Analysis and Management Plan

for

The Upper Ahnapee River Watershed

Photo: Brian Forest

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Prepared by:

Door County

Soil and Water Conservation Department

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Executive Summary

The Ahnapee River originates in a wetland complex in Southern Door County and travels 14.7 miles to its outlet to Lake Michigan in the City of Algoma, Kewaunee County. The Door County portion of the Ahnapee River is approximately 8.5 miles in length and averages approximately 25 feet in width. The Forestville Millpond is situated north of the county line and was formed in 1877 by the creation of a dam and impoundment of approximately 94 acres of surface water.

The watersheds in Door County that contribute to the Ahnapee River in Door County total approximately 31,200 acres and are made up of 53% agricultural activities. An analysis of the land use, as well as computer modeling of sediment and nutrient loads, highlights the primary driver of pollutant loading as agricultural sources.

This plan focuses on the portion of the Ahnapee River Watershed that lies geographically within Door County. Kewaunee County has produced a similar plan for the southern portion of the watershed which comprises approximately 55,890 acres. The Kewaunee County plan is structures similar to this plan in that it identifies pollutant loading, sources of those loads and outlines a plan with measurable milestones to reduce those loads.

There are several monitoring locations throughout the watershed, including stations monitored for the Northeast Lakeshore Total Maximum Daily Loading study as well as reference points for the Wisconsin DNR's Wadeable Trend Reference Streams. Data from these stations was referenced in this plan, as well as a comprehensive study of the Forestville Millpond which allowed for water chemistry analysis in 2017 and provides the most comprehensive data available. 25% of the upstream samples taken throughout the summer exceeded the established stream threshold for Total Phosphorus concentrations, while two out of the three samples taken in the Millpond exceeded the acceptable threshold for waterbodies such as the Millpond. Temperature within the Ahnapee River and the Millpond did not rise above tolerable levels on dates sampled, but Dissolved Oxygen levels dropped below established thresholds several times throughout the sampling season. The measured concentrations of Total Phosphorus and Chlorophyll, as well as established water clarity measurements place the Forestville Millpond in the category of a Eutrophic waterbody.

Results of the bathymetric study show that the Millpond is extremely shallow. A surface area of 94 acres was surveyed and the maximum depth was determined to be approximately 6 feet with the average depth being 2.9 feet and 92% of the waterbody falling under 3 feet of depth. Additionally, sediment cores revealed one to two feet of accumulated muck at the bottom of the Millpond. This represents a very shallow system with an abundance of unconsolidated sediments with high concentrations of Total Phosphorus that are easily stirred up and contribute to poor water clarity conditions.

Implementation of Chapter 23 of the Door County Code has allowed for inventory of 46% of the ag-related parcels within the Upper Ahnapee River Watershed for determinations of compliance with Agricultural Performance Standards and Manure Management Prohibitions outlined in Chapter NR 151, Wisconsin Administrative Code. Future efforts will target agricultural parcels that have not yet been inventoried and those that have a current noncompliant status.

The goals established for this plan have the overarching purpose of improving and sustaining water quality and habitats throughout the Ahnapee River Watershed. In summary, they are as follows:

- Improve and maintain the drinking water supply within the Upper Ahnapee River Watershed to acceptable State standards.
- Protect and improve the surface water resources of the Upper Ahnapee River Watershed from nonpoint source pollution and maintain acceptable State surface water quality standards.
- Maintain the ecological integrity of the Ahnapee River Corridor, including associated upland forest habitat and wetlands.

The direction taken by the SWCD in addressing these goals will be through a series of activities, long and short-term, that will be implemented through existing and future programs as well as through assistance to both voluntary and regulated landowners.

The monitoring and evaluation of the conditions in the Upper Ahnapee River Watershed will be an ongoing effort over the next five years, and beyond. The purpose will be to evaluate the effectiveness of activities identified within this plan at meeting the stated goals. Once appropriate, the strategy for monitoring and evaluation will incorporate the following elements:

- Administrative review and tracking
- Monitoring of surface water chemistry
- Monitoring of groundwater resources
- Pollutant load monitoring
- Progress meeting activities and milestones

The fiscal support of the SWCD, from combinations of both County sources and external grant funds, is anticipated to continue for the duration of the implementation of this Upper Ahnapee River Watershed plan. SWCD will continue to actively seek grants that support county-wide program efforts that will also assist in meeting this plan's goals.

To achieve the objective of improvement and protection of water quality, Information and Education elements associated with this plan will be structured around the following:

- Increased understanding of the sources and impacts of water impairment, especially nonpoint pollution, and the consequence to the Ahnapee River Watershed
- Increased awareness and understanding of best management practices appropriate for the Upper Ahnapee River Watershed, including their results in water quality improvement

1. Background

Location and Municipalities

Door County covers most of a narrow peninsula that extends into Lake Michigan to form Green Bay. The Door County portion of the Ahnapee River Watershed comprises portions of the Townships of Gardner, Nasewaupee, Forestville and Brussels and the Village of Forestville (see Figure 1-1).

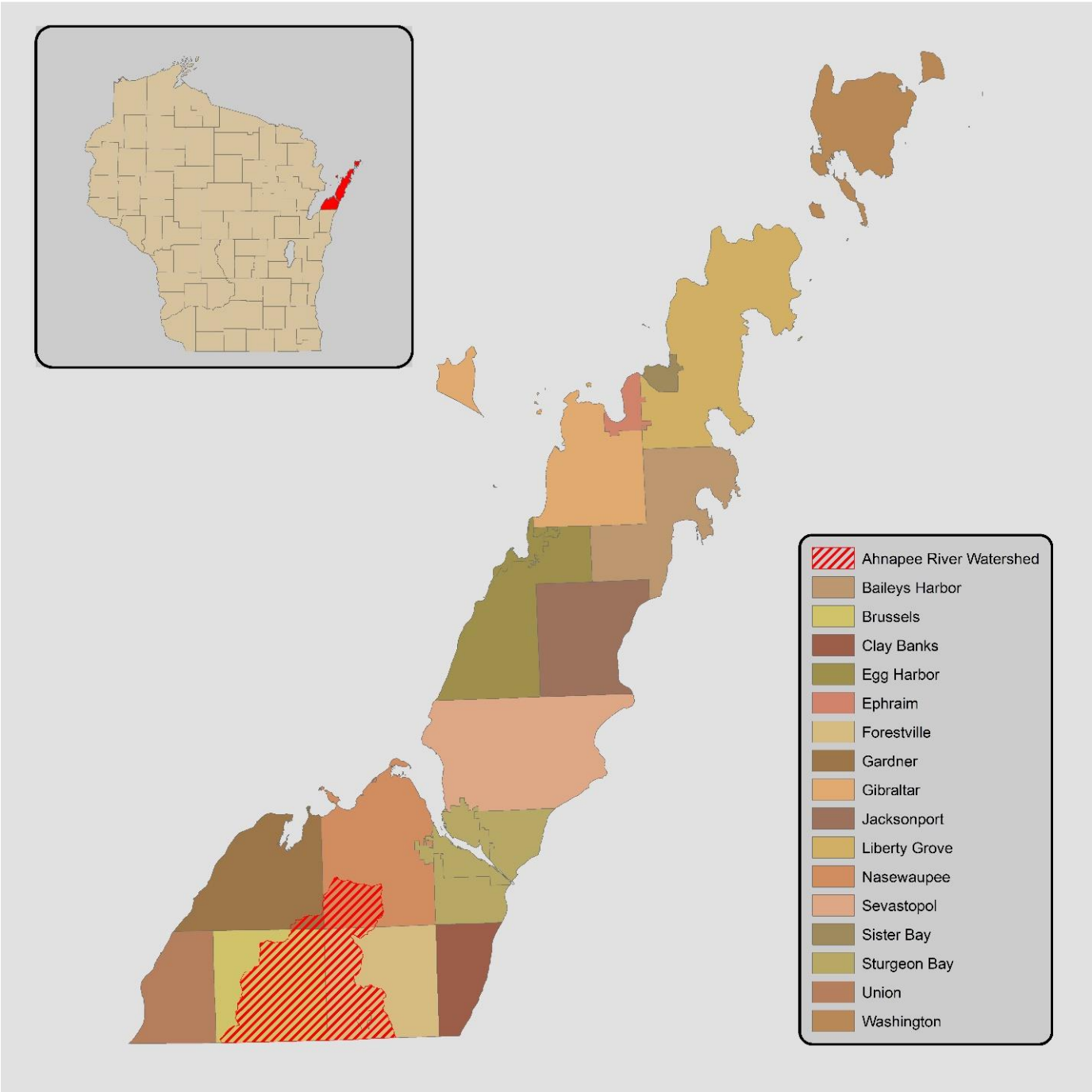

Figure 1-1. Door County Location and Municipalities.

The Ahnapee River is 14.7-miles in length. It originates in southern Door County and flows southeast through Kewaunee County and enters Lake Michigan at the City of Algoma (Figure 1-3). For the purpose of this plan, the primary focus will remain on the portion of the Ahnapee River that is located in Door County, the Upper Ahnapee River Watershed comprising approximately 34,000 acres.

The Door County portion of the Ahnapee River is approximately 8.5 miles in length and averages approximately 25-feet in width. The Ahnapee originates in a wetland and spring complex and is fed by several tributaries along its course. This plan will focus on eleven subwatersheds that comprise the Door County portion (see Figure 1-2). The School Road, Lincoln School and Maplewood Swamp Subwatersheds enter an unnamed tributary from the north. The confluence of the Northern Tributary Subwatershed with the Ahnapee River is south of County H in the Township of Brussels. Silver Creek enters the Ahnapee River near Highway 57 in the Township of Brussels. An unnamed tributary from the east also enters the Ahnapee River in the Township of Brussels near Curve Road. This upper portion of the Ahnapee River enters the Forestville Millpond northwest of the Village of Forestville. The Millpond outlets to the lower portion of the Ahnapee River and subsequently enters Kewaunee County. The Black Ash Swamp and a small tributary on the county line have contributing watersheds to the Ahnapee River with their confluence occurring in Kewaunee County.

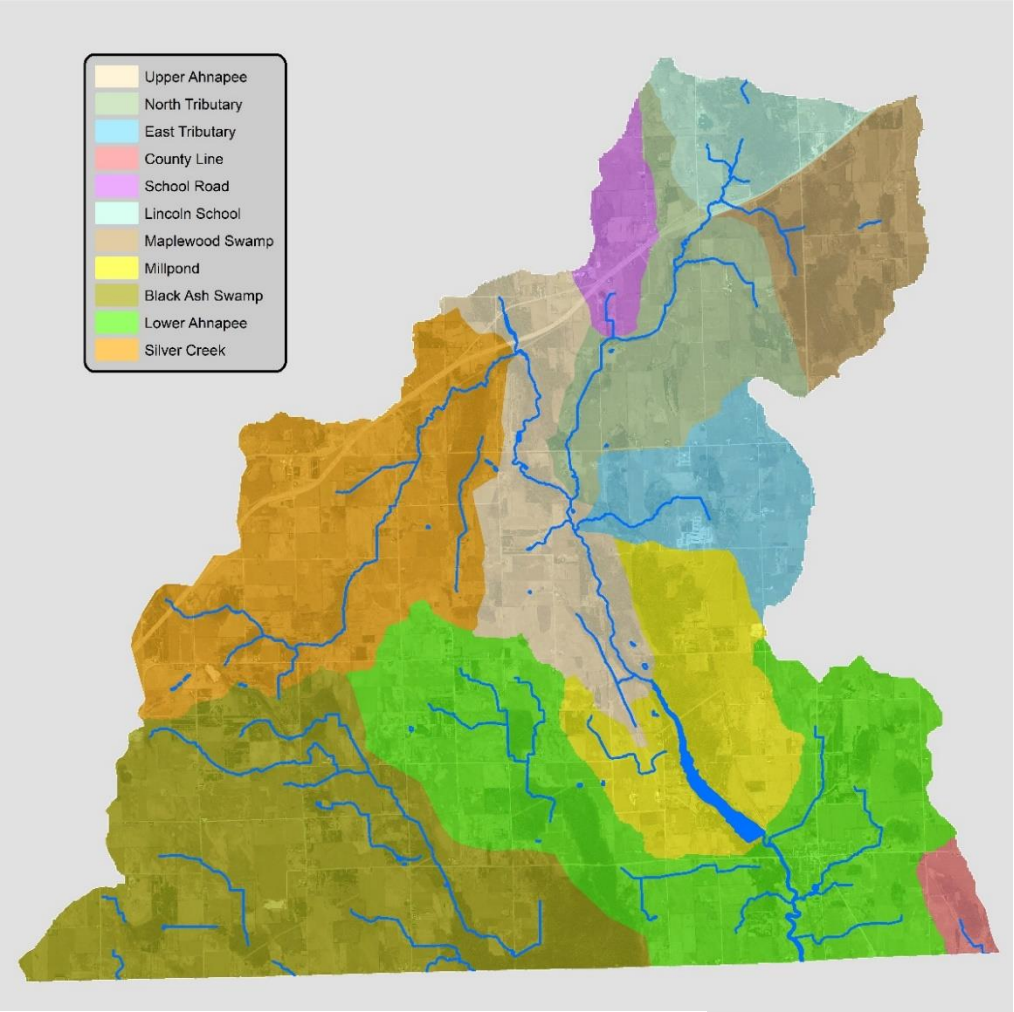

Figure 1-2. Ahnapee River Subwatersheds in Door County.

Ahnapee Watershed

The portion of the river that flows through Kewaunee County totals approximately six miles in length and drains a watershed of approximately 55,890 acres. Similar to the assessments made for this plan, the Kewaunee County Land and Water Conservation Department has established characteristics of the subwatersheds draining to the Ahnapee River (see Figure 1-3), such as land use and sources of pollution. The Kewaunee County plan for the lower portion of the Ahnapee River likewise identifies opportunities for pollutant load reduction and estimates those reductions through a series of activities with measurable milestones.

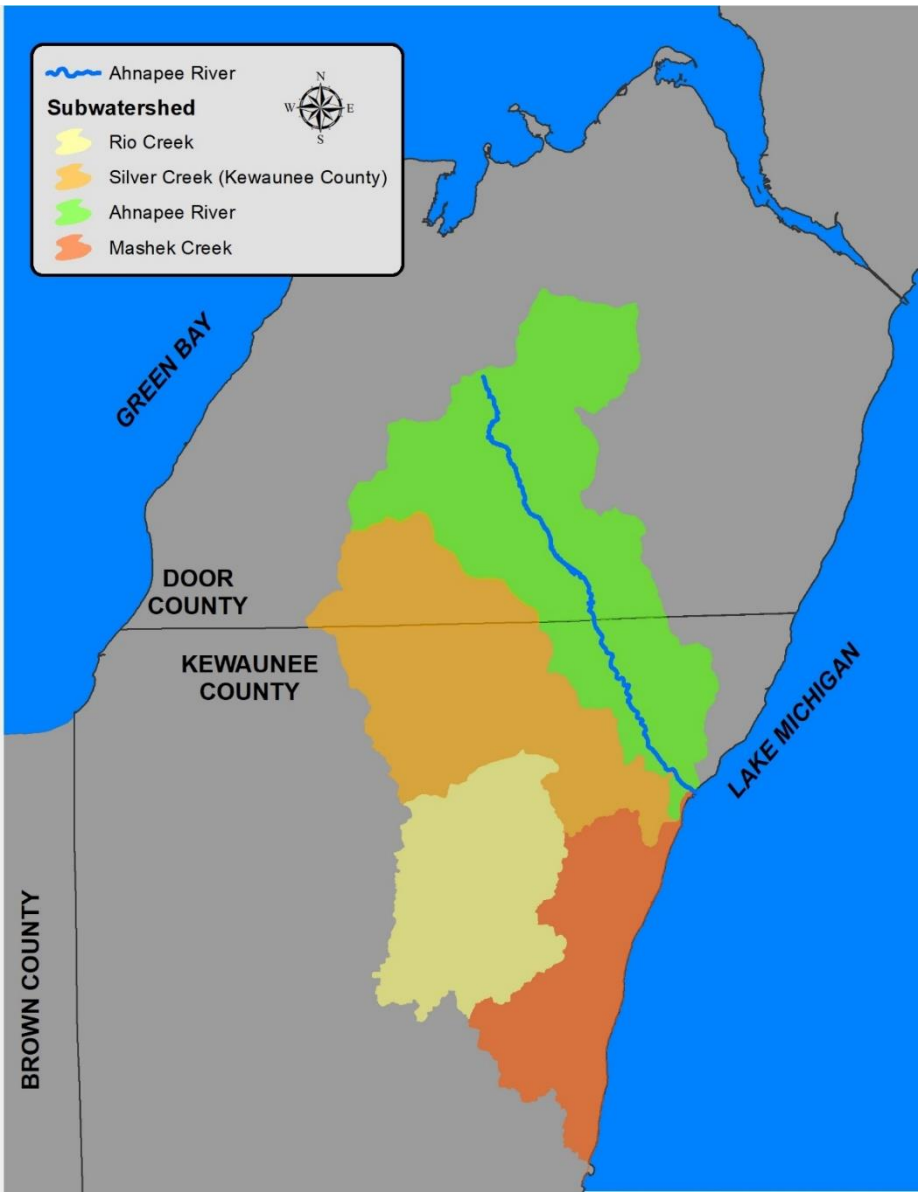

Figure 1-3. Ahnapee River Watershed

Goals, objectives and load reductions identified in the Kewaunee County plan are similar to those identified in this plan. A joint effort between the counties of Door and Kewaunee is necessary to improve the quality of both surface and groundwater throughout the entire Ahnapee River Watershed.

Bedrock

The peninsula on which Door County is situated is a cuesta with a west-facing scarp and eastward dipping back slope that forms the western portion of the Niagaran Escarpment, which is a remnant reef complex consisting of Silurian and Ordovician-aged dolostones and shales. The watershed for the Ahnapee River is underlain by Silurian dolostones (see Figure 1-4).

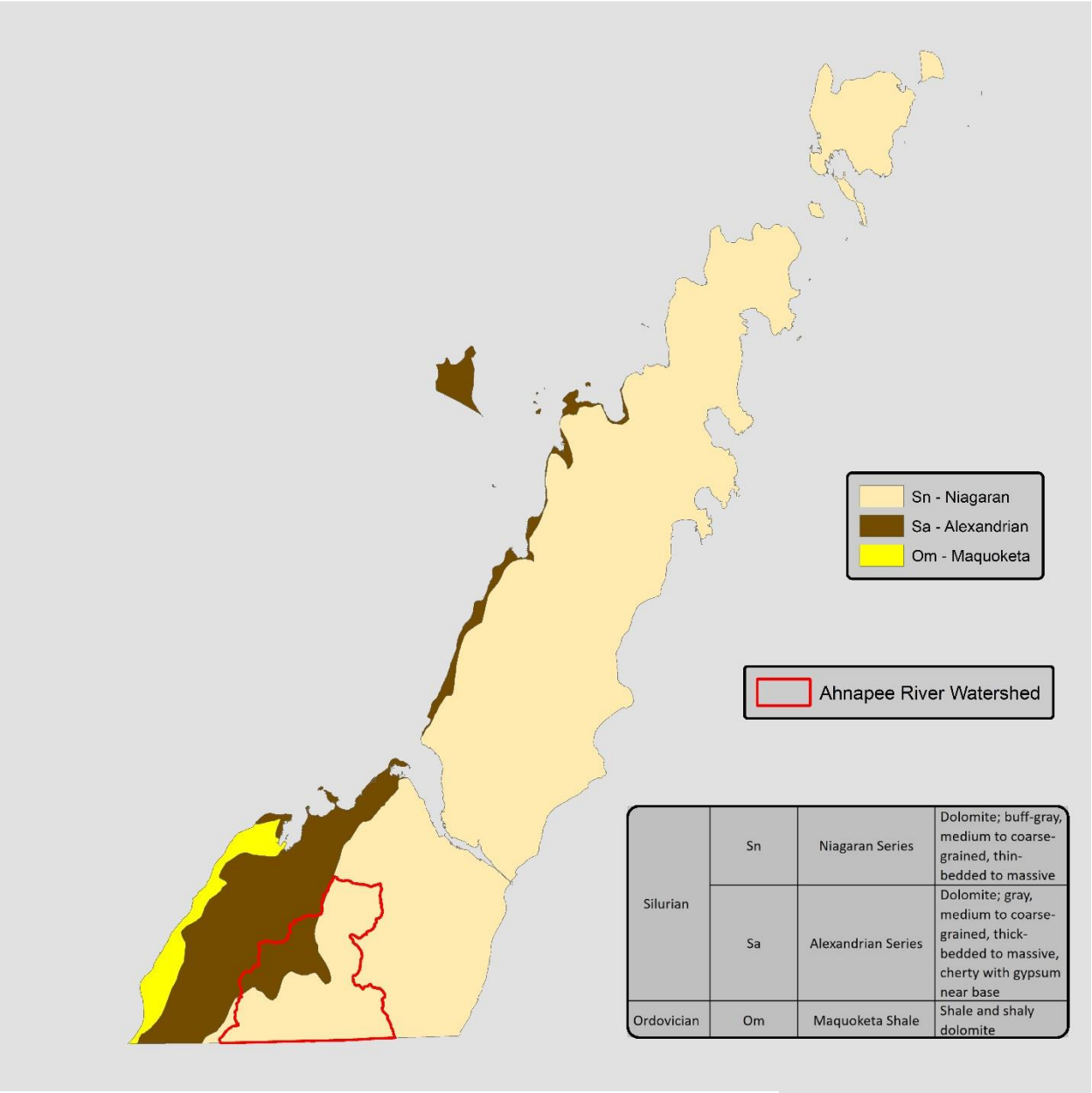

Figure 1-4. Generalized Bedrock Map.

The Silurian-aged dolostone is a calcareous rock with high concentrations of magnesium. Below the Silurian dolostone lies Ordovician-aged dolostones and shales (see Figure 1-5). Underlying the Ordovician units are the sandstones of the Cambrian. The dolostone is highly fractured and modified through dissolution by water. Solution activity has produced enlarged vertical crevices and horizontal bedding planes as well as a prominent karst landscape. Karst features or solution features such as

sinkholes, swallets, and collapse features, are numerous throughout the county and are potential conduits for surface water to enter the aquifer with little filtration or attenuation of contaminants before it enters the drinking water supply (see Figure 1-6). The nature of the bedrock combined with very shallow soils provides little filtration of contaminants entering the drinking water supply.

