and the solutions available to each landowner. We hope this section will provide two exemplary case studies of how landowners can align with and benefit from the plan.

#### How do we accomplish the recommended projects and practices?

To construct the recommended projects and practices throughout the watershed will take time, money, and expertise. The possibilities are greater than what can reasonably be expected by the community. Therefore, stakeholders decided what priority projects they would like to accomplish within a ten-year time frame, resulting in the amounts stated above for each project. However, there is help out there! The main sources of technical and financial support to implement this watershed plan are:

- Several agencies will accept grant applications for the implementation of projects. To name a few, Illinois Environmental Protection Agency's Section 319 and GIGO programs address water quality, ComEd Green Region Grants address pollinator habitat and nature-based solutions to climate resiliency, and the Illinois Department of Natural Resources promotes recreation with their Open Space Lands Acquisition and Development grants.
- The Natural Resources Conservation Service in partnership with Trout Unlimited desires to implement streambank stabilization projects within this watershed. Interested streamside landowners could get involved through the Streambank Stabilization and Restoration Program (SSRP).
- The Natural Resources Conservation Service and Soil and Water Conservation District also have a selection of conservation programs available to agricultural producers.
- The Natural Land Institute partners with landowners to protect land from future development with conservation and agricultural easements, ensuring natural areas and farmland in perpetuity. There may be grant opportunities to purchase the easements.
- Olson Ecological Solutions is available to match landowners with grant opportunities and organizations that can assist with grant writing.

Several private foundations and public entities also exist with missions aligned with this watershed plan and a focus within the watershed's geographic location. Further technical and financial resources can be found in section 5.4 and 5.5.

#### What should we do next?

Now that we have a watershed plan, we strive to implement it over the next ten years. Help us to keep the plan alive. Become involved. For more information, contact the Natural Resource Conservation Service, Natural land Institute, Stephenson Soil and Water Conservation District, Blackhawk Hills Regional Council, Trout Unlimited, Illinois Environmental Protection Agency's Bureau of Water, Olson Ecological Solutions, or a friend or neighbor who was instrumental in the planning process.

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