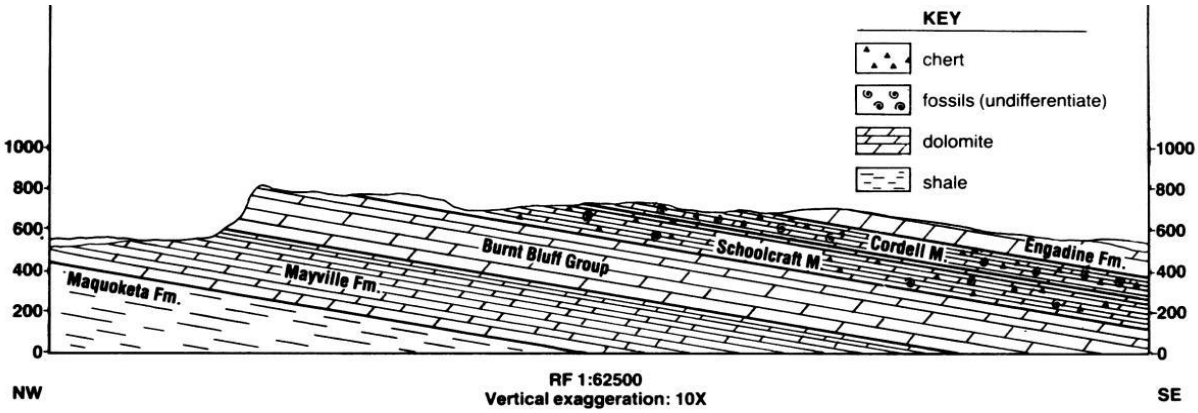

Figure 1-5. Generalized Geologic Cross-Section.

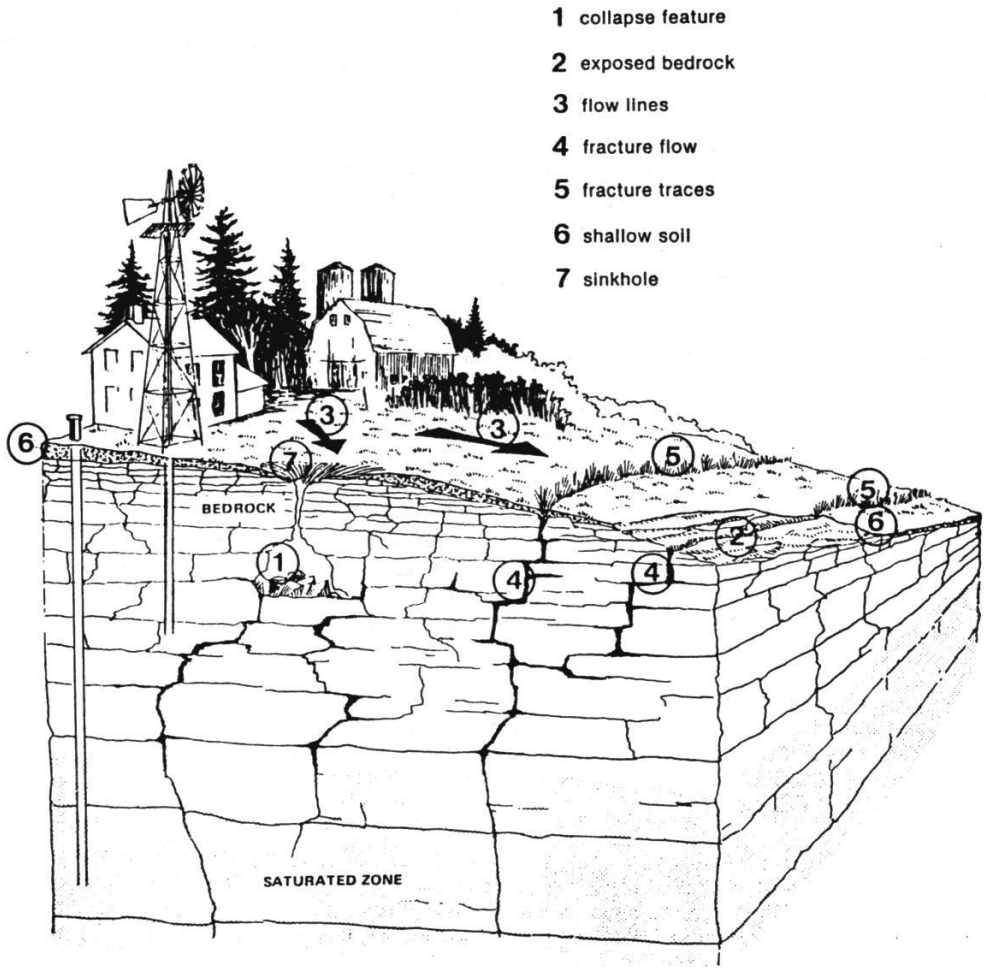

Figure 1-6. Typical Karst Cross-Section with Common Solution Features.

Glacial Geology

During the Pleistocene epoch, the Door County Peninsula was glaciated numerous times. During these glacial advances, the Green Bay Lobe expanded in a southeasterly direction out of the present day Green Bay Basin and across the entire peninsula as the Lake Michigan Lobe advanced on the east side (see Figure 1-7). Through subsequent advance and retreat of the ice lobes, the existing Great Lakes basins were shaped. As ice lobes melted and receded to the northeast, a series of proglacial lakes formed and drained through numerous outlets at various elevations. Glacial Lake Oshkosh formed approximately 13,000 years before present and first drained southward into the Lower Wisconsin River valley, then drained through four successively lower outlets to the Lake Michigan Basin (see Figure 1-8). These outlets were through the valleys of the current West Twin River, Kewaunee River, Ahnapee River and finally Sturgeon Bay. The drainage through the Ahnapee River valley outlet shaped the current watershed (see Figure 1-9).

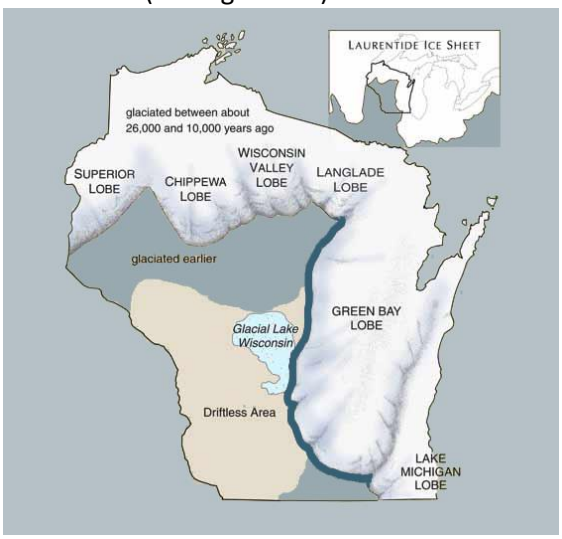

Figure 1-7. Late Wisconsin Glaciation Ice Lobes.

Figure 1-8. Proglacial Lake Oshkosh.

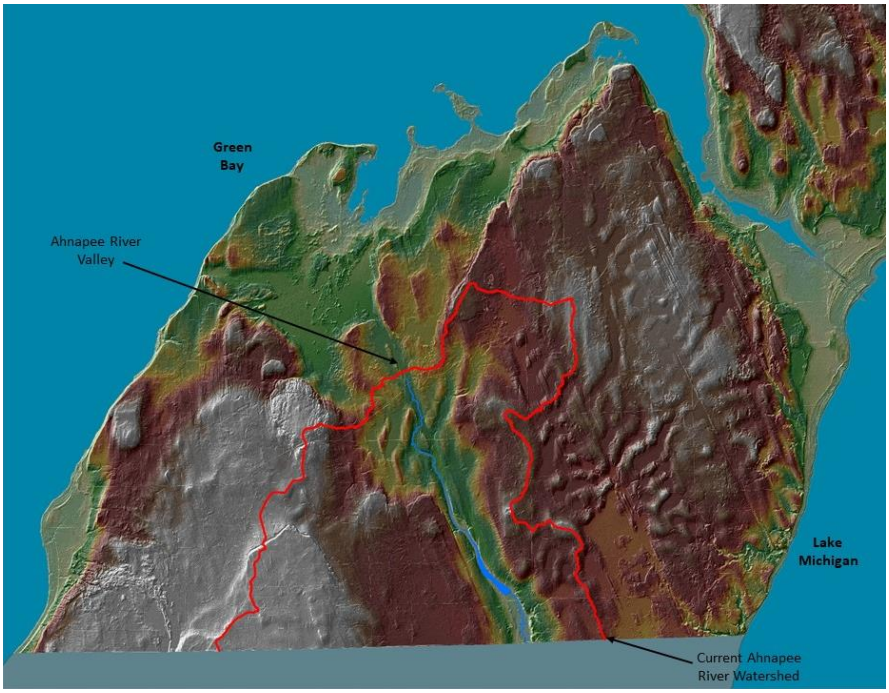

Figure 1-9. DEM of Current Ahnapee River Valley in Door County.

Soils

The soils of Door County originate from glaciation, bedrock weathering, and fluvial activity. The majority of the soils are formed in glacial till, but a smaller portion is also formed in outwash sand and gravel or lacustrine sediment. Due to the calcareous nature of the parent material from which they originated, the soils of Door County are characteristically alkaline. The Liberty Grove Member, a thin till unit of buff-colored pebbly loam with a high carbon content, is the prominent till type deposited in Northern Door County during the older Woodfordian glacial advance. The second recorded advance, the Greatlakean, deposited a fine-grained reddish till referred to as the Glenmore till throughout the southern part of the county. Many of the soils of the county are very shallow, especially in the northern two-thirds of the peninsula. Soils are generally deeper in the southern part of the county, especially in deposits found in valleys like the Ahnapee River Watershed. 9% of the soil in the watershed is less than 24 inches in depth, 17% of the watershed has soil depth to bedrock between 24 and 60 inches and 74% of the watershed has soil depths greater than 60 inches to bedrock (see Figure 1-10).

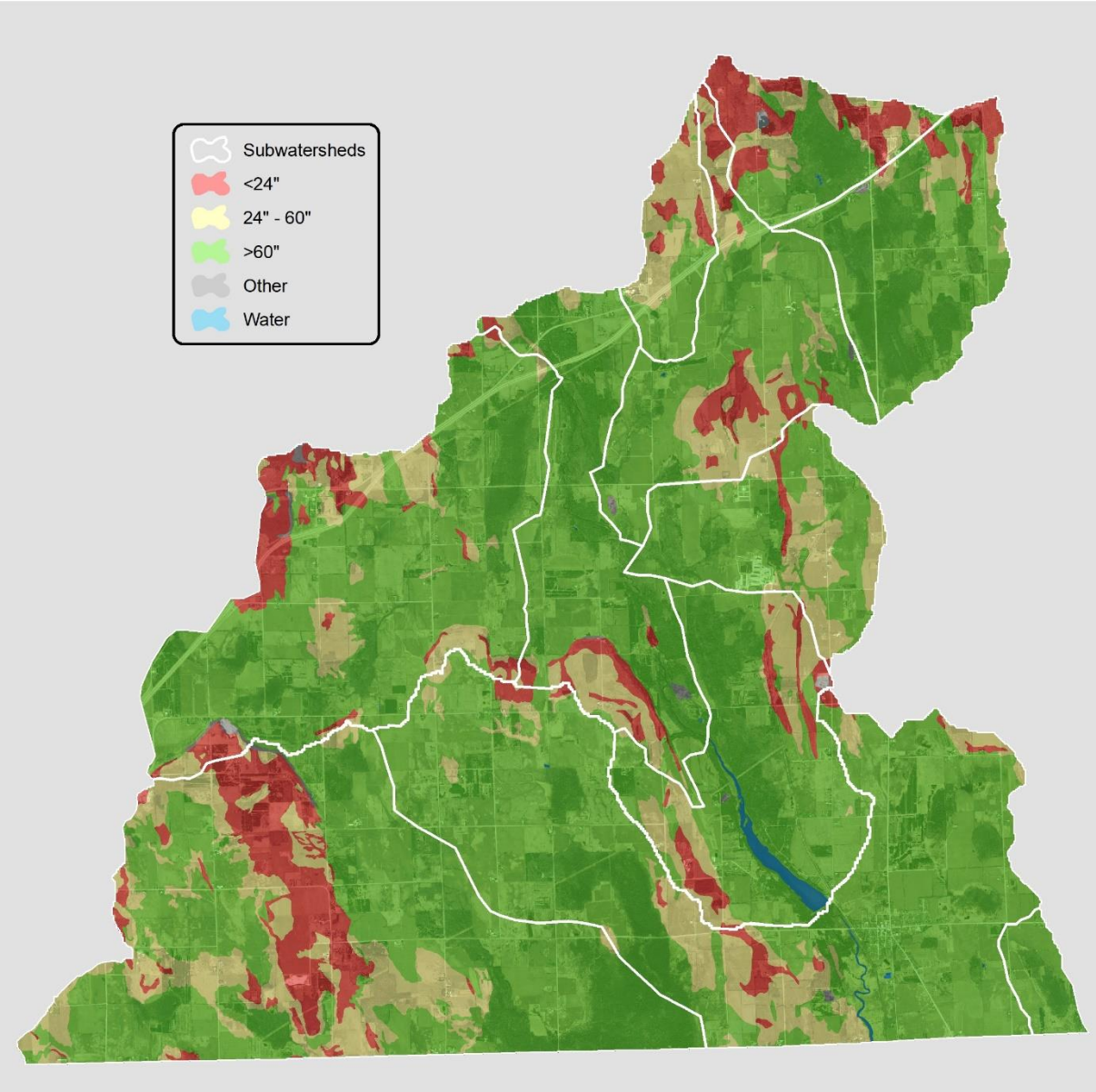

Figure 1-10. General Soil Depth to Bedrock – Based on Mapped Soil Type.

Soil Associations

There are 75 different soil types found throughout Door County. Soil types with similar inherent properties are grouped into six general soil associations. These representative soil associations can be found throughout the Upper Ahnapee River Watershed (see Figure 1-11).

These six soil associations can be used to determine the large-scale suitability for certain types of land use, planning, and management. The six major soil associations found in the Upper Ahnapee River Watershed are:

- Summerville-Longrie-Omena association:
    - Occupies approximately 18% of the Upper Ahnapee River Watershed; found mostly in northern Door County.
    - Shallow to deep, well-drained, nearly level to moderately steep soils that have a sandy loam or loam subsoil over sandy loam, fine sandy loam till, or dolostone bedrock.
- Emmet-Solona-Angelica association:
    - Occupies approximately 45% of the Upper Ahnapee River Watershed.
    - Deep, well-drained to poorly-drained, nearly level to sloping soils that have a loamy sand to silt loam subsoil over sandy loam or loam till.
- Rousseau-Kiva-Markey association:
    - Occupies less than 1% of the Upper Ahnapee River Watershed; mainly found along the eastern shore of Door County and in southern Washington Island.
    - Deep, well-drained and moderately well-drained, and gently sloping and sloping soils that have a fine sand or sandy loam subsoil over sand or sand and gravel outwash; and very poorly drained, nearly level organic soils.
- Kewaunee-Kolberg-Manawa association:
    - Occupies approximately 25% of the Upper Ahnapee River Watershed.
    - Deep and moderately deep, well-drained and somewhat poorly drained, nearly level to moderately steep soils that have a dominantly silty clay subsoil over silty clay till or dolostone bedrock.
- Deford-Yahara Variant-Carbondale association:
    - Occupies approximately 2% of the Upper Ahnapee River Watershed; found in the Mink River and northern Baileys Harbor areas and the eastern half of the canal.
    - Deep, poorly drained, nearly level soils that are underlain by fine sand outwash or that have a silt loam subsoil over stratified lake sediments; and very poorly drained, nearly level organic soils.
- Carbondale-Cathro association:
    - Occupies approximately 8% of the Upper Ahnapee River Watershed.
    - Very poorly drained, nearly level organic soils (poorly drained mucks).

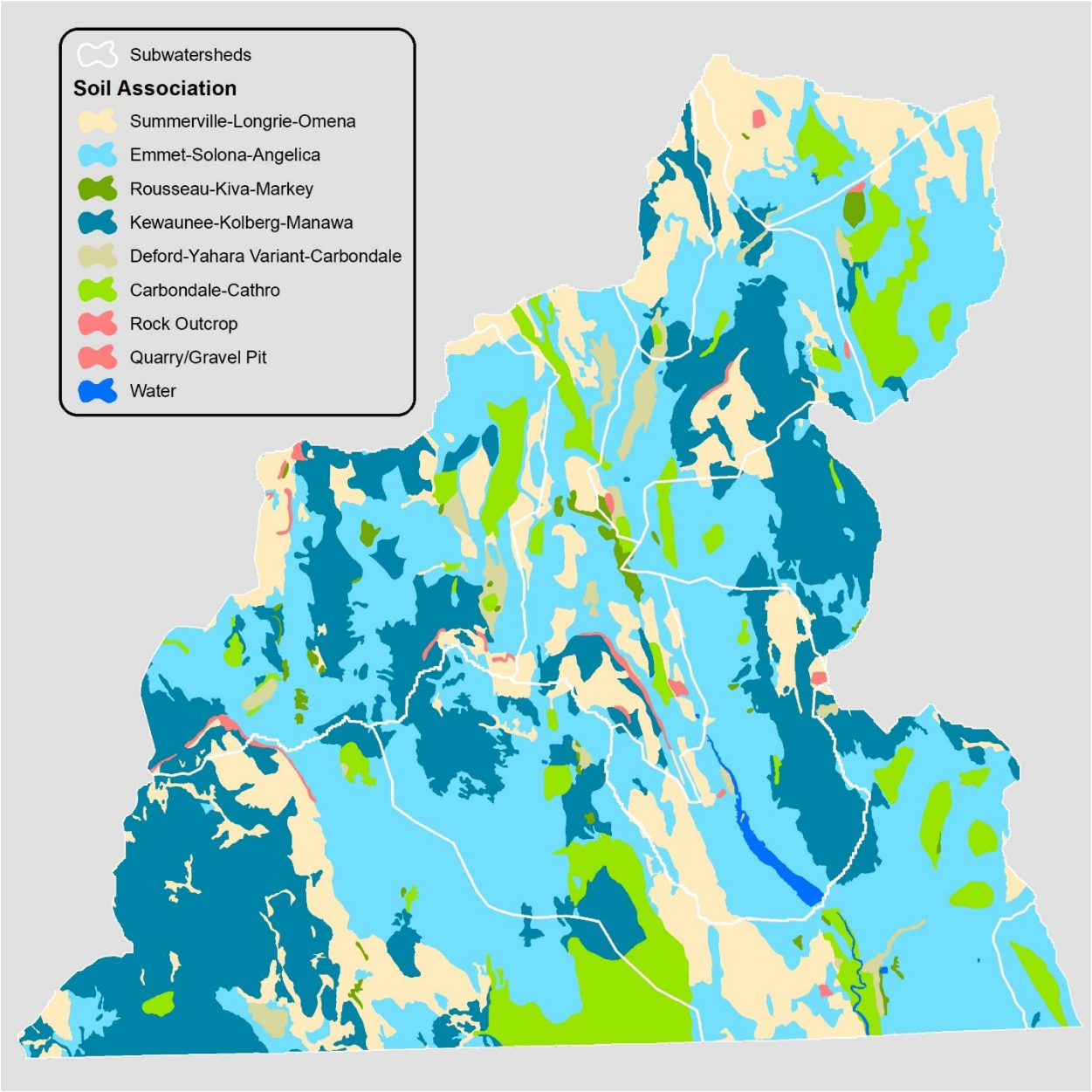

Figure 1-11. General Soil Associations.

Hydrologic Soil Groups

Hydrologic soil groups are based on an estimate of runoff potential based on soil characteristics. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission. Group A soils make up less than 1% of the Upper Ahnapee River Watershed.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission. Group B soils constitute approximately 30% of the watershed.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission. Group C soils are the largest group and make up approximately 43%.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission. Group D soils make up about 11% of the watershed landscape.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes. Approximately 8% of the watershed is made up of A/D soils and 6% is made up of B/D soils. The breakdown of Hydrologic Groups is shown in Chart 1-1 and the distribution is portrayed in Figure 1-12.

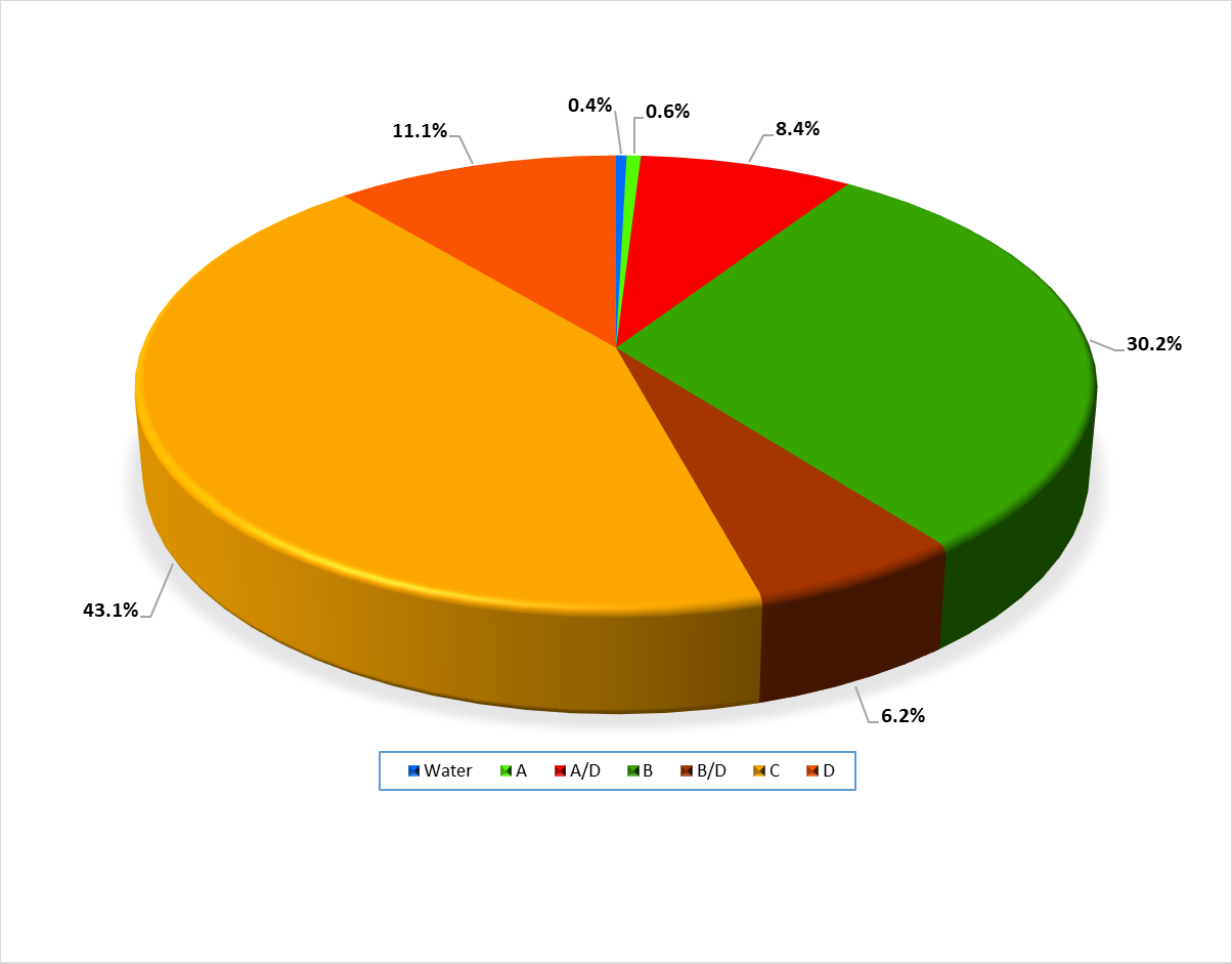

Chart 1-1. Hydrologic Soil Groups.

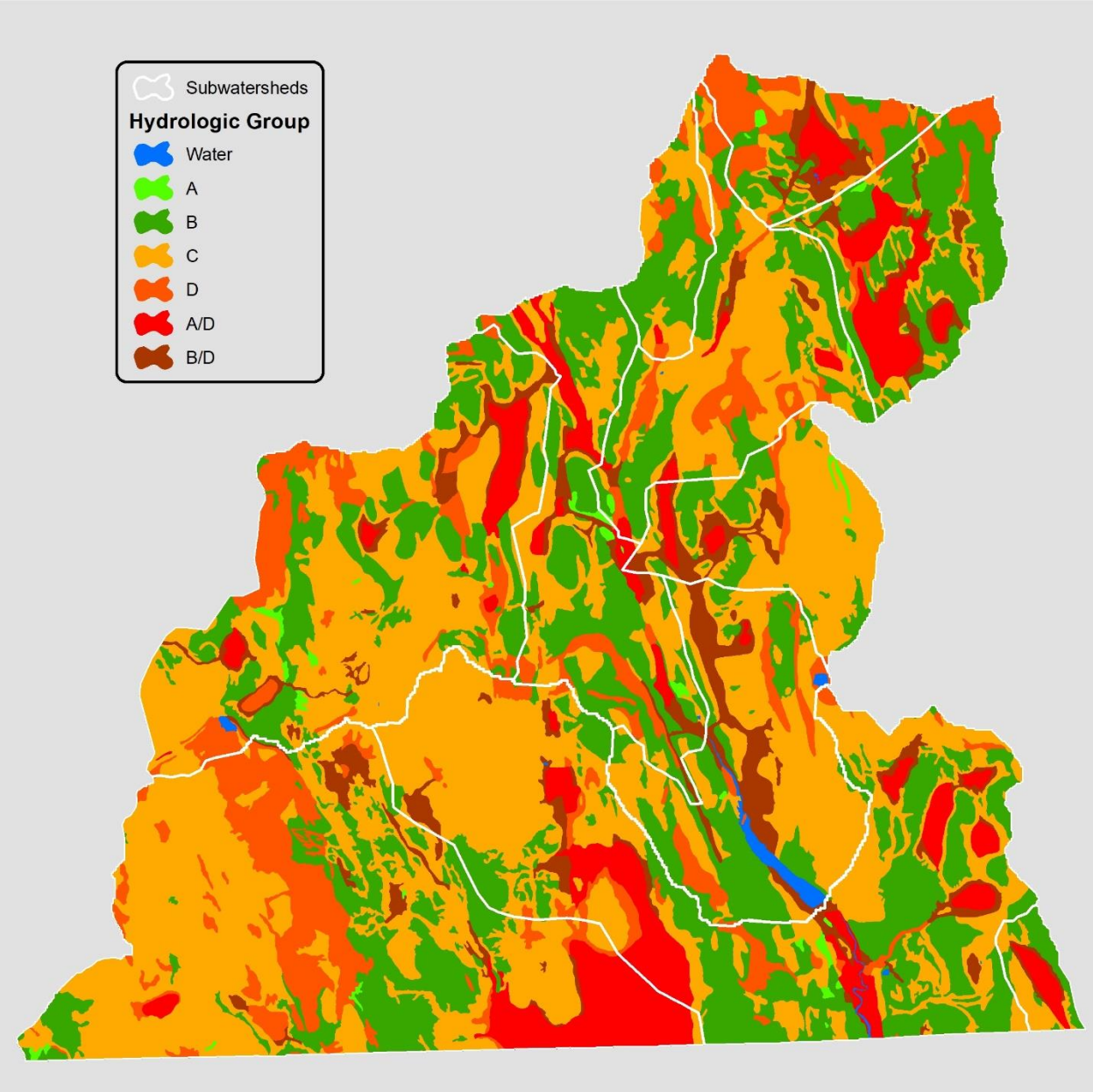

Figure 1-12. Distribution of Hydrologic Soil Groups.

Wetlands

By definition, a wetland can be defined as ”an area where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation, and which has soils indicative of wet conditions” [s. 23.32(1), Wis. Stats.]. Wetlands in Door County, and throughout Wisconsin, play an important role in both preservation of critical habitat and protecting both water quality and quantity. Wetlands are largely distributed throughout the Upper Ahnapee River watershed in headwaters and along stream corridors (see Figure 1-13). Wetlands in the watershed are dominated by forested and emergent/wet meadow types (see Chart 1-2). Wetlands in the Upper Ahnapee River Watershed account for 12% of all Door County wetlands.

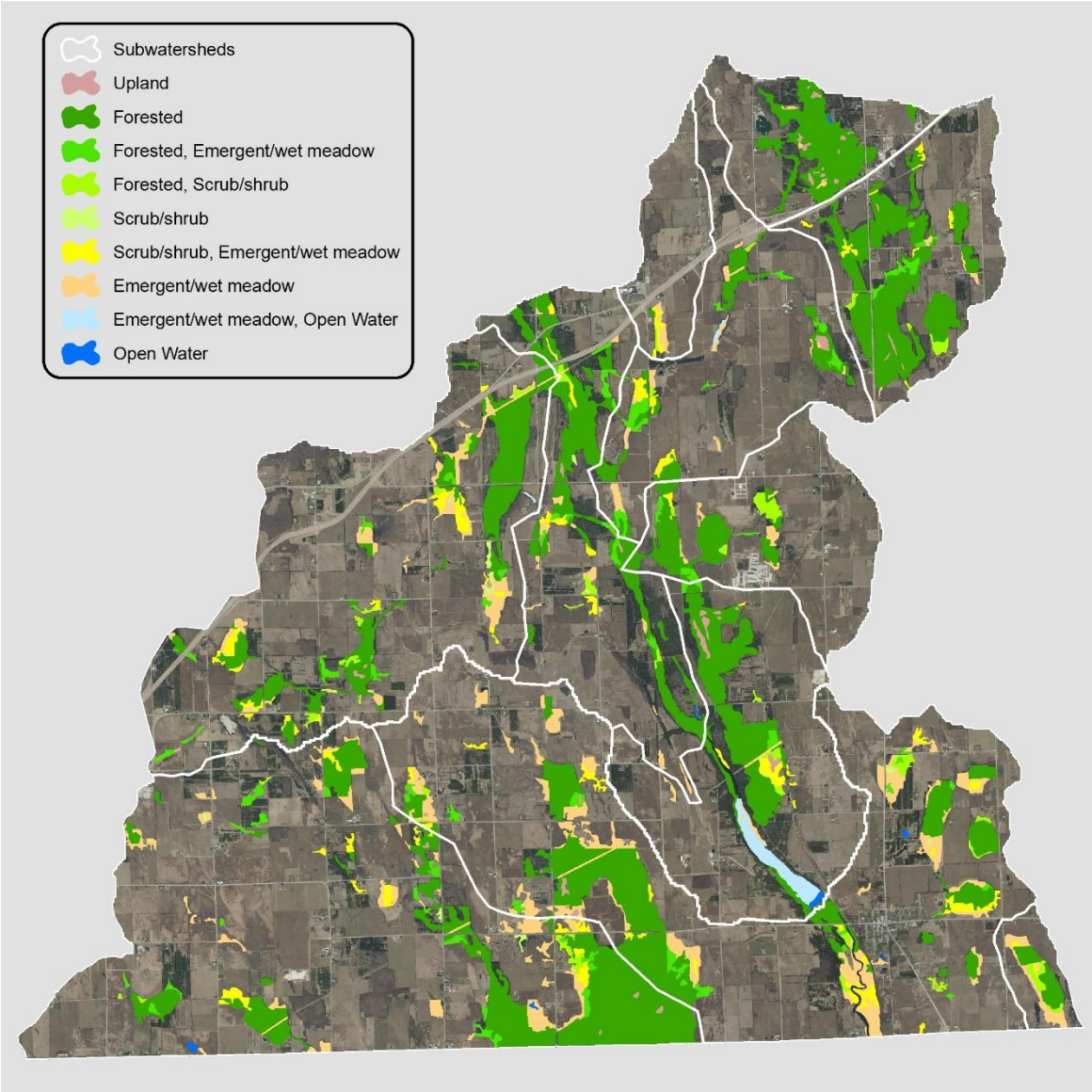

Figure 1-13. Location and Classification of Wetlands

Upland Areas – These are areas surrounded by wetlands or areas that are generally segregated from wetlands, or may be right at the boundary of wetland conditions, where the water table is not close enough to the surface to satisfy the requirements of other wetland complex types. These sites can many times be characterized by raised hummocks resulting from shallow rooting in response to saturated soil conditions. Plant species in upland areas are typically those found in non-wetlands, but can be found there occasionally.

Forested – Often referred to as swamps, this wetland type is dominated by trees. Common types of forested wetlands are coniferous swamps, lowland hardwood swamps, and floodplain forests. Soils in forested wetlands are typically wet in spring and early summer, but may dry up later in the year. Forested ephemeral ponds are important systems that are generally small, shallow, poorly-drained basins that provide critical habitat within wetland systems. This wetland type can include bogs and forested floodplain complexes comprised of species such as tamarack, white cedar, black spruce, elm, black ash, green ash and silver maple.

Scrub/Shrub – Dominated by woody vegetation that ranges from true shrubs and young trees to small trees and shrubs that may have been stunted due to their growing conditions. These types of wetlands

can demonstrate a phase of succession, leading to a Forested Wetland, or they can represent a relatively stable community. Scrub/shrub wetlands can include bogs and alder thickets that are characterized by woody shrubs and small trees such as tag alder, bog birch, willow and dogwood.

Emergent/Wet Meadow – These wetlands are generally typified by frequent of continuous inundation and are dominated by plants that are typically rooted underwater and emerge into the air. Vegetation in an emergent wetland is typically present for most of the growing season in an average year. If there is not standing water present, these systems will at least maintain saturated soil conditions. Sedges, grasses and reeds often dominate these systems and they can also be home to blue flag iris, marsh milkweed, mint and various species of goldenrod and aster.

Open Water – These areas are characterized by lakes, ponds and unvegetated river sloughs that are six feet or less in depth. Open water settings are generally absent of aquatic emergent and terrestrial vegetation species but are dominated by plants that grow principally on or below the surface of the water. Species found in this setting often include pondweed, duckweed, lotus and water lilies.

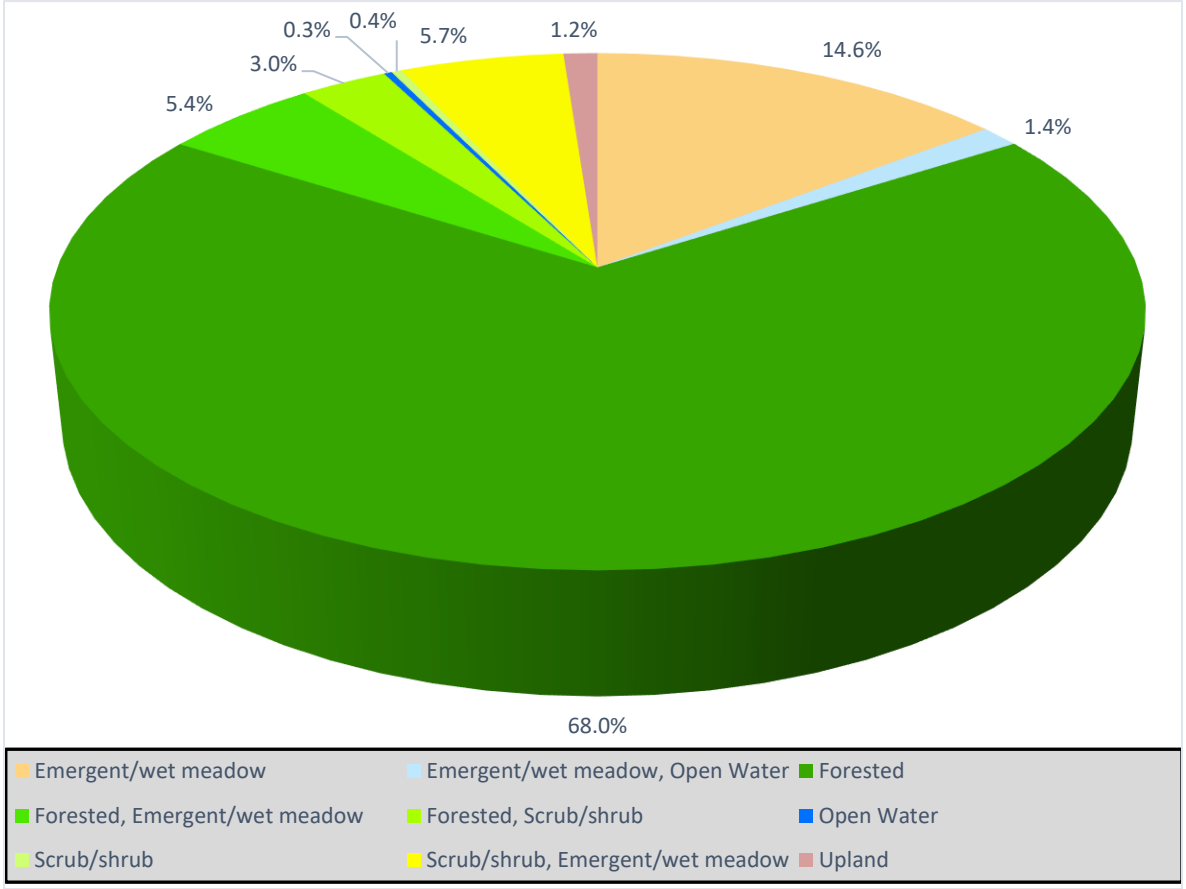

Chart 1-2. Distribution of Wetland Types.

Surface Water Resources

Ahnapee River – Above the Forestville Dam

The main branch of the Ahnapee River is 8.5-miles in length within Door County boundaries and averages twenty-five feet in width, with a gradient of 7.7-feet/mile. The headwaters of the Ahnapee River consist of springs and waters flowing from Silver Creek. Many portions of the Ahnapee's 18.2-surface acres tend to become stagnant in times of low flow. Along its course there are also intermittent areas that can limit recreational use. Near the Village of Forestville the river is impounded by the Forestville Dam and creates the Forestville Millpond, the focus of a 2017 Lake Planning Grant project to establish current conditions and establish future management options The Ahnapee River is classified as a warmwater sport fishery for its entire length and experiences seasonal runs of Lake Michigan trout and salmon up to the dam in Forestville (Hogler et al 2004).

The Ahnapee River has been a 303(d) listed water for PCB contaminants since 1998 and was assessed during the 2018 listing cycle; new total phosphorus, biological (macroinvertebrate and fish Index of Biotic Integrity (IBI) scores), and temperature sample data were clearly below thresholds for the Fish and Aquatic Life use. Based on that data, the segment of the Ahnapee River above the Forestville Millpond will not be proposed to be added to the 2020 303(d) impaired waters list for Total Phosphorus (WDNR personal communication).

Forestville Millpond

In 1877, a dam was constructed on the Ahnapee River, creating the Forestville Millpond. The Millpond has a surface area of approximately 94 acres with a maximum depth of approximately 6 feet and an average depth of 2.9 feet. Due to many years of poor water quality, a comprehensive lake planning grant project was done in 2017 to establish current conditions and provide information for future decision-making.

A bathymetric study revealed that the Millpond is extremely shallow with 92% of the waterbody falling under 3 feet of depth. Additionally, sediment cores revealed one to two feet of accumulated muck at the bottom of the Millpond. This represents a very shallow system with an abundance of unconsolidated sediments that are easily stirred up and contribute to poor water clarity conditions. Sediment cores also revealed high concentrations of Total Phosphorus in the accumulated sediments, illustrating many years of nutrient and sediment loading. Cores also demonstrated elevated levels of oil and grease, and some samples showed traces of heavy metals, but not at thresholds to warrant concern. Overall, sediments in the Millpond represented a silt loam deposition and nutrient levels showed impairment, but not to the point of being problematic for disposal off-site. Information pertaining to the sediment cores from the 2018 Comprehensive Lake Management Planning Grant Final Report for the Forestville Millpond can be viewed in Appendices B and C.

Water chemistry was performed upstream and within the Millpond. 25% of the upstream samples taken throughout the summer exceeded the established stream threshold for Total Phosphorus concentrations, while two out of the three samples taken in the Millpond exceeded the acceptable threshold for waterbodies such as the Millpond. Temperature within the Ahnapee River and the Millpond did not rise above tolerable levels on the dates sampled, but Dissolved Oxygen levels dropped below established thresholds several times throughout the sampling season. The measured

concentrations of Total Phosphorus and Chlorophyll, as well as established water clarity measurements place the Forestville Millpond in the category of a Eutrophic waterbody.

The aquatic plant survey revealed a very sparse population of any type of aquatic vegetation, with the most abundant species being nonnative Eurasian Water Milfoil. Other species identified indicated that suitable habitat does exist for quality aquatic habitats, but other factors show that changes need to be made to create a sustainable home for a biodiverse population. Additionally, a fish population survey revealed that the makeup of the fish population is characteristic of a eutrophic waterbody with elevated nutrient inputs, low dissolved oxygen levels and plant populations that reflect those conditions.

For the purposes of this plan, water chemistry and sediment core data from the 2017 comprehensive lake planning grant have been included as Appendix A and C and considered representative of the current conditions for the Upper Ahnapee River Watershed. The full version of the final report is available online at:
http://map.co.door.wi.us/swcd/Forestville%20Millpond%20LPL162317%20Final%20Report.pdf

Ahnapee River – Below the Forestville Dam

The segment of the Ahnapee River below the Forestville Dam flows in Door County for approximately a mile and a half before crossing the county line at CTH X. The river continues in Kewaunee County for approximately eight miles before its outlet to Lake Michigan in the City of Algoma. The portion of the river below the dam was assessed during the 2014 listing cycle and placed on the 303(d) Impaired Waters List due to impairment from Total Phosphorus concentrations. Assessment during the 2016 listing cycle yielded similar results with total phosphorus samples exceeding criteria for the Fish and Aquatic Life use and biological impairment was observed with at least one macroinvertebrate Index of Biotic Integrity (IBI) scoring in the poor condition category.

Silver Creek

Silver Creek is 5.25-miles long with an eight-foot width at the widest portions and with a gradient of 5.3 feet/mile, originating in spring-fed headwaters. It is one of three Silver Creeks in Door County and is located in the Town of Brussels. There is little historic data for this stream, but it is part of the headwaters for the Ahnapee River and part of the current TMDL monitoring effort (see Table 1-1). The watershed for this stream drains portions of primarily agricultural lands southeast of Brussels and north of Kolberg, and then flows into wooded wetlands where significant springs exist. These springs support the perennial portion of the stream where it then converges with the Ahnapee River. This stream has no formal rankings/ratings, but small forage fish are present in the stream. Although this stream currently meets water quality standards, excessive nutrient and sediment loading and low flow remain a threat to Silver Creek.

Parameter	05/08/2019	06/05/2019	07/11/2019	08/01/2019	09/04/2019	10/11/2019
Total Phosphorus	0.0137	0.0422	0.0207	0.0342	0.0780	0.0477
Total Suspended Solids	ND	6.00	3.20	ND	4.00	ND

Table 1-1. 2019 Water Quality Monitoring Data for Silver Creek (Source – Wisconsin DNR Surface Water Quality Data Viewer)

Figure 1-2 illustrates the surface watershed to these primary waterbodies and their tributaries. Chart 1-3 provides an analysis of the distribution of surface waters throughout the subwatersheds.

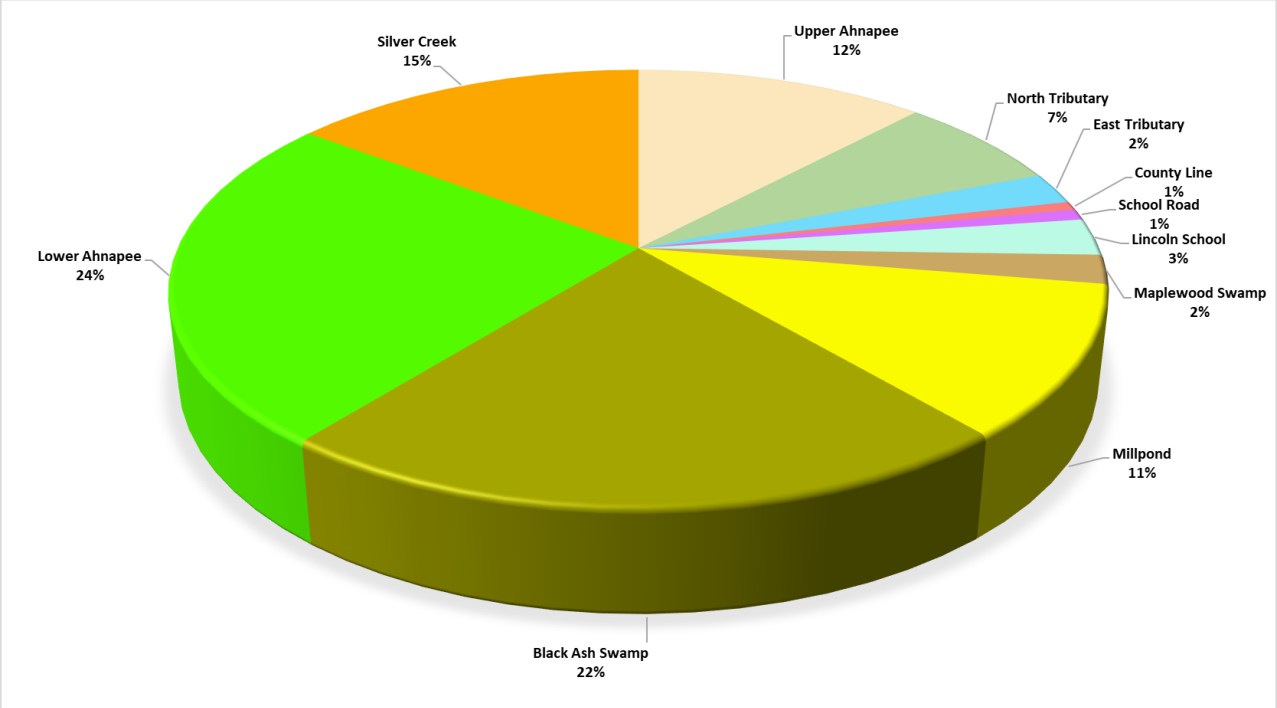

Chart 1-3. Distribution of Surface Water Resources in the Upper Ahnapee River Subwatersheds.

Groundwater Resources

Although Door County is surrounded by Lake Michigan and Green Bay waters, the primary source of drinking water is from groundwater resources. This resource impacts all of the population residing within the Upper Ahnapee River Watershed. The groundwater aquifer in the Silurian Dolostones can be divided into two hydrologically connected subaquifers. The upper, or Niagaran aquifer, exists within the Engadine Dolostone, Manistique Formation, and the Burnt Bluff Group. The lower, or Alexandrian aquifer, resides in the Mayville Dolostone. The Ordovician-aged Maquoketa Formation consists of a layer of shale beneath the Mayville. The shale acts as a confining unit, or aquaclude, between the Silurian aquifers and the Ordovician aquifer below (see Figures 1-5).

Groundwater, due to the underlying geology, is readily impacted by surface activities and surface waters. Land uses, thin soils over fractured bedrock, soils with high permeability rates, solution features and closed depressions all contribute to the high potential for groundwater contamination (see Figure 1-6). These factors are also the primary reasons for the rapid movement of the groundwater giving local aquifers an extremely quick recharge time. As a result, the quality of the groundwater is a significant concern to the people of Door County and the Upper Ahnapee River Watershed.

Information about the status of groundwater in Door County is relatively inconsistent because of the high number of private wells. A study of private wells was conducted by the University of Wisconsin-Oshkosh in 2015 and 2016 with 477 and 392 wells sampled, respectively. The 2015 samples yielded results showing 12% exceeding standards for Total Coliform, 1% indicating the presence of E. coli and 3%

exceeding Nitrate standards. In 2016, 22% of the samples exceeded Total Coliform standards, 2% indicated the presence of E. coli and 2% exceeded Nitrate standards. The most recent study of private wells was conducted in the fall of 2019 through a collaborative effort between Door County and the University of Wisconsin-Oshkosh. There were 148 wells sampled in this effort and results indicated 16% of the samples exceeded Total Coliform standards, there were no detects of E. coli presence and 2% of the wells exceeded the standards for Nitrates. Past evidence of well contamination is based on historical events, a high incidence of bacteria, nitrate and in some portions of the county, lead and arsenic. A long history of contamination from various events is still evident in the concerns of residents of the area.

Countywide efforts to study groundwater will continue through 2020 through sampling events coordinated with the University of Wisconsin-Oshkosh. Known quantitative data for bacteria and nitrate levels can be viewed on the University of Wisconsin-Stevens Point Groundwater Center's Groundwater Quality Viewer (https://gissrv3.uwsp.edu/webapps/gwc/pri_wells/#). This data is a compilation of private well testing across the State of Wisconsin, but the information is limited and not a statistical design, therefore should not be extrapolated to a specific well but used to interpret trends. Figure 1-14 and 1-15 below represent results for the Ahnapee River Watershed. A caveat to this data is the lack of sample distribution, the depicted data is based on a one square-mile section with the number of samples within each section represented. These values are averages across each section, with no regard to their spatial position. It should be noted that none of the represented averages show exceedance of nitrate standards and while some sections show a percentage of samples with coliform bacteria detects, there were no E. coli detects.

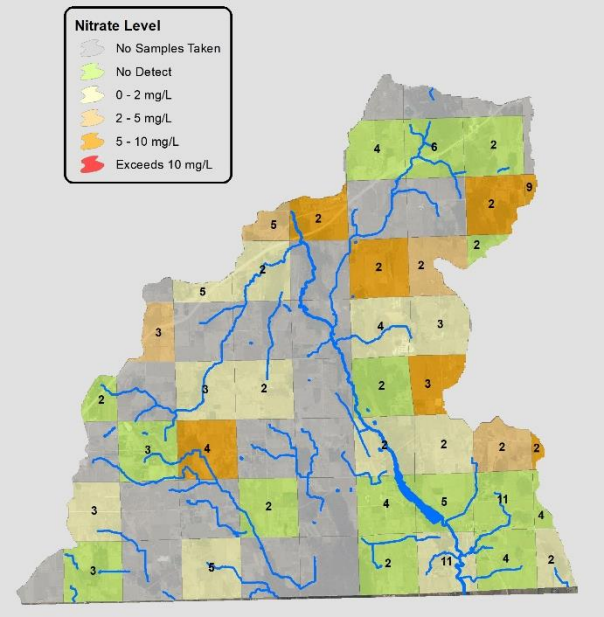

Figure 1-14. Average Nitrate Levels per Section – Number of Sample Labeled

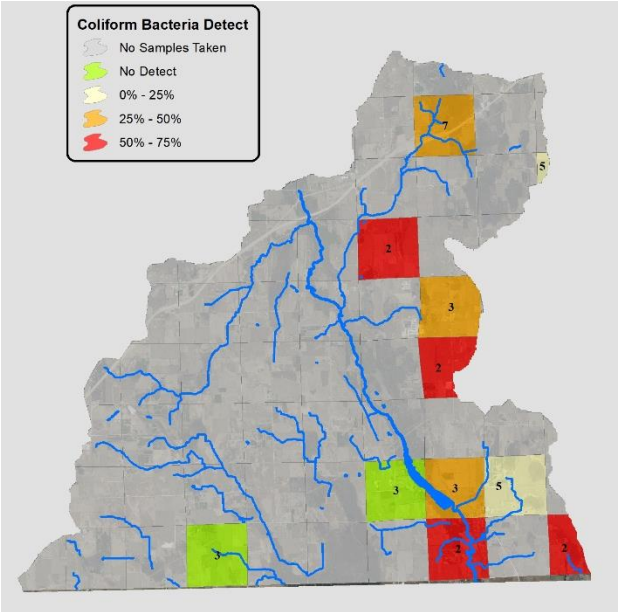

Figure 1-15. Percentage of Coliform Bacteria Detect per Section – Number of Samples Labeled

In addition to private wells, there is a municipal water supply for the unincorporated area of Maplewood. There is not yet a formal zone of contribution or wellhead protection plan established for this system that supplies drinking water to 44 residential and 6 commercial areas, comprising approximately 120 people. Much of the contributing area for this system lies within the Upper Ahnapee River Watershed landscape.

2. Land Use

The watershed that contributes to the Door County portion of the Ahnapee River is approximately 34,000 acres of predominantly rural landscape. The total acreage is comprised of approximately 53% agricultural use, 41% woodlands and natural areas and 6% developed and urban areas (see Chart 2-1).

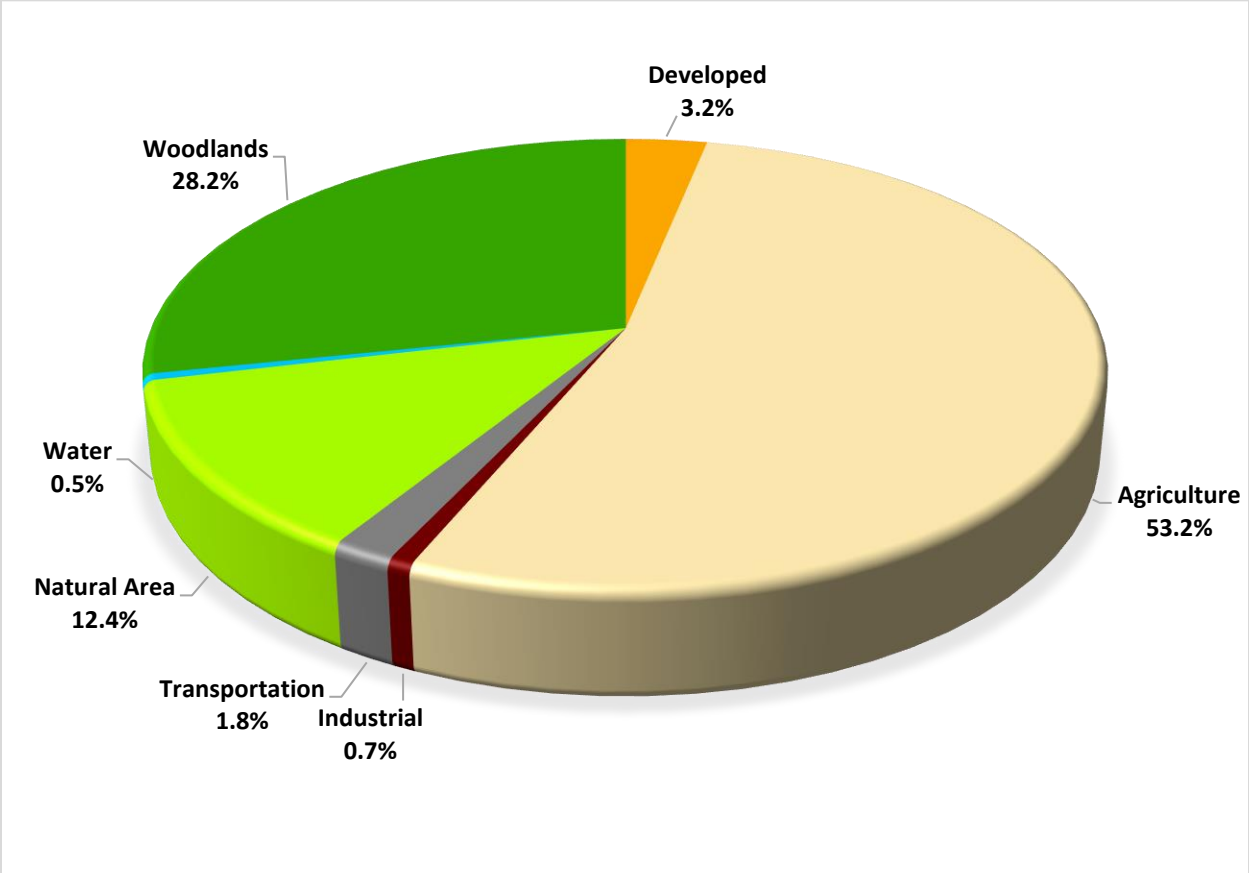

Chart 2-1. Summary of Watershed Land Use.

For the most part, wetlands and forested areas are located adjacent to the Ahnapee River corridor and its tributaries. The majority of developed areas exist along the Highway 42/57 corridors and adjacent to the Millpond and the Village of Forestville (see Figure 2-1).

Agriculture

Agriculture within the watershed is made up of cropland, pastures and farmsteads/farm buildings. There is approximately 16,500 acres of cropland and pastures, including long-term specialty crops such as orchards. There are currently approximately 16,100 acres included in a Nutrient Management Plan (see Figure 2-2). This represents 98% of the cropland within the watershed. Cropland is predominantly a mix of dairy rotations and cash cropping, with most fields in corn, soybeans, small grains or alfalfa.

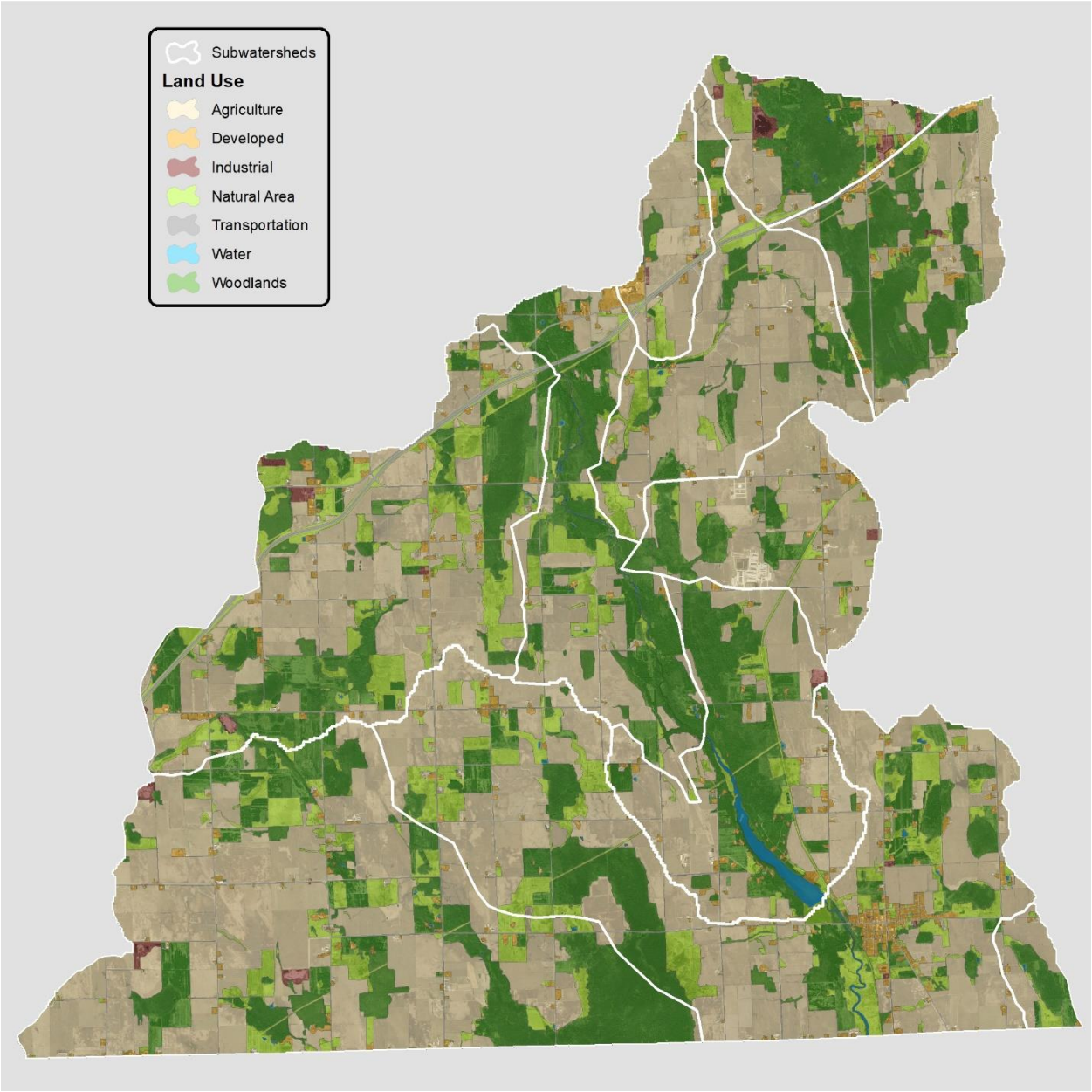

Figure 2-1. Upper Ahnapee River Watershed Land Use.

There are twenty-six locations practicing animal husbandry that have been identified (see Figure 2-2). The population is made up of a mix of species including horses, sheep, beef cows and dairy cows. Livestock population estimates were generated through a combination of review of 2019 Nutrient Management Plans and 2018 field verifications. The general size ranges of the livestock operations is 15 very small (20 or less animals), 8 small (less than 300 animal units), 1 medium size (300-999 animal units), and one large (over 1000 animal units), operated at two locations.

SWCD has worked with all significant livestock operations in the watershed to install appropriate best management practices to address waste storage and feedlot runoff issues, but additional inventory is required to assess compliance with process wastewater standards promulgated in 2012. Since 2003 SWCD has secured eleven Targeted Runoff Management grants from the Wisconsin Department of

Natural Resources to offer cost share for eligible activities. These resulted in disbursement $780,981 of cost-share to install best management practices within the watershed, including manure storage, barnyard runoff control, clean water diversions, milkhouse waste collection and exclusion of animals from unsuitable areas. Four operations declined cost share and either changed management or installed best management practices at their own cost to meet the required agricultural performance standards and prohibitions in Chapter 23 Door County Code (see Chapter 5). SWCD conducts annual "Operation and Maintenance" site visits for ten years after cost share practices are installed and works with landowners to resolved identified deficiencies. In 2018 nine such site visits were conducted in the watershed and all installed practices were being maintained as intended and within the expectations of agricultural performance standards and manure management prohibitions.

There is one Concentrated Animal Feeding Operation (CAFO) comprised of two sites within the watershed boundaries. The Wisconsin Department of Natural Resources regulates waste storage structures and manure application at CAFOs under a Wisconsin Pollutant Discharge Elimination System permit. CAFO animal production areas have a "zero discharge standard" for runoff to navigable waters. The permit for this dairy operation at the two locations was issued April 1, 2017 and expires March 31, 2022 and allows for expansion up to 10,177 animal units over the permit term. The permit contains requirements for proper nutrient management and structure/system construction to protect water quality, along with schedules for reports and evaluations. The "Feed Storage - Engineering Evaluation" schedule requires an evaluation by 11/01/2017 and construction of improvements to permanently correct adverse conditions by 11/01/2018.

In addition to the one CAFO production site located at two sites within the watershed boundaries, 9,244 acres of cropland within the watershed are included in CAFO nutrient management plans, through the 2019 cropping season. This results in approximately 56% of the cropland within the Upper Ahnapee River Watershed being operated by CAFOs, with additional cropping and nutrient application restrictions. CAFOs are not subject to cost share requirements that may apply to non-CAFO cropland and are generally ineligible for state and local funding for best management practices.

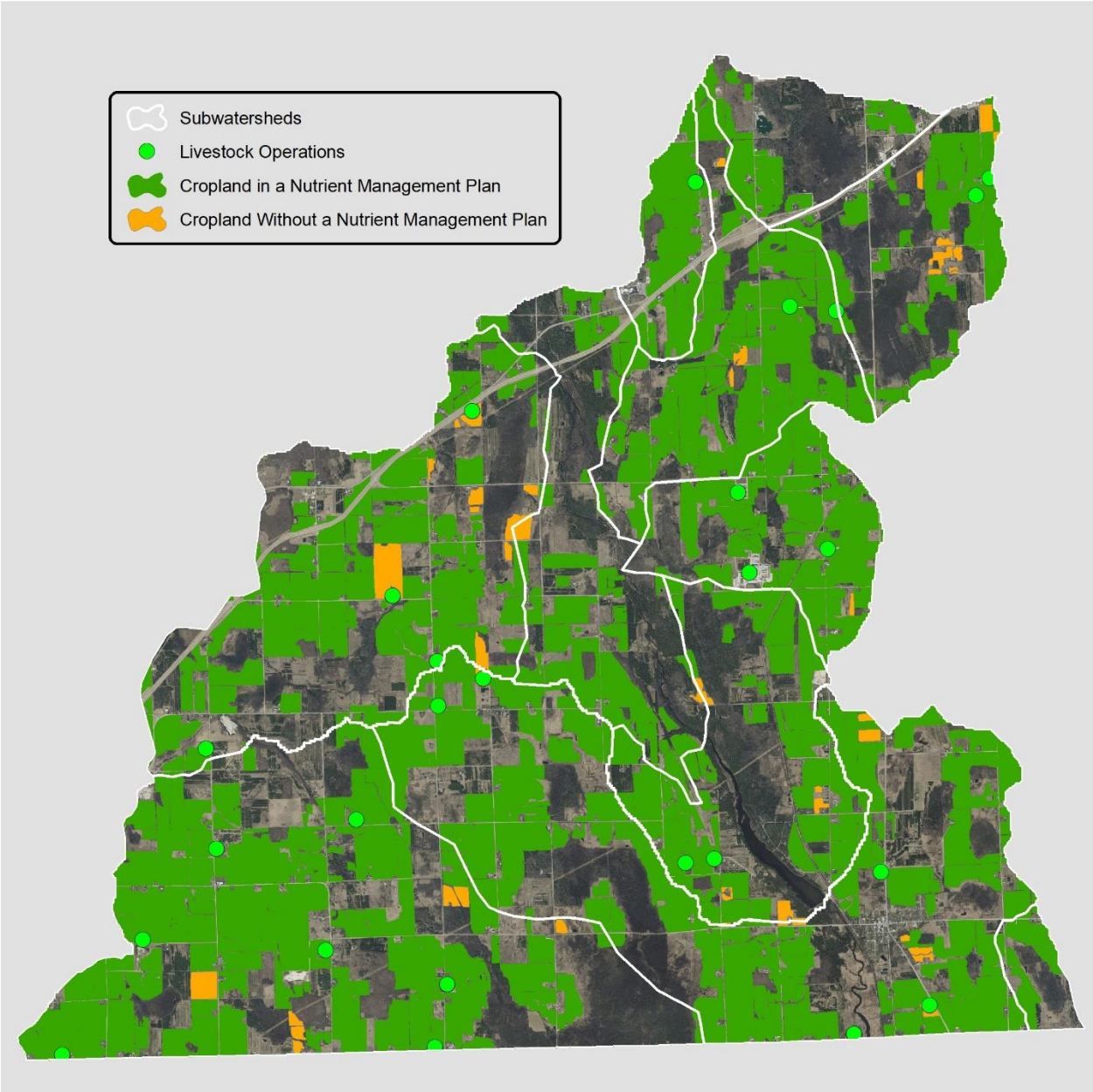

Figure 2-2. Livestock, Cropland and Nutrient Management Coverage.

In addition to the cropping and nutrient information provided in annual nutrient management plans, the SWCD tracks soil test phosphorus levels to identify and track fields that might be approaching or exceeding optimal concentrations. These fields are potential sources of phosphorus delivery as excessive levels built up in the soil pose the risk of transportation to water resources with any erosion that could take place. Optimal ranges for phosphorus soil test ranges, measured in parts per million, varies depending on the soil types and crops planted. For purposes of quantifying the values relative to each other, the values for a typical dairy rotation were used with categories 0-25, 26-35, 36-100 and greater than 100. Each group representing a progressively higher concern for excessive nutrient levels. Figure 2-3 and Chart 2-2 illustrate the distribution of phosphorus soil test levels in 2018 nutrient management plans throughout the Upper Ahnapee River Watershed. One consideration to keep in mind when

assessing this data is that soil tests are only required every four years, so mapped data could be misinterpreted with regard to immediate needs. It is much better used to target historically excessive soil test results and look at long term trends that represent long term pastures or mismanaged manure applications. The majority of the annual nutrient management plans reviewed by the SWCD fall within tolerable levels for the Phosphorus Index, a value representing the average runoff phosphorus delivery to the nearest surface water in a given year generated through analysis of field characteristics, nutrients applied and crops planted. Compliant fields will have an average Phosphorus Index value of six or lower over an eight-year accounting period and not exceeding a value of twelve in any given year within the accounting period. While the Phosphorus Index is an element of compliance with the Statewide Agricultural Performance Standards, it is also a metric that is developed through inputs of various data, including soil test phosphorus. This value is generated through manipulation of inputs, while soil test phosphorus is a more realistic data set to track and use to target, as it represents true field conditions.

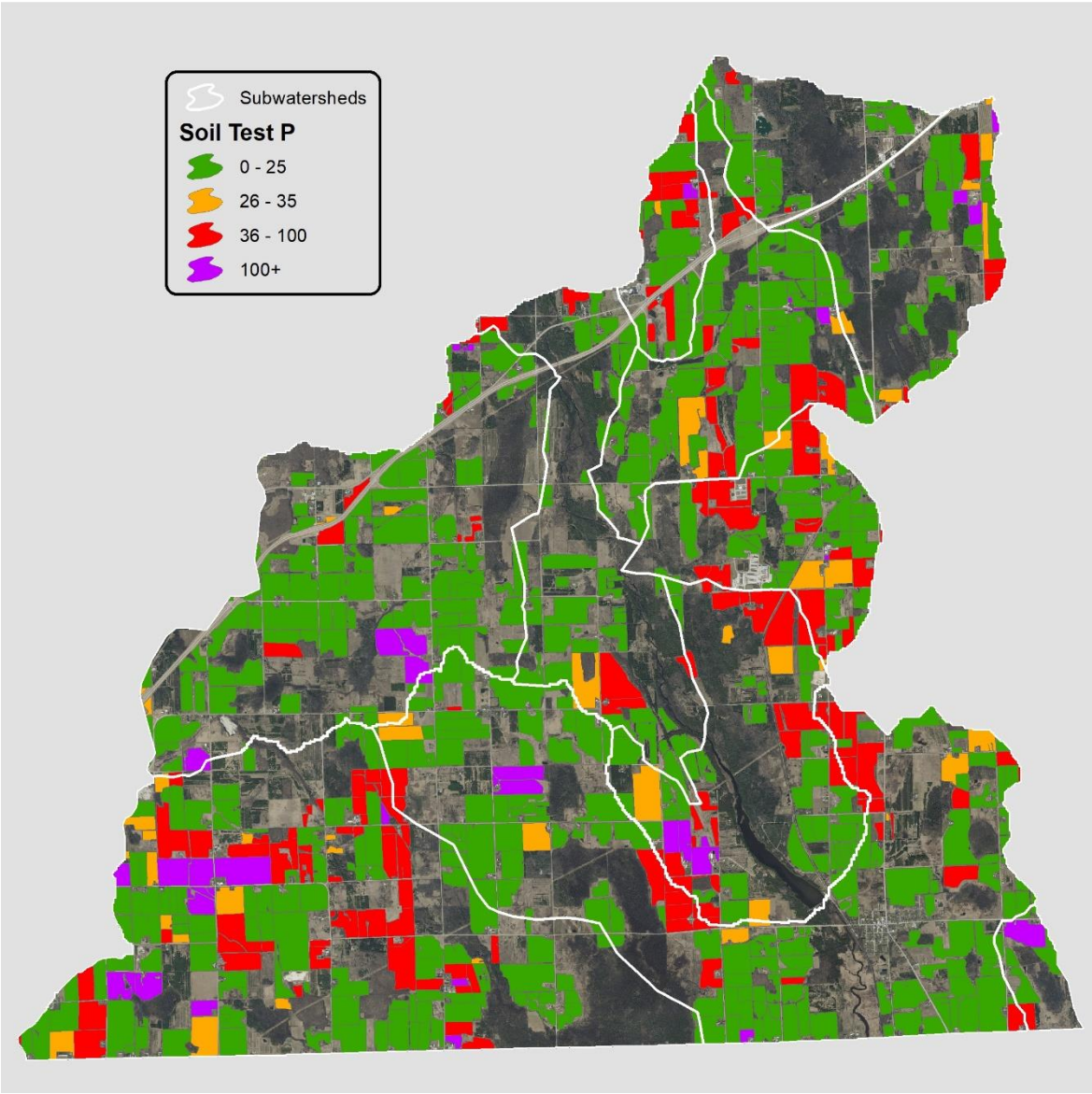

Figure 2-3. Location of Soil Test Phosphorus Levels Reported in 2018 Nutrient Management Plans

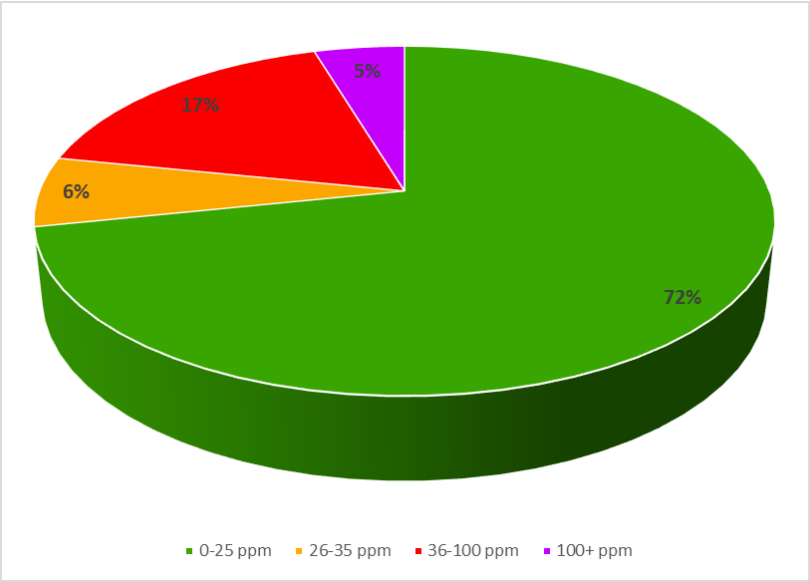

Chart 2-2. Distribution of Soil Test Phosphorus Concentrations.

Additional concerns with cropland lie in the areas adjacent to surface waterbodies. Performance standards require that tillage setbacks are implemented in these areas, as well as setbacks for nutrient applications outlined in nutrient management plans that are dictated by the NRCS 590 Standard. Opportunities that exist for the cropland acreage adjacent to surface waters are found in establishment of riparian buffers and, in the case of channelized erosion, constructed practices that provide a safe outlet for surface runoff. There are approximately 39 linear miles of field edges that are adjacent to surface waterbodies throughout the entire watershed (see Figure 2-4).

Within the Upper Ahnapee River Watershed, there are currently approximately 175 acres of riparian cropland enrolled in the Conservation Reserve Enhancement Program (CREP), a US Department of Agriculture cropland retirement program designed to protect areas of significant habitat protection and water quality protection from runoff from adjacent cropland.

Drain tiles in cropped fields are a concern to both surface and groundwater, as they act as conduits of nutrients applied to the surface and intercepted before being incorporated or used by a growing crop. Transport of these nutrients can provide rapid introduction of pollutants to both surface and groundwater resources. Research done by UW-Discovery Farms has shown an average of 0.9 pounds of Phosphorus per acre per year and 240 pounds of sediment per acre per year was documented to be leaving cropped fields via tile drainage (Cooley, et al, 2014). Existing known tile inlets and outlets are given manure application restrictions on maps, and are inventoried by SWCD as they are discovered. Staff will continue to collect locations for inlets/outlets as they are found as part of other cropland inventory activities. If additional resources become available, consideration can be given to a dedicated effort to locate these features and add them to existing inventories of known conduits. When identified, tile outlets could be addressed with best management practices to reduce the potential of nutrient delivery.

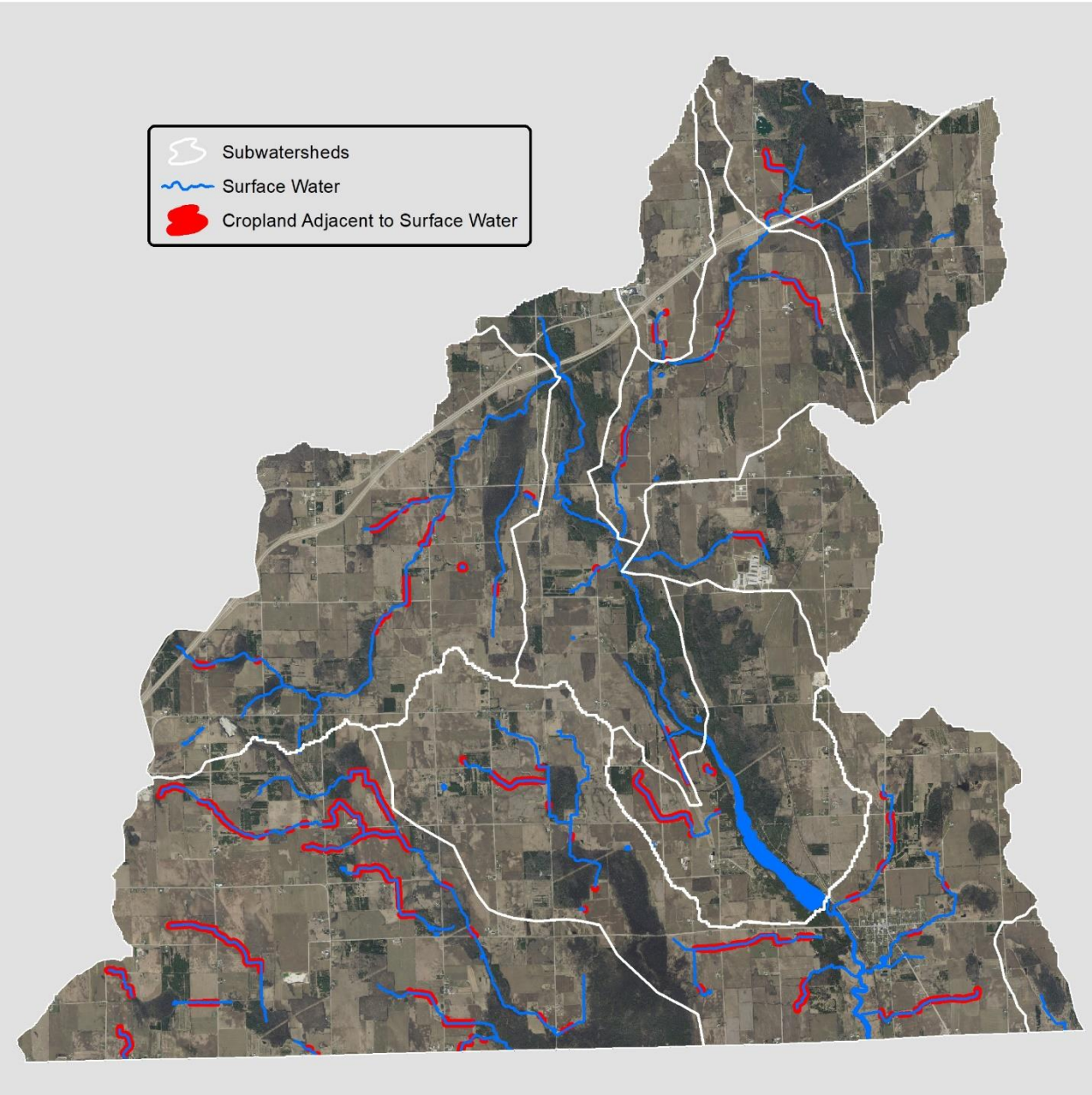

Figure 2-4. Location of Cropland Adjacent to Surface Water.

Another critical component of proper application of nutrients on cropland is following restrictions for soils that are shallow to bedrock and setbacks from identified conduits to groundwater via karst features. Silurian Bedrock Standards prohibit the mechanical application of manure on cropland that is less than 24” to bedrock. Door County’s current soil data set identifies categories less than 20” and those from 20” – 60”. Soils in the 20” – 60” range require verification and documentation before nutrient applications. Those that are mapped less than 20” are prohibited unless verified as being greater than 24”. Figure 2-5 depicts the soils mapped less than 20” and also identifies mapped conduits to groundwater.

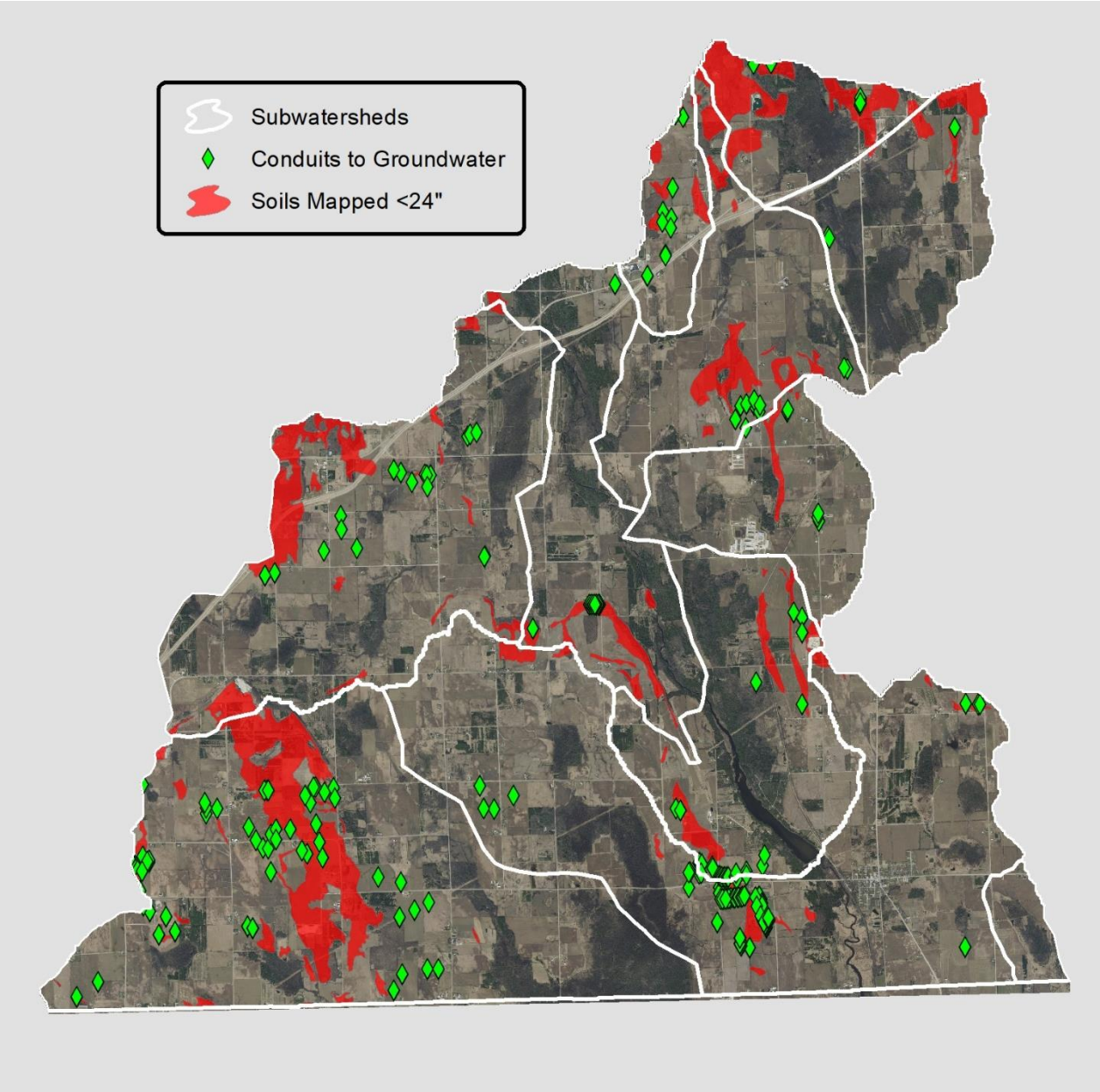

Figure 2-5. Shallow Soils and Conduits to Groundwater

Woodlands

Woodlands throughout the watershed are comprised of both natural systems, as well as tree plantations. There is approximately 8,800 acres of woodlands. Much of the Ahnapee River corridor is made of two predominant types of woodlands; the upland types are generally northern mesic forests composed of maples, hemlock, white pine, beech and yellow birch and lowland forests are made up of swamps dominated by black spruce, tamarack and cedar.

Natural Areas

Acreage that has been placed in the Natural Areas category consists of open space, wetlands, parks, trails and recreational areas. This landscape type constitutes approximately 3,900 acres of the total watershed. Many of these areas are adjacent to stream corridors, as well as agricultural fields.

Developed

Developed areas are comprised of residential areas, commercial, retail, schools and administrative buildings. This equates to approximately 1,000 acres in the watershed and is spread throughout. The most current information locating sanitary systems for residential development shows 559 active systems and 51 deactivated systems within the watershed (see Figure 2-6). The County-wide Sanitary Survey was completed in 2015; all sanitary systems in the Upper Ahnapee River Watershed have been inspected and brought up to existing code.

Transportation

State and County highways, town roads and village streets make up the transportation category. The transportation network is dispersed throughout the watershed and covers approximately 570 acres.

Industrial

Industrial areas are made up of a variety of land use types, including communication and utility elements, waste processing, manufacturing, electrical substations/transmission and extractive activities. Approximately 220 acres of the watershed consists of industrial type land use.

Wastewater Treatment Facility

The Village of Forestville has had a Municipal Wastewater Treatment Facility since 1949. The wastewater system consists of a covered aerated lagoon consisting of three treatment zones with a floating mixer in the initial zone, an aerated polishing reactor with four attached growth media modules and disinfection using ultraviolet radiation. A Flow Equalization/Emergency Storage lagoon is also available. The most recent upgrade was completed in 2012.

Activities related to the wastewater treatment plant are regulated by the Wisconsin Department of Natural Resources via a Wisconsin Pollutant Discharge Elimination System (WPDES) permit. WPDES permit #0028894 dictates acceptable protocols for monitoring both influent and effluent, as well as acceptable concentrations for effluent released to the Ahnapee River at the outfall (see Figure 2-7).

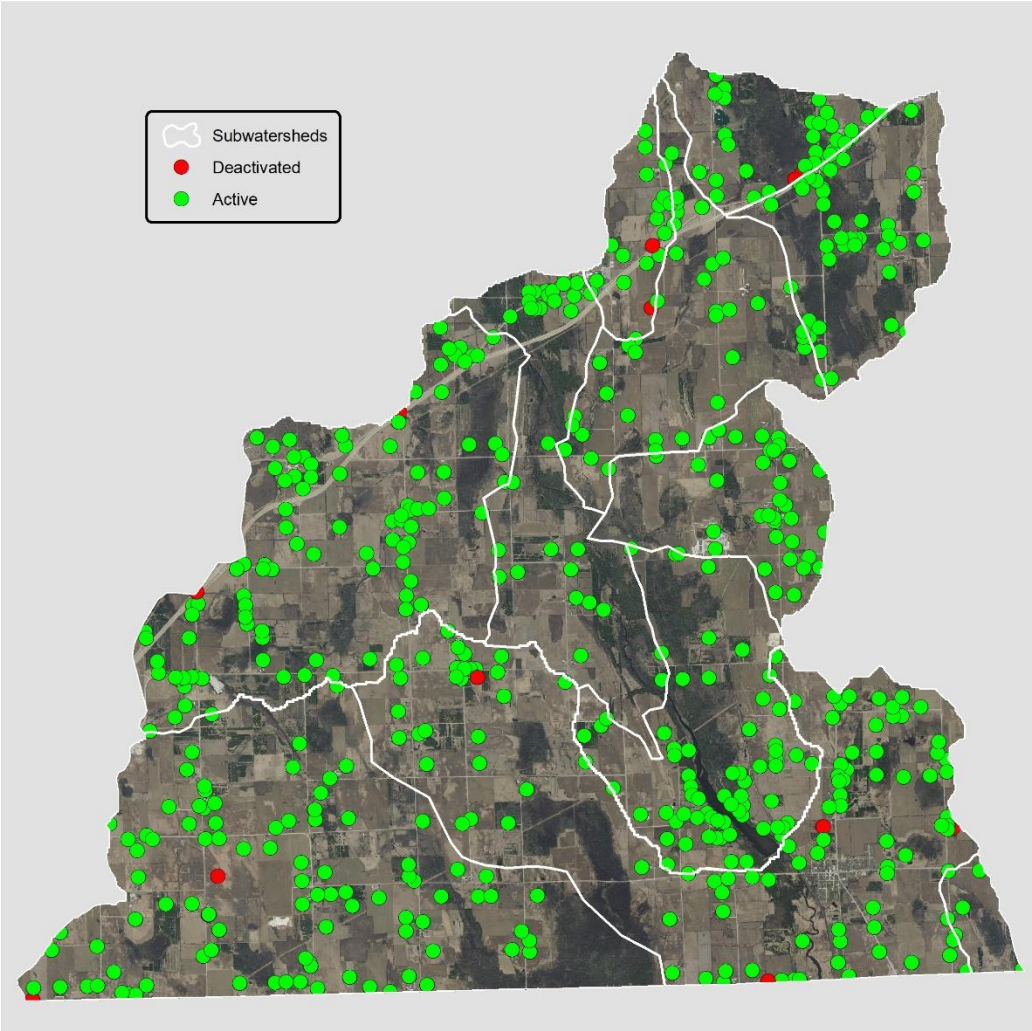

Figure 2-6. Distribution of Sanitary Systems.

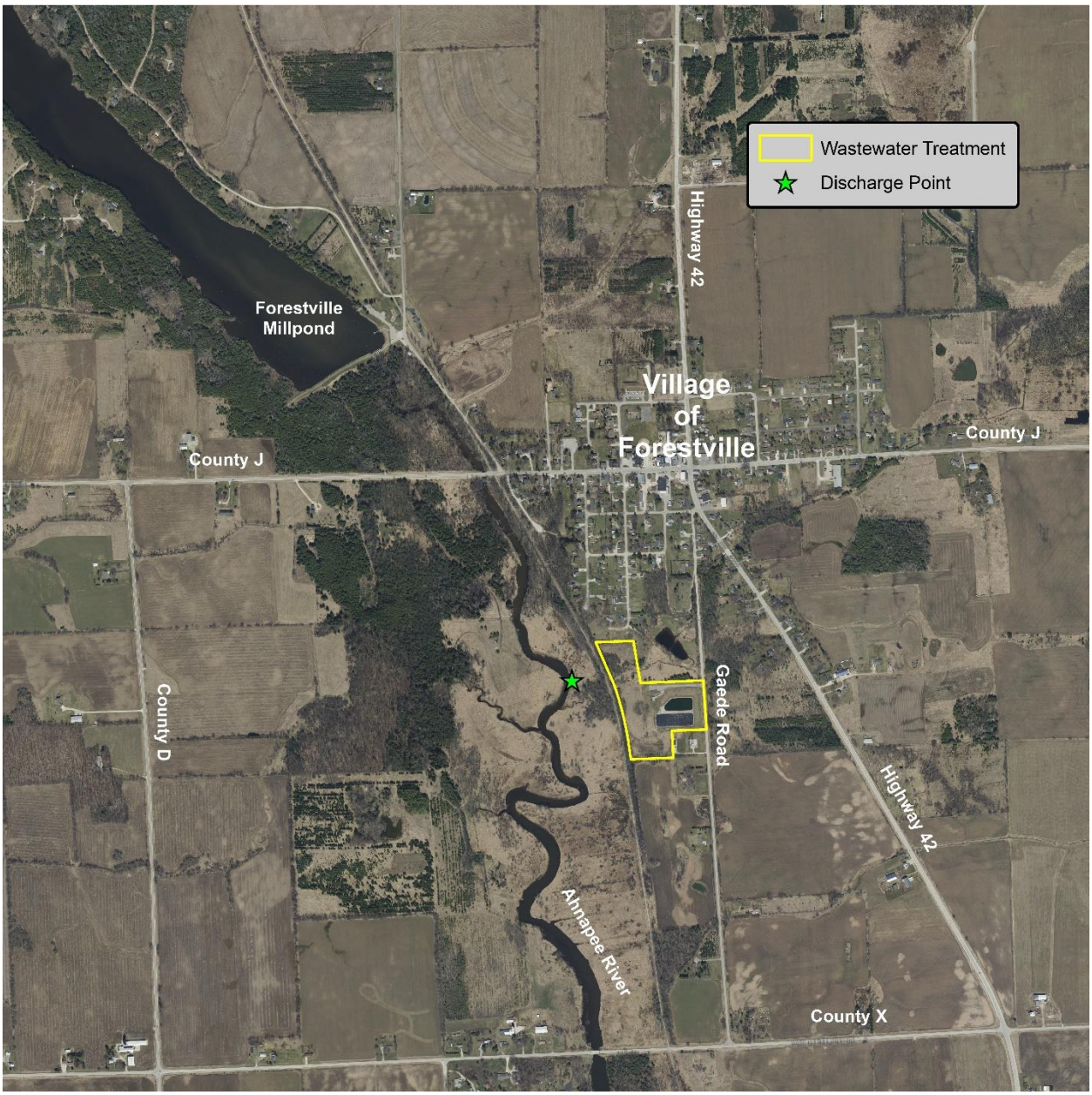

Figure 2-7. Village of Forestville Wastewater Treatment Facility

3. Model Results

A significant portion of the evaluation of the Upper Ahnapee River Watershed is to develop an estimate of nutrient and sediment loading. To develop this estimate, the SWCD used the model titled Spreadsheet Tool for Estimating Pollutant Load (STEPL), developed for the Environmental Protection Agency to calculate loads from various land uses and the reductions when coupled with best management practices (BMPs).

Inputs for the model were collected through ArcGIS review, as well as field verification of cropland, feedlots and animal numbers. Door County has a very robust GIS data set, making development of necessary input easier. To further refine estimates, the watershed was divided into smaller subwatersheds (see Figure 3-1) by processing county LiDAR data collected in 2002. Data was processed through ESRI ArcGIS and Aquaveo Watershed Modeling Software. These subwatersheds and their geographic locations are also described in Section 1 of this document.

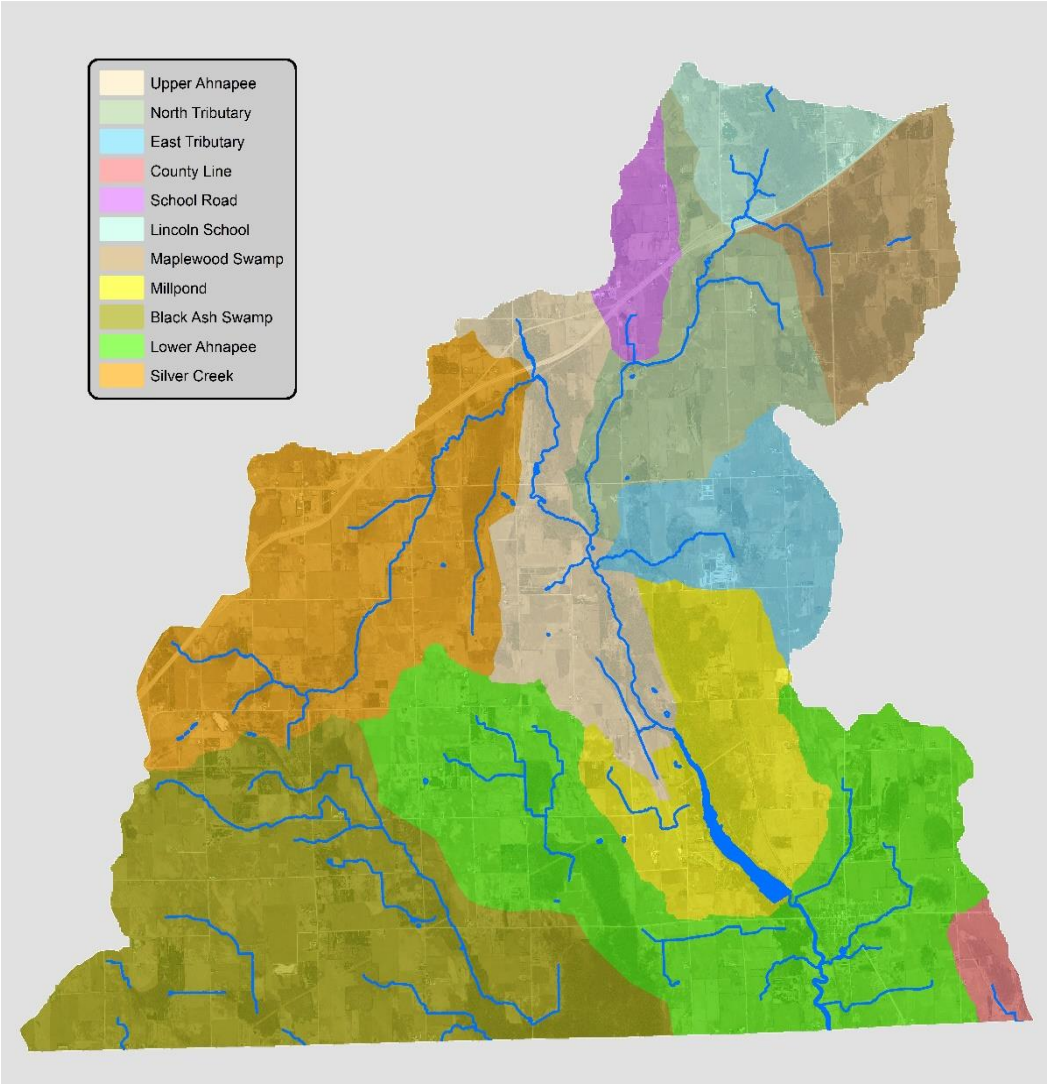

Figure 3-1. Subwatersheds of the Upper Ahnapee River Watershed

Each subwatershed was inventoried for total acreages of urban areas, cropland, pastureland, forests, natural areas and feedlots. Inventories were developed through interpretation of 2017 orthophotography and analysis of ArcGIS land use data compiled by the Door County Land Use Services in 2016. Field verifications of land use were done, as needed. Within STEPL, each of the urban areas was broken into individual acreage for commercial, industrial, institutional, transportation, multi-family and single-family. Each of these land use types has an associated nutrient and sediment load, based on values assigned by the model and calculated via the Universal Soil Loss Equation. Additionally,

agricultural inputs are detailed by the number of agricultural animals in each watershed and the number of months that manure is applied to cropland and pastureland. Likewise, information collected by the Door County Sanitarian Department was entered to calculate nutrient contributions from residential sources. The number of septic systems, average population for each system and the average failure rate, confirmed by the Door County Sanitarian Department, were factored into the model inputs. The following tables (see Table 3-1 – Table 3-4) summarize the sum of the inputs to the STEPL model for the Upper Ahnapee River Watershed.

Subwatershed	Urban	Cropland	Pastureland	Forest	Natural Area	Total
MIllpond	131	1294	63	945	211	2644
Upper Ahnapee	109	920	0	1162	282	2473
Silver Creek	363	2225	25	1343	918	4874
School Road	97	495	4	35	77	708
North Tributary	85	1664	23	379	263	2414
Maplewood Swamp	126	770	20	899	118	1933
Lower Ahnapee	388	3556	9	1363	1070	6386
Lincoln School	133	314	0	496	155	1098
East Tributary	74	1189	2	328	78	1671
County Line	11	161	0	121	31	324
Black Ash Swamp	257	3845	24	1743	678	6547
Total	1774	16433	170	8814	3881	31072

Table 3-1. STEPL Land Use Acres Input by Subwatershed

Subwatershed	Beef Cattle	Dairy Cattle	Sheep	Horse
MIllpond	10	125	--	--
Upper Ahnapee	--	--	--	--
Silver Creek	6	70	--	5
School Road	31	--	--	--
North Tributary	94	--	--	5
Maplewood Swamp	10	--	--	32
Lower Ahnapee	16	--	40	10
Lincoln School	--	--	--	--
East Tributary	--	7317	--	--
County Line	--	--	--	--
Black Ash Swamp	170	1067	--	--
Total	337	8579	40	52

Table 3-2. STEPL Agricultural Input by Subwatershed
(derived from 2019 NMPs and 2018 Inspections)

Subwatershed	Number of Septic Systems	Average Population per Septic System	Average Septic Failure Rate (%)
Millpond	66	2.43	2
Upper Ahnapee	30	2.43	2
Silver Creek	96	2.43	2
School Road	17	2.43	2
North Tributary	38	2.43	2
Maplewood Swamp	41	2.43	2
Lower Ahnapee	106	2.43	2
Lincoln School	30	2.43	2
East Tributary	35	2.43	2
County Line	6	2.43	2
Black Ash Swamp	94	2.43	2
Total	559	--	--

Table 3-3. STEPL Septic System Input by Subwatershed

Subwatershed	Urban Acres	Commercial %	Industrial %	Institutional %	Transportation %	Multi-Family %	Single-Family %
Millpond	131	5	11	--	21	--	63
Upper Ahnapee	109	1	--	18	38	--	43
Silver Creek	363	5	12	1	43	1	38
School Road	97	4	6	36	29	--	25
North Tributary	85	2	1	--	38	--	59
Maplewood Swamp	126	19	4	--	36	--	41
Lower Ahnapee	387	4	3	8	27	1	57
Lincoln School	133	3	49	3	15	--	30
East Tributary	74	2	9	8	25	--	56
County Line	11	--	--	--	35	--	65
Black Ash Swamp	257	3	20	1	34	--	42

Table 3-4. STEPL Urban Land Use Distribution Input by Subwatershed

Output generated by STEPL includes total load values for the following parameters:

Phosphorus – A calculation of phosphorus delivery from watershed sources. Phosphorus is an essential nutrient in plants and animals, and is also a common constituent of agricultural fertilizers, manure, and organic wastes in sewage and industrial effluent.

Sediment – An estimation of the delivery of soil particles from all land uses. Sediment delivery is primarily associated with cropland and equates to higher values of other parameters that impact surface waters including elevated phosphorus (attaches to soil particles), increased turbidity and suspended solids, warmer temperatures and lower dissolved oxygen concentrations.

Nitrogen – A value representing the amount of nitrogen delivered by watershed land use. As organic materials decompose, they release ammonia, which is in turn oxidized to form both nitrates and nitrites. The primary sources of organic nitrates include human sewage, livestock manure, fertilizers and erosion of natural deposits. Inorganic nitrogen in surface waters is a primary driver of eutrophication.

Biochemical Oxygen Demand – A measurement of the amount of dissolved oxygen needed (demanded) by aerobic organisms to break down organic matter in a waterbody. This measurement can be equated to the organic material present in wastewater and a quantification of inputs from runoff from cropland, urban areas, feedlots and failing septic systems.

Nitrogen and Biochemical Oxygen Demands values were generated, but are not included in this report as Phosphorus and Sediment are the pollutants of concern in the Upper Ahnapee River Watershed.

Model Assumptions

Part of the model process is to identify best management practices and provide an estimate of their implementation throughout the watershed. Many successful years of conservation have been a benefit to the Upper Ahnapee River Watershed. All of the significant livestock operations within the subwatersheds have addressed feedlot runoff and waste management concerns. For the purpose of modeling, waste management practices were applied on 100% of the subwatersheds with significant animal numbers and potential manure management issues.

The STEPL model does not account for discharges from feed storage areas and does not have associated management practices to select within the model. As such, the model results presented here do not account for this potential source of pollutants from farm operations. The one CAFO located within the watershed plan area has a schedule for engineering evaluation by 11/1/2017 and correction of any adverse conditions of the existing feed storage area by 11/1/2018. In December 2018, the Wisconsin Department of Natural Resources determined that "a discharge from the feed storage area to a navigable water will occur on a recurring basis under actual site conditions". The Wisconsin Department of Natural Resources has not yet established a new timeline for installation of corrective practices to address this discharge. SWCD considers feed storage areas when conducting comprehensive reviews of farm operations and there are no known feed storage discharges from the small or medium operations in the Upper Ahnapee Watershed at this time. SWCD updated Chapter 23 to include the process wastewater performance standard in 2018; an updated inventory and associated notifications are necessary to fully account for this potential source of pollutants.

98% of the cropland within the Upper Ahnapee River Watershed is included in a nutrient management plan to address manure application at proper rates, locations and timing. To reflect 2018 conditions, conservation tillage was applied to 50% of the cropland acreage to represent cropland acres that are either reducing soil loss by maintaining residue in watershed or maintaining alfalfa for greater than three years over the crop rotation. 50% of the modeled cropland was selected for these BMPs to depict realistic deficiencies in implementation and reflect current conditions. Deficiencies are identified annually in reviews of all submitted nutrient management plans, as well as more comprehensive, in-depth review of select plans. Known deficiencies in implementation include:

- Improper documentation sources and volumes of nutrient sources
- Improper documentation of the location of surface water resources or conduits to groundwater
- Outdated or insufficient numbers of representative soil sample for cropland and pastures
- Failure to maintain appropriate setbacks during nutrient applications
- Failure to address concentrated flow channels during field preparation
- General discrepancies between plan documentation and actual implementation

STEPL model results of phosphorus and sediment loads under current cropland conditions are broken down by subwatershed under “2018 Implementation” (Table 3-5). The modeled load reduction estimates from future increases in cropland conservation efforts are also broken down by subwatershed under “90% NMP Implementation + Cover Crops + Buffer” (Table 3-5). The load reductions for phosphorus (35%) and sediment (24%) are interim goals that were used for this planning effort. A comprehensive evaluation of necessary load reductions from all sources in the watershed to meet water quality goals will be available once the Wisconsin Department of Natural Resources completes the development of the Northeast Lakeshore Total Maximum Daily Load analysis. In the meantime, the reductions in phosphorus and sediment from 2018 implementation levels illustrate the opportunities through future conservation work and BMP installation.

To target attainable goals for the duration of this watershed plan future conservation practices were modeled by layering additional conservation practices in the following way:

- Tier 1 – Appropriate nutrient management efforts (55% of cropland)
- Tier 2 - Appropriate nutrient management efforts AND additional cover crops (25% of cropland)
- Tier 3 - Appropriate nutrient management efforts AND cover crops AND vegetative buffers adjacent to surface water (10% of cropland)

Appendix E of this document contains the BMP Calculator information generated in STEPL to calculate the combined efficiencies of cropland practices and the resultant coefficients for model input.

This approach results in 90% of cropland under the three tiers of conservation practices, and portrays expected results of robust and full implementation of nutrient management plans. Full implementation requires adequate protection of concentrated flow channels and maintenance of vegetation in grassed waterways, which can be variable by year and is not explicitly modeled in this approach. The remaining 10% of cropland was modeled with no conservation practices. SWCD strives for 100% compliance with nutrient management but used a lower percentage for these model results to reflect anticipated deficiencies due to weather and landowner/operator reluctance to adopt conservation practices.

Nutrient management assumes that concentrated flow channels in fields are protected in permanent vegetation to reduce soil loss. Door County SWCD staff have observed that this does not always occur, or existing vegetative waterways are poorly maintained. Staff are actively working with landowners and operators to address these concerns. Another important item to note is that the STEPL model address a significant portion of the sediment delivery in the calculations for phosphorus delivery, as phosphorus attaches to soil particles and they share the same delivery mechanism.

	2018 Implementation		90% NMP Implementation + Cover Crop + Buffer			
Subwatershed	Phosphorus (lb/year)	Sediment (tons/year)	Phosphorus (lb/year)	% Reduction	Sediment (tons/year)	% Reduction
MIllpond	2155.2	318.6	1419.5	34.1%	241.4	24.2%
Upper Ahnapee	1323.1	237.5	912.2	31.1%	181.9	23.4%
Silver Creek	3736.9	521.8	2515.7	32.7%	405.7	22.2%
School Road	791.6	161.2	547.1	30.9%	122.5	24.0%
North Tributary	2614.4	402.7	1663.2	36.4%	301.5	25.1%
Maplewood Swamp	1169.1	213.6	818.6	30.0%	164.5	23.0%
Lower Ahnapee	5392.7	729.6	3470.0	35.7%	555.0	23.9%
Lincoln School	794.5	111.4	570.3	28.2%	89.0	20.2%
East Tributary	2879.3	309.5	1733.0	39.8%	231.3	25.3%
County Line	265.9	58.4	181.2	31.9%	43.8	24.9%
Black Ash Swamp	5724.2	768.7	3648.1	36.3%	581.0	24.4%
Total	26846.9	3833	17478.8	34.9%	2917.5	23.9%

Table 3-5. STEPL Total Load by Subwatershed

Current phosphorus and sediment loads by land use are listed in Table 3-6.

Land Use	Phosphorus (lb/year)	Sediment (tons/year)
Urban	1935.7	278.2
Cropland	23812.9	3473.1
Pastureland	64.4	3.6
Forest	846.3	55.0
Natural Areas	61.5	23.3
Septic	136.1	0.0

Table 3-6. STEPL Total Load by Land Use

Summary of Results

The output generated by the STEPL model shows that the majority of nutrient and sediment loading is driven by agriculture, more specifically cropland. On review of land use in the watershed, this is not surprising as 50% of the land use throughout the watershed is agriculture-based.

The comparison of total load before and after the application of BMPs creates a strong argument for the need for additional conservation work on the landscape. Currently, 98% of the cropland is being operated under the guidelines of a nutrient management plan; but as described on Page 31, only 50% of the cropland was modeled with a NMP to realistically portray the deficiencies recognized in submitted plans. Targeting the remaining 2% of acreage to attempt full compliance with nutrient management requirements is not likely to significantly lower input of nutrients and sediment from field sources. Alternatively, continued work to address upland field needs with practices such as constructed waterways, reduced tillage and vegetative buffers will further reduce nutrient and sediment loss from

agricultural sources; this will entail full and accurate implementation of existing nutrient management plans and additional voluntary practices to reduce soil erosion.

Priority will be given to the subwatersheds with the highest amount of phosphorus and sediment loading. Conservation efforts will be focused on the subwatershed with the greatest amount of loading and move down the list to each subsequently higher total (see Table 3-7).

Subwatershed	Phosphorus (lb/year)	Sediment (tons/year)	Ranking
Black Ash Swamp	5724.2	768.7	**1**
Lower Ahnapee	5392.7	729.6	**2**
Silver Creek	3736.9	521.8	**3**
East Tributary	2879.3	309.5	**4**
North Tributary	2614.4	402.7	**5**
MIllpond	2155.2	318.6	**6**
Upper Ahnapee	1323.1	237.5	**7**
Maplewood Swamp	1169.1	213.6	**8**
Lincoln School	794.5	111.4	**9**
School Road	791.6	161.2	**10**
County Line	265.9	58.4	**11**

Table 3-7. Ranked Subwatersheds by Greatest Amount of Phosphorus and Sediment Loading

4. Surface Water Chemistry

The portion of the Ahnapee River Watershed that enters the Forestville Millpond was the focus of a lake planning grant throughout the 2017 field season. There have been historic sampling locations within the entire Upper Ahnapee Watershed, but the data compiled for the Forestville Millpond study was the most recent and most consistent, and representative of the Upper Ahnapee River Watershed at the time this plan was written.

Upper Ahnapee Sampling Locations in 2017 Forestville Millpond Study

Four sites were sampled on the Ahnapee River system upstream from the Forestville Millpond (see Figure 4-1). Sampling was done twice a month, from May through October of 2017, at the following locations: Station #153161 is located at the County H crossing of the Ahnapee River; Station #10047671 is also located at County H, as it crosses an unnamed tributary; Station #10047672 is located on the main branch of the Ahnapee River, upstream of the confluence with an unnamed tributary flowing from the east; and, Station #10047673 is also located on the Ahnapee River, downstream of the confluence with the same tributary. Stations #10047672 and #10047673 are both located on private property.

Samples were collected by the University of Wisconsin – Oshkosh, Environmental Research and Innovation Center students and staff, according to accepted protocols. Samples were analyzed at the State of Wisconsin Lab of Hygiene. Samples collected at the upstream locations were analyzed for the following:

- Suspended Solids
- Total Phosphorus
- Temperature
- Dissolved Oxygen
- pH

Millpond Sampling Location in 2017 Forestville Millpond Study

Water chemistry samples from the Forestville Millpond were collected at one location, once a month, from June through August of 2017. Station #153160 is located in the southeast end of the Millpond, just upstream of the dam spillways (see Figure 4-2).

Water chemistry samples in the Millpond were also collected by the University of Wisconsin – Oshkosh, Environmental Research and Innovation Center students and staff, according to accepted protocols. Collected samples were analyzed at the State of Wisconsin Lab of Hygiene. Samples collected at the Millpond location were analyzed for the following:

- Suspended Solids
- Total Phosphorus
- Chlorophyll A
- Nitrate + Nitrite
- Total Nitrogen
- Temperature
- Dissolved Oxygen
- pH

Figure 4-1. Upper Ahnapee River Sample Locations.

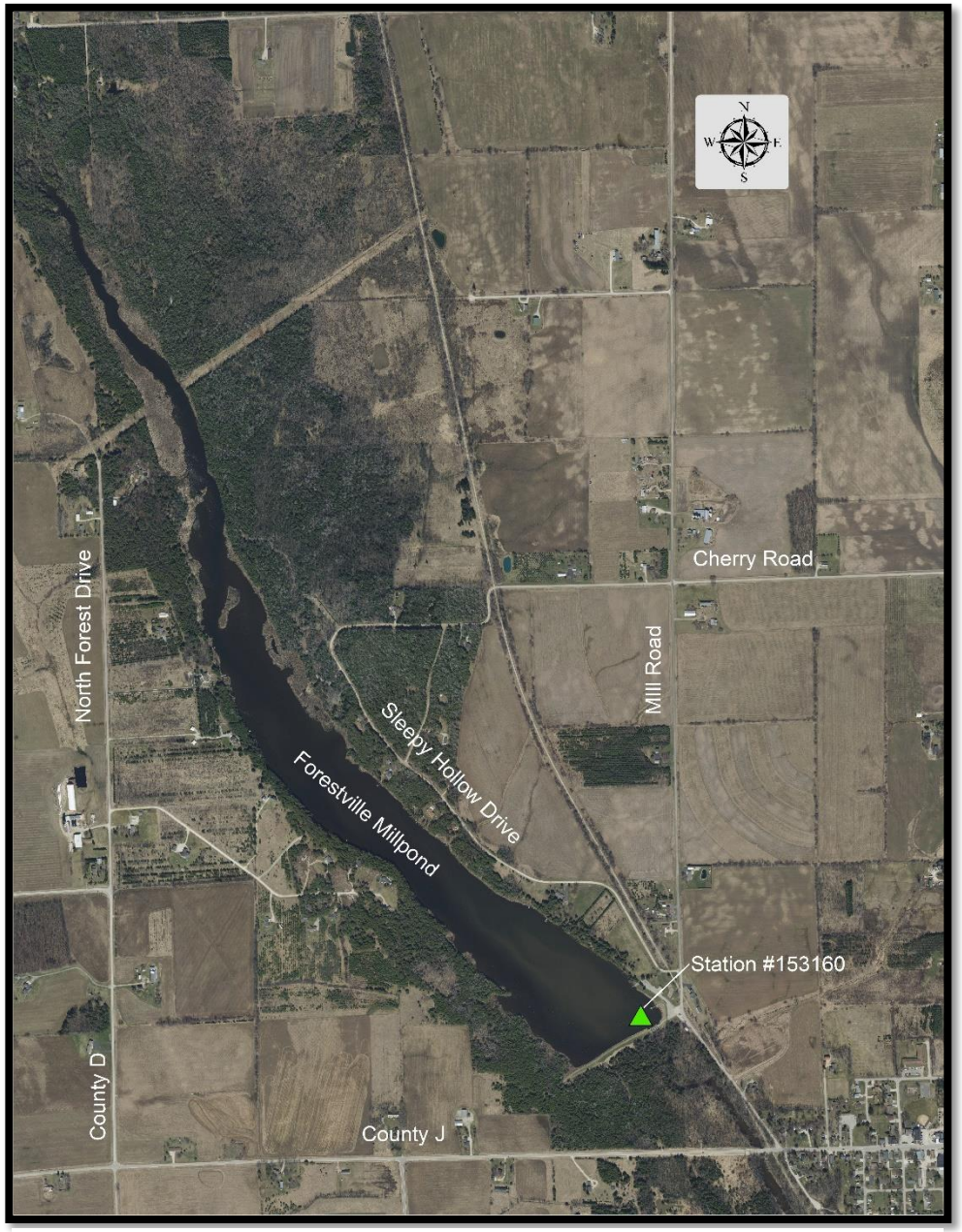

Figure 4-2. Millpond and Downstream Sample Locations.

Results

Station #153161 – Ahnapee River at County H											
Date Sampled	5/15/17	5/30/17	6/12/17	7/17/17	7/31/17	8/22/17	8/30/17	9/16/17	9/30/17	10/15/17	10/28/17
Suspended Solids (mg/L)	No Detect	4.67	7.25	8.0	11.3	12.0	10.2	4.4	2.6	7.0	3.6
Total Phosphorus (mg/L)	0.0204	0.0590	0.107	0.097	0.120	0.108	0.0904	0.023	0.0258	0.0576	0.0423
Temperature (°C)	12.8	17.6	20.7	17.6	19.95	20.02	--	17.64	10.81	11.4	7.45
Air Temperature (°C)	14	14	21	16	22	20	19	29	11	11	4
Dissolved Oxygen (mg/L)	10.3	7.2	5.5	5.4	5.94	2.88	--	10.09	10.17	9.5	3.9
pH	8.4	7.8	8.3	6.6	7.87	7.79	--	6.8	6.43	5.9	7.96
Station #10047671 – Unnamed Tributary											
Date Sampled	5/15/17	5/30/17	6/12/17	7/17/17	7/31/17	8/22/17	8/30/17	9/16/17	9/30/17	10/15/17	10/28/17
Suspended Solids (mg/L)	No Detect	2.50	4.25	2.50	No Detect	4.0	7.2	11.3	12.5	7.75	6.0
Total Phosphorus (mg/L)	0.0368	0.0360	0.0412	0.052	0.0196	0.0258	0.0333	0.165	0.334	0.13	0.0456
Temperature (°C)	14.4	16.0	18.1	16.1	22.57	16.55	--	18.19	14.46	12.2	7.0
Air Temperature (°C)	14	14	21	16	22	20	19	29	11	11	4
Dissolved Oxygen (mg/L)	8.8	9.0	8.7	6.13	3.37	4.14	--	3.79	1.78	8.0	4.1
pH	8.5	8.3	8.3	7.4	7.13	7.92	--	6.17	6.18	6.2	8.02
Station #10047672 – John May 80M											
Date Sampled	5/15/17	5/30/17	6/12/17	7/17/17	7/31/17	8/22/17	8/30/17	9/16/17	9/30/17	10/15/17	10/28/17
Suspended Solids (mg/L)	4.75	3.25	5.50	3.60	3.0	5.6	2.6	2.4	No Detect	14.8	No Detect
Total Phosphorus (mg/L)	0.0286	0.0431	0.0614	0.066	0.0327	0.0392	0.0227	0.018	0.0201	0.261	0.0419
Temperature (°C)	11.4	16.5	20.2	17.7	22.91	18.91	--	20.21	12.4	11.9	6.98
Air Temperature (°C)	14	14	21	16	22	20	19	19	11	11	4
Dissolved Oxygen (mg/L)	8.7	8.8	7.9	5.6	5.82	3.8	--	9.98	10.52	8.2	4.0
pH	8.4	8.6	8.3	7.7	8.28	8.06	--	7.16	8.07	6.9	7.96
Station #10047673 – John May 50M											
Date Sampled	5/15/17	5/30/17	6/12/17	7/17/17	7/31/17	8/22/17	8/30/17	9/16/17	9/30/17	10/15/17	10/28/17
Suspended Solids (mg/L)	No Detect	3.50	6.75	3.00	2.8	7.8	2.8	No Detect	No Detect	9.0	2.0
Total Phosphorus (mg/L)	0.0290	0.0454	0.0652	0.081	0.0369	0.0568	0.0270	0.0181	0.02	0.0793	0.0376
Temperature (°C)	11.6	16.6	20.2	17.4	22.67	18.93	--	20.35	12.09	11.9	6.99
Air Temperature (°C)	14	14	21	16	22	20	19	29	11	11	4
Dissolved Oxygen (mg/L)	8.9	9.2	7.8	5.4	5.5	3.62	--	10.14	10.47	9.4	1.3
pH	8.4	8.7	8.5	7.6	8.16	8.04	--	6.98	6.81	5.9	8.02

Table 4-1. Water Chemistry Data from Upstream Locations from 2017 Forestville Millpond Study.

Station #153160 – Forestville Millpond Above Dam – 1-foot Depth			
Date Sampled	7/17/17	8/22/17	9/16/17
Suspended Solids (mg/L)	22.0	22.5	5.8
Total Phosphorus (mg/L)	0.136	0.0851	0.0355
Temperature (°C)	25.43	23.95	23.78
Air Temperature (°C)	16	20	29
Dissolved Oxygen (mg/L)	6.23	3.2	10.48
pH	8.11	8.29	6.66
Chlorophyll A - µg/L	59	41.7	5.1
Nitrate + Nitrite - mg/L	0.909	0.815	2.0
Total Nitrogen- mg/L	2.36	2.32	1.31

Table 4-2. Water Chemistry Data in Forestville Millpond (One-Foot Depth) – 2017.

Station #153160 – Forestville Millpond Above Dam – 3-foot Depth			
Date Sampled	7/17/17	8/22/17	9/16/17
Suspended Solids (mg/L)	--	--	7.6
Total Phosphorus (mg/L)	--	--	0.0348
Temperature (°C)	21.98	23.79	23.58
Air Temperature (°C)	16	20	29
Dissolved Oxygen (mg/L)	4.42	3.29	10.39
pH	7.82	8.39	7.63
Chlorophyll A - µg/L	--	--	6.44
Nitrate + Nitrite - mg/L	--	--	2.04
Total Nitrogen- mg/L	--	--	1.22

Table 4-3. Water Chemistry Data in Forestville Millpond (Two-Foot Depth) – 2017.

Station #153160 – Forestville Millpond Above Dam – 5-foot Depth			
Date Sampled	7/17/17	8/22/17	9/16/17
Suspended Solids (mg/L)	--	--	--
Total Phosphorus (mg/L)	--	--	--
Temperature (°C)	21.66	23.76	23.0
Air Temperature (°C)	16	20	29
Dissolved Oxygen (mg/L)	3.93	3.43	10.82
pH	7.72	8.42	8.05
Chlorophyll A - µg/L	--	--	--
Nitrate + Nitrite - mg/L	--	--	--
Total Nitrogen- mg/L	--	--	--

Table 4-4. Water Chemistry Data in Forestville Millpond (Three-Foot Depth) – 2017.

Raw data collected at these sites can be reviewed in Appendix A of this document.

Total Suspended Solids

Total Suspended Solids (TSS) occur from a number of materials including silt, decaying plant and animal matter, industrial waste and sewage. These can be from a variety of sources including excess soil erosion, wastewater discharge, snow melt and stormwater runoff.

High TSS concentrations can impact aquatic life in a number of ways, one of the most prevalent being the blocking of sunlight from reaching submerged vegetation, resulting in reduced rates of photosynthesis. As photosynthesis is reduced, plants release less dissolved oxygen into the water. Light that is completely blocked can led to death of aquatic vegetation and subsequent decomposition, using available oxygen. Each of these situations leads to low dissolved oxygen and potential fish kills. Elevated TSS can also lead to decreased water quality and impact the ability of fish to see and catch prey. Suspended sediment can also clog fish gills, reduce growth rates, decrease resistance to disease, and prevent egg and larval development.

There is not a specified threshold to evaluate TSS. As a general guide, permits issued to wastewater treatment plants outline a maximum of 20 mg/L as a monthly average and 30 mg/L as a weekly average. TSS concentrations in the upstream sample sites did not exceed 13 mg/L, and five of the forty-four samples taken throughout the season exceeded 10 mg/L. Of four samples taken within the Millpond, the July and August samples, taken at a depth of one foot, exceeded 20 mg/L.

Total Phosphorus

Phosphorus is an essential nutrient in plants and animals, and is also a common constituent of agricultural fertilizers, manure, and organic wastes in sewage and industrial effluent. Phosphorus exists in water in either a particulate phase or a dissolved phase. Particulate matter includes living and dead plankton, precipitates of phosphorus, phosphorus adsorbed to particulates, and amorphous phosphorus. The dissolved phase includes inorganic phosphorus and organic phosphorus. Total phosphorus (TP) is a measure of all the forms of phosphorus, dissolved or particulate, that are found in a sample.

A disproportionate level of Phosphorus in waterbodies is the major nutrient contributor to excessive aquatic plant growth, including algae blooms. Eutrophication is a natural process that results from accumulation of nutrients in lakes or other water bodies, but it is often accelerated by human activities that increase the rate and the amount of nutrients entering the water body. If excessive amounts of nutrients are added to a water body, algae and aquatic plants can grow in large quantities. When these plants die, they are decomposed by bacteria, which use dissolved oxygen. Dissolved oxygen concentrations can drop too low for fish to breathe, leading to fish kills. Excessive amounts of algae grow into scum on the water surface, decreasing recreational value and clogging water-intake pipes. Rapid decomposition of dense algae scums with associated organisms can give rise to foul odors.

The State of Wisconsin has established the maximum threshold for Phosphorus levels in surface waters throughout the state. As outlined in NR 102.06(3)(b), the maximum threshold criterion for total phosphorus in the Ahnapee River is 75 micrograms per liter (µg/L) or .075 milligrams per liter (mg/L). As outlined in NR 102 (4)(b)3, the maximum threshold criterion for the Forestville Millpond is 40 micrograms per liter (µg/L) or .040 milligrams per liter (mg/L). Algal blooms in surface waters are likely to occur at phosphorus levels greater that 20 micrograms per liter (µg/L) or 0.020 milligrams per liter (mg/L). Nearly all of the samples taken in the upstream locations (#'s 153161, 10047671, 10047672 and 10047673)revealed levels that exceeded 0.020 mg/L and eleven of the forty-four samples exceeded the 0.075 mg/L stream threshold (see Chart 4-1). All of the samples taken in the Millpond (#153160) revealed levels in exceedance of 0.020 mg/L and two of the three samples exceeded the 0.040 mg/L threshold designated for waterbodies similar to The Forestville Millpond (see Chart 4-2).

The Lower Ahnapee River, below the Forestville Dam, has been listed as a 303(d) Impaired Water, due to excessive Total Phosphorus concentrations. The link to this designation and the condition of the Millpond and Upper Ahnapee watersheds is clear upon review of Total Phosphorus concentrations in this study.

Temperature

The measurement of temperature provides an indicator of specific conditions at the time of sampling, as well as potential levels of thermal pollution. Thermal pollution can be described as the human-induced change in the temperature of lakes, rivers and other surface waters to the point that it could adversely affect fish and other aquatic wildlife. Elevated water temperatures can reduce the reproductive success of fish and other aquatic wildlife, can contribute to degradation of habitat and in extreme cases can lead to fish kills.

The acute temperature criteria has been established for each month by water type. The Ahnapee River is considered a small, warm-water fishery. The acceptable temperature threshold for the Ahnapee ranges from 80°F - 85°F throughout the field season; all of the samples were well below the acute temperature criteria (see Chart 4-3). Temperatures in the Millpond fell within 71°F – 77.8°F (see Chart 4-4).

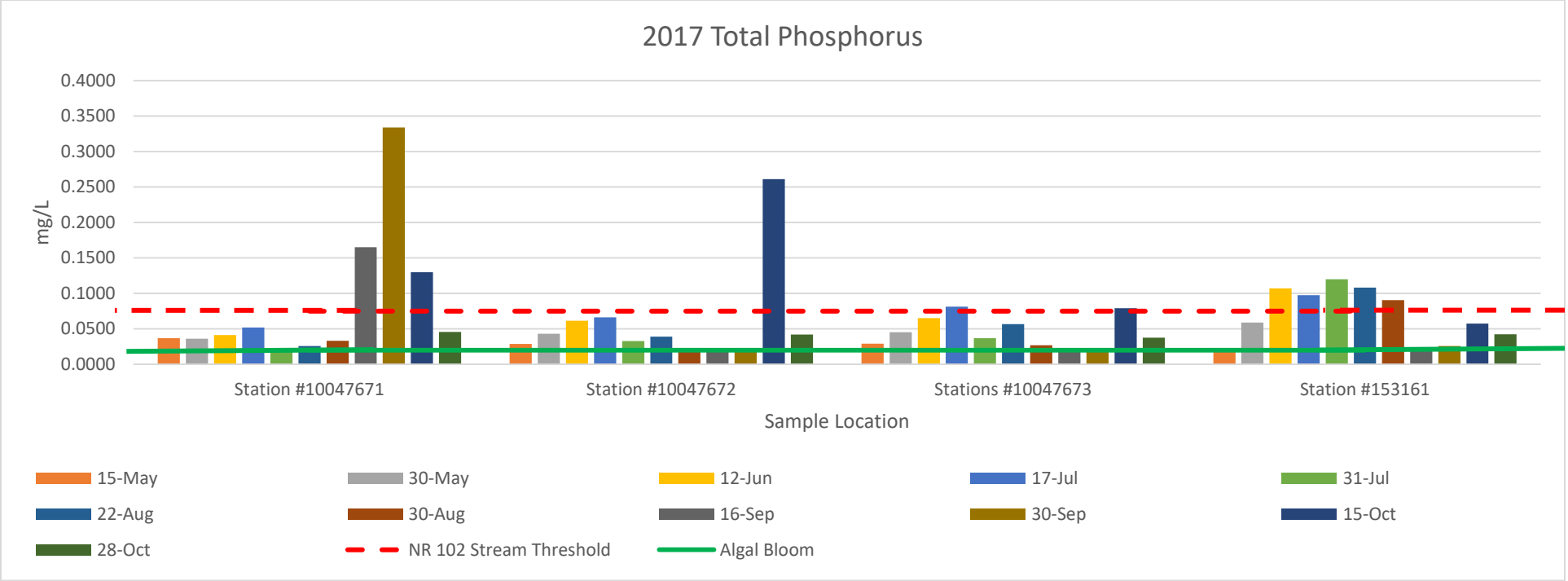

Chart 4-1. Total Phosphorus at Upstream Sites - 2017.

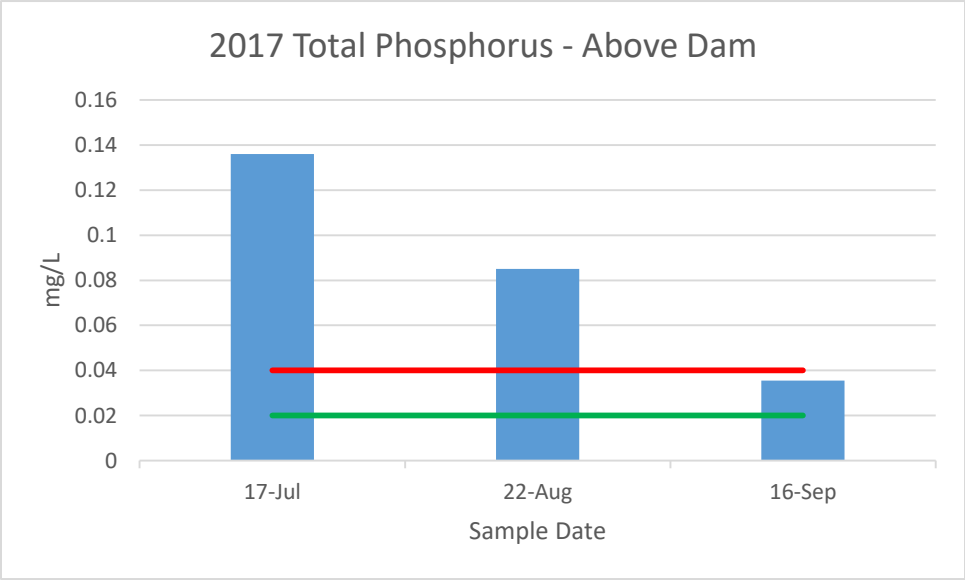

Chart 4-2. Total Phosphorus at Millpond Site - 2017.

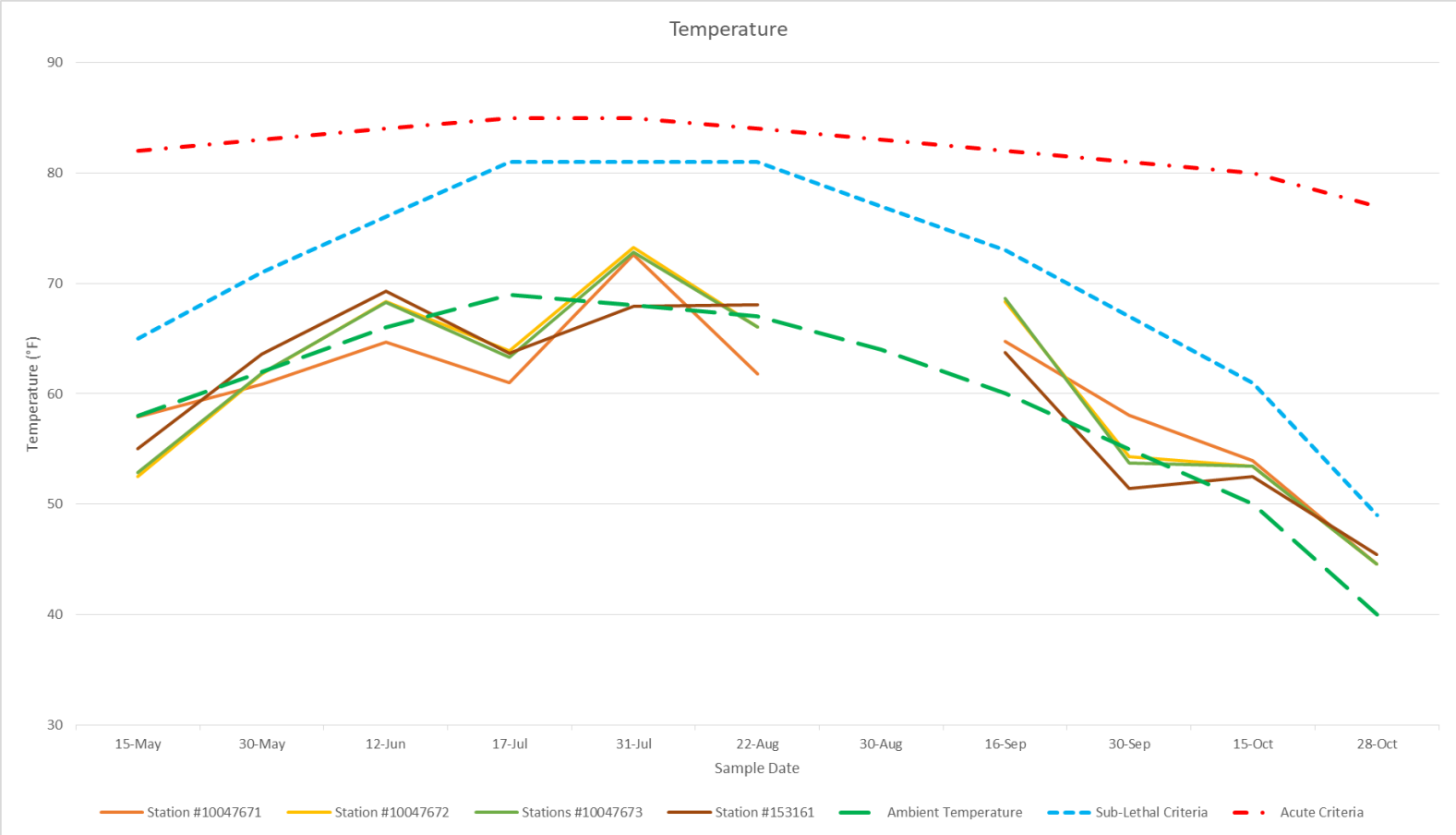

Chart 4-3. Temperature at Upstream Sites – 2017.

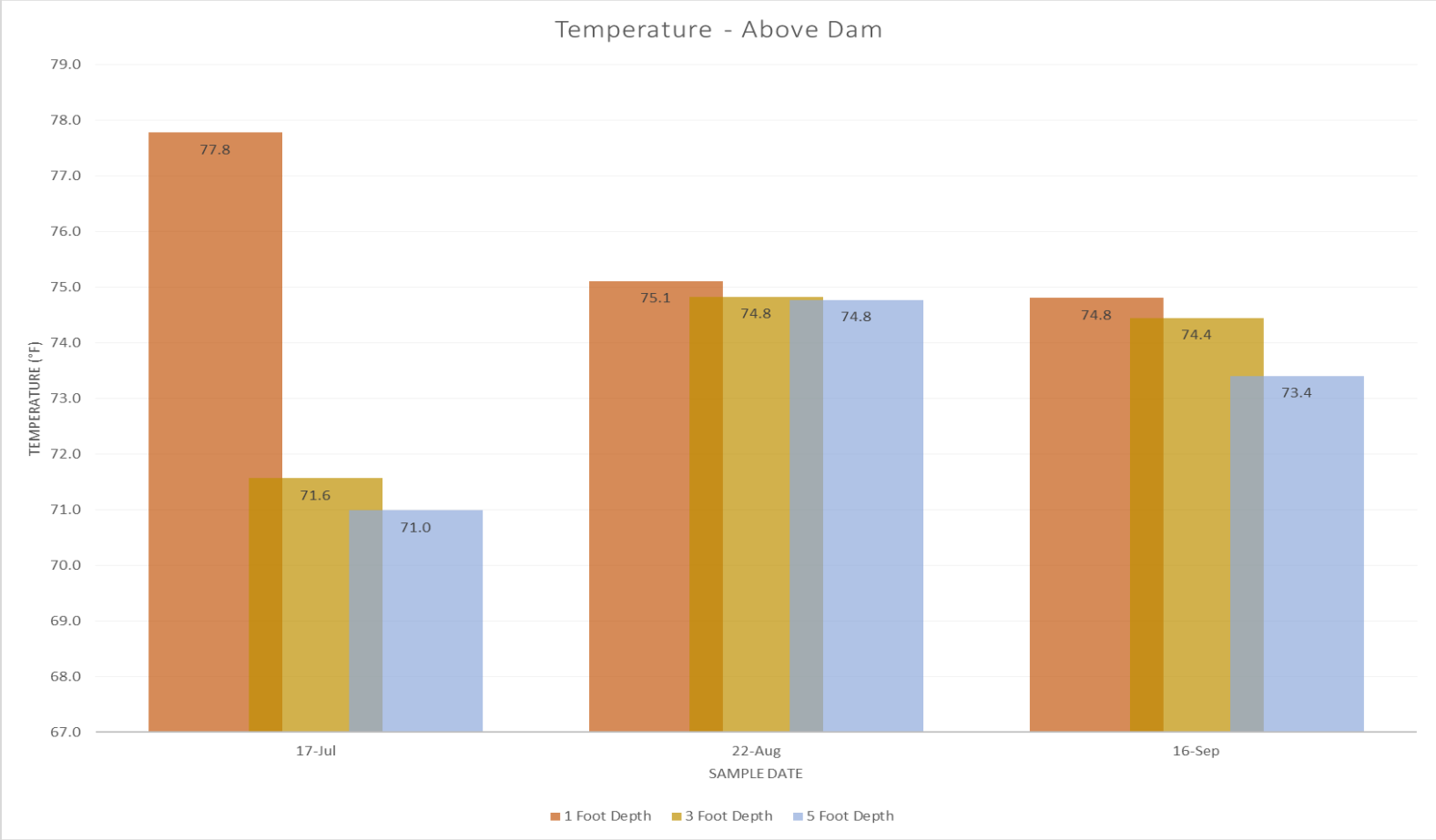

Chart 4-4. Temperature above the Dam - 2017

Dissolved Oxygen

Dissolved oxygen is the amount of gaseous oxygen that is dissolved in the water; this is a result of direct absorption from the atmosphere, aeration through rapid movement or a byproduct of photosynthesis by aquatic plants. The amount of dissolved oxygen in a waterbody represents the amount of oxygen available to aquatic organisms including, fish, invertebrates and bacteria; anything that lives in the water and requires oxygen to respire, relies on dissolved oxygen. As the concentration of dissolved oxygen in a waterbody drops, it will result in changes in the types and amounts of aquatic organisms that can survive there. The measurement of dissolved oxygen is one of the most significant parameters to measure to determine the suitability of a waterbody for fish and other aquatic life.

Oxygen is removed from the water through chemical reactions that occur during the decay process and respiration of aquatic organisms. Temperature of the water, atmospheric pressure, light penetration and water turbulence can all impact the concentration of dissolved oxygen in a waterbody. Dissolved oxygen levels can be drastically reduced by the introduction of excessive amounts of organic matter such as sewage, manure or decaying plant matter. Introduction of warm water, excess nutrients and erosion from cropland and urban sources can also drastically impact dissolved oxygen concentrations.

The State of Wisconsin has established the minimum concentration of dissolved oxygen content to support fish and aquatic life to be 5 milligrams per liter (mg/L). Dissolved oxygen concentrations in the upstream sampling locations each dropped below the 5 mg/L threshold at times throughout the sampling season (see Chart 4-5). Concentrations measured in the Millpond were below the 5 mg/L threshold at various depths in the July sample, all depths in the August sample and all depths were above 5 mg/L in September (see Chart 4-6).

pH

From a chemistry perspective, pH is the measurement of the intensity of the acidity of a solution. Acids are defined as those compounds that release a hydrogen atom, and bases are those compounds that accept protons; pH is a measure of hydrogen ion activity. Both surface and groundwater have naturally occurring ranges of pH. Changes in the pH of a waterbody can have drastic effects on aquatic life (see Table 4-5). Most organisms have adapted to a specific pH and even slight changes can have significant consequences, this is especially true of aquatic macroinvertebrates and fish eggs and fry.

Several factors affect pH in surface waters. One of the most important is the bedrock and composition of the soil through which the water moves. Additionally, pH can be influenced by the amount of plant growth and organic material that exists in the waterbody; as this material decomposes, carbon dioxide is released, resulting in a weak carbonic acid due to the interaction with the water. Another factor that affects the pH of a waterbody is the introduction of chemicals and minerals from human activity. This can be in the forms of discharge, runoff, and atmospheric depositions.

pH values that have been established for fish and aquatic life fall between 6.0 and 9.0, with no greater than a change greater than 0.5 outside the estimated natural seasonal maximum and minimum. The recorded pH for all of the upstream sites and the Millpond sampling site fell between 6.2 and 8.4.

Water pH	Effects
6.5	Walleye spawning inhibited
5.8	Lake trout spawning inhibited
5.5	Smallmouth bass disappear
5.2	Walleye, burbot, lake trout disappear
5.0	Spawning inhibited in many fish
4.7	Northern pike, white sucker, brown bullhead, pumpkinseed, sunfish and rock bass disappear
4.5	Perch spawning inhibited
3.5	Perch disappear
3.0	Toxic to all fish

Table 4-5. Impact of Acidity on Fish Species

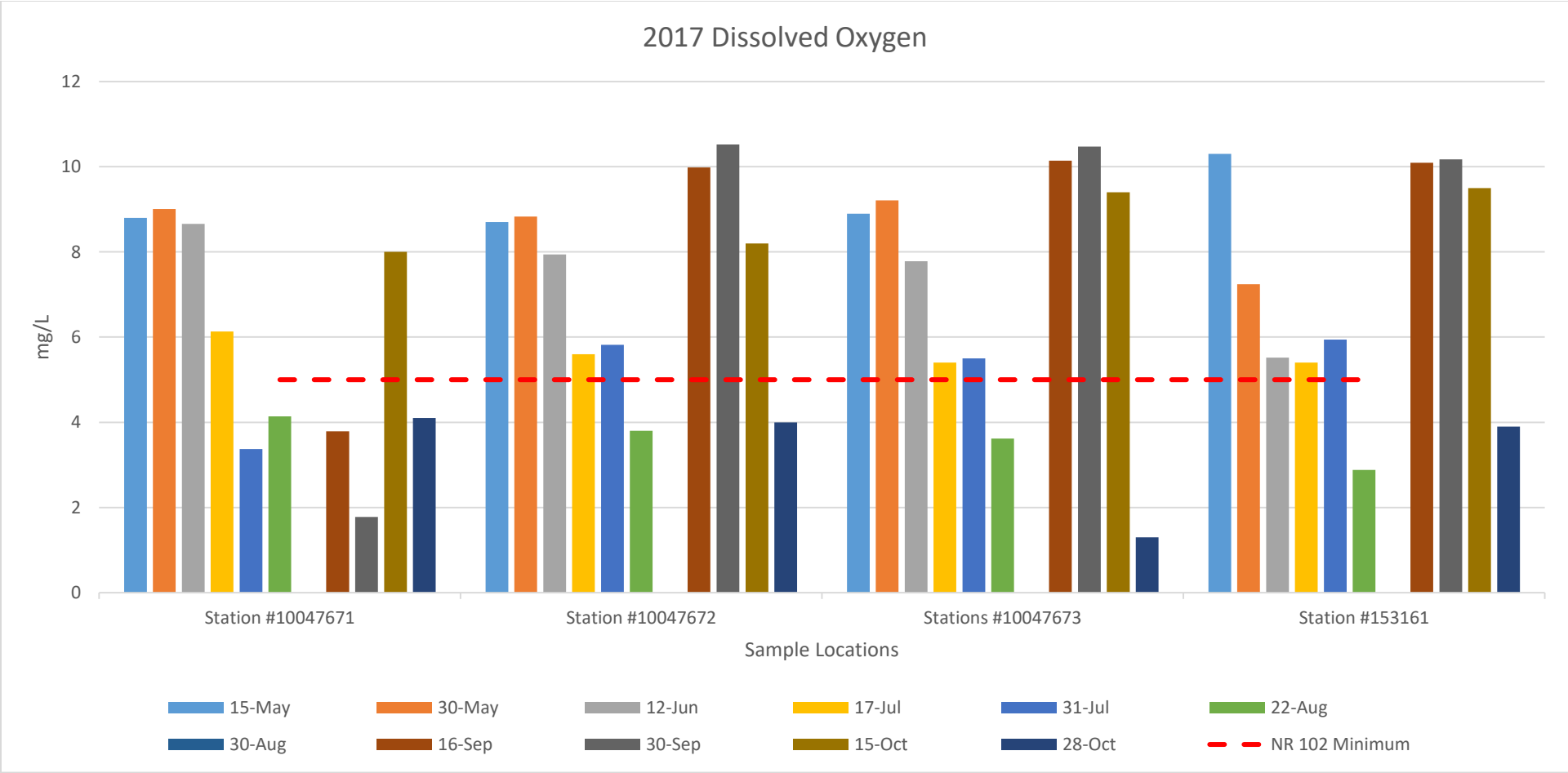

Chart 4-5. Dissolved Oxygen Concentrations in Upstream Samples – 2017.

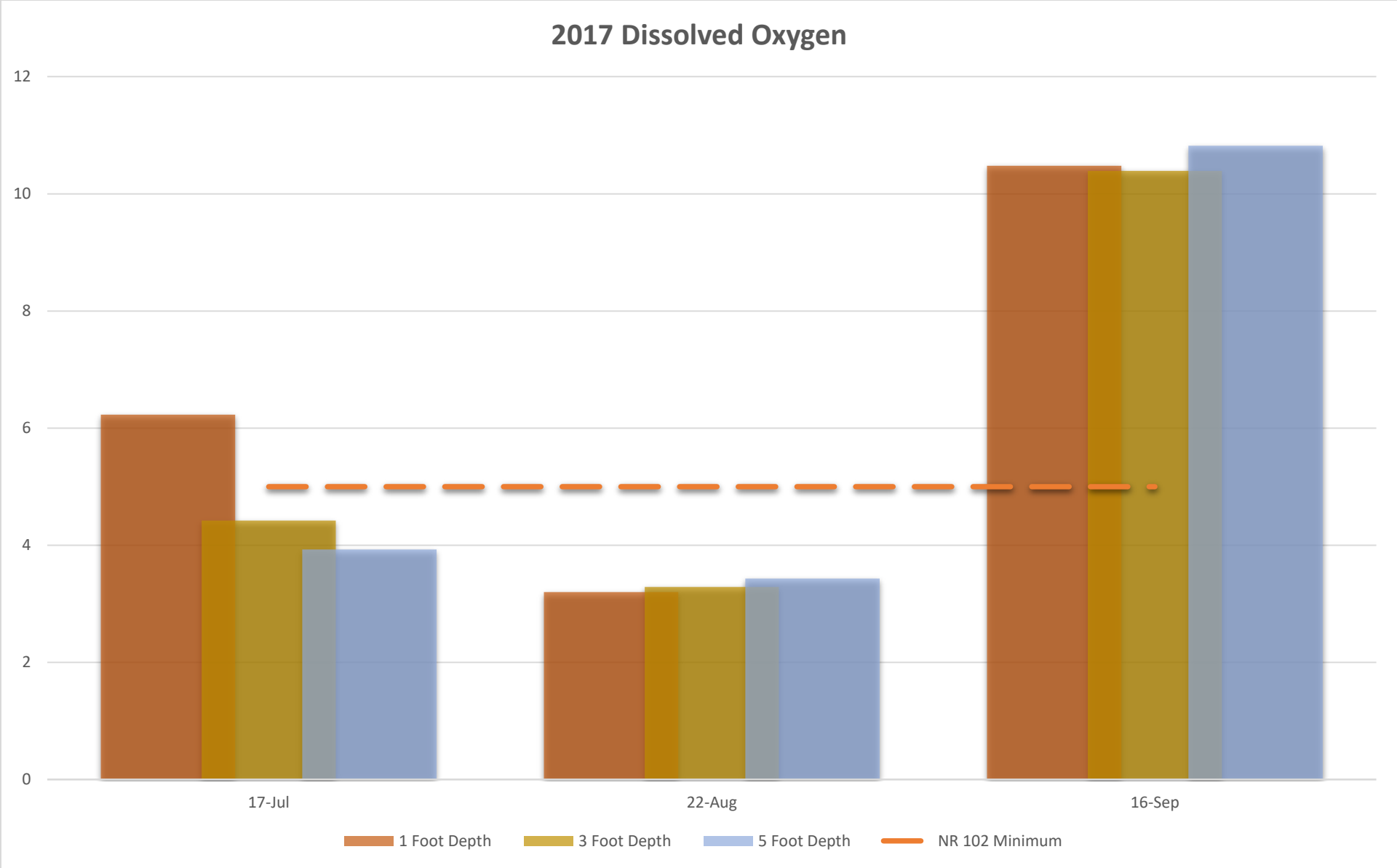

Chart 4-6. Dissolved Oxygen Concentrations in Millpond Samples- 2017.

Chlorophyll-A

Chlorophyll allows photosynthesizing plants to use sunlight to convert light energy into chemical energy. Chlorophyll-A is the predominant type of chlorophyll found in green plants and algae and is used as a measure of the algae biomass in a waterbody, a symptom of degraded water quality conditions. Algae populations that grow rapidly form blooms that have the potential to create health risks and water quality concerns. Some water quality problems that arise from high concentrations leading to algae blooms can be reduced light penetration impacting aquatic plant populations, discoloration of water, taste and odor concerns and reduced dissolved oxygen resulting in less available oxygen to plants and aquatic life. Development of blue-green algae blooms can bring about the production of naturally-occurring toxins that present a health risk to people, pets, livestock and wildlife. Chlorophyll-A is one of the measurements used to estimate a lake's Trophic State Index (TSI). The TSI will be discussed in a separate section of this chapter. The generally accepted chlorophyll-A threshold for fish & aquatic life use impairment is 27 µg/L. The samples taken in July and August exceeded this threshold with values of 59 µg/L and 41.7 µg/L, respectively. The sample taken in September was 5.1 µg/L.

Nitrogen

Nitrate and Nitrite are naturally occurring, inorganic ions throughout the environment. As organic materials decompose, they release ammonia, which is in turn oxidized to form both nitrates and nitrites. The primary sources of organic nitrates include human sewage, livestock manure, fertilizers and erosion of natural deposits. Waterbodies producing nitrogen samples in excess of 0.3 mg/L in the spring have shown sufficient levels to support summer algae blooms. All samples taken in the Millpond exceeded this value.

Total nitrogen is the sum of the three forms of nitrogen that are commonly measured, total kjedhal nitrogen (ammonia, organic and reduced nitrogen) and nitrate-nitrite. Water with low dissolved oxygen may slow the rate at which ammonium is converted to nitrite (NO2-) and finally nitrate (NO3-). Nitrite and ammonium are far more toxic than nitrate to aquatic life.

The Wisconsin DNR currently regulates nitrogen as a toxic substance through implementation of the state's water quality standards for ammonia. The acute and chronic toxicity criteria is determined on a case-by-case basis, dependent on the appropriate aquatic life use category. Chart 4-7 illustrates the nitrogen concentrations measured on the Millpond.

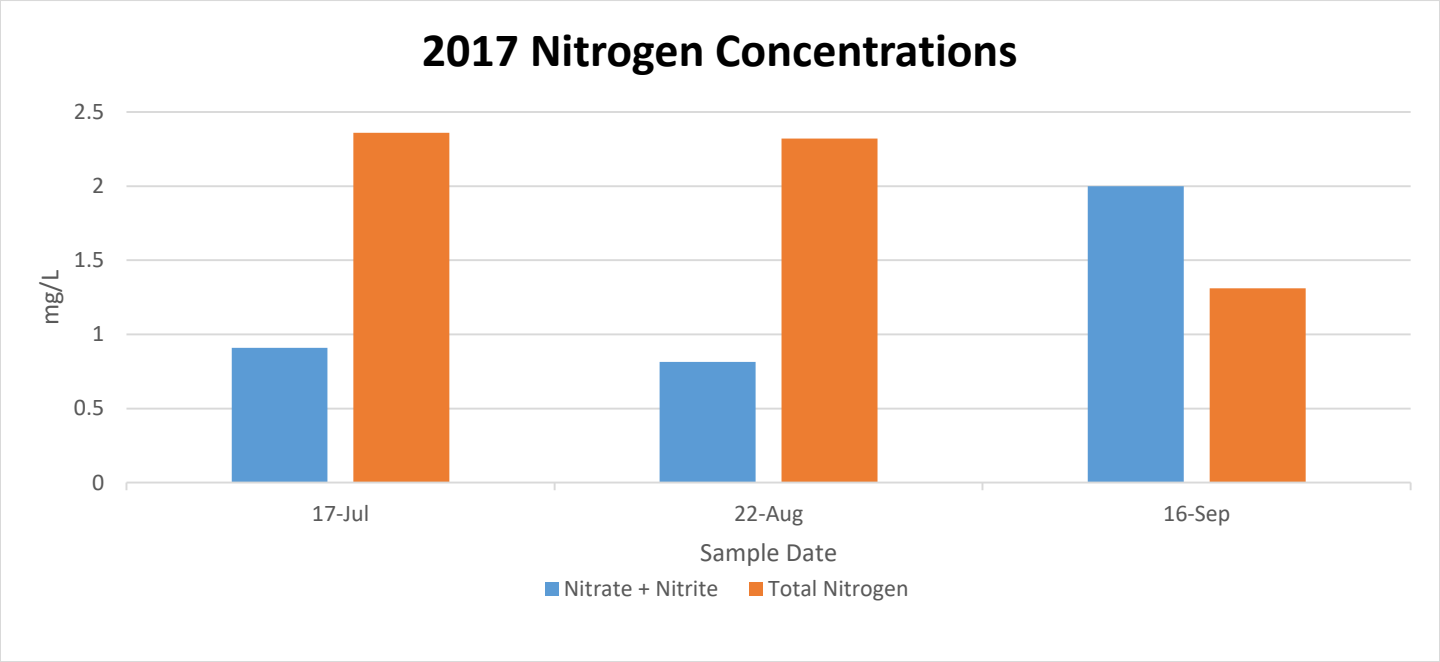

Chart 4-7. Nitrogen Concentrations in Millpond Samples - 2017

Millpond Trophic State Index

The Trophic State Index (TSI) is a classification system that rates lakes, ponds and reservoirs based on the biological activity, generally driven by nutrient loading. Classifications are as follows:

> Oligotrophic – Low nutrient levels. Low populations of aquatic plants, animals and algae.
>
> Mesotrophic – Moderate nutrient levels. Healthy and diverse populations of aquatic plants, fish and algae
>
> Eutrophic – High nutrient levels. Large populations of aquatic plants, fish and algae. Plants and algae populations often grow to nuisance levels. Fish species tolerant of warm temperatures and low dissolved oxygen concentrations.
>
> Hypereutrophic – Very high nutrient levels. Often exhibit large algae blooms. Fish populations are dominated by carp and other species that tolerate warm temperatures and low dissolved oxygen concentrations.

Based on the chemistry data collected in the 2017 season, the average summer Chlorophyll concentration was determined to be 50.4 µg/L. The summer Total Phosphorus average was 136 µg/L.

The overall Trophic State Index was 64. The TSI suggests that the Forestville Millpond ranks as eutrophic. This TSI usually suggests blue-green algae become dominant and algal scums are possible, extensive plant overgrowth problems possible.

By contrast, results calculated in 1994 present an average summer Chlorophyll concentration of 25.4 µg/L and summer Total Phosphorus concentrations at an average 58 µg/L. This resulted in an overall TSI score of 59.

WDNR Wadeable Trend Reference Site

The Wisconsin DNR has a long-term monitoring station located at Station #153161, the County H crossing of the Ahnapee River. This station is part of the Wadeable Trend Reference Streams program to track long-term variation in biological indices. Conversation with the Wisconsin DNR Water Quality Biologist has confirmed that monitoring at this site will continue through the duration of this plan. Future monitoring frequency will be determined with Wisconsin DNR consultation and assessment of implementation efforts in the upstream subwatersheds.

Total Phosphorus results for this program, from 2010 - 2019 are displayed below in Table 4-6.

Date	Jul-10	Jul-11	Jul-12	Aug-13	Aug-14	Jul-15	Aug-16	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17
TP (mg/L)	0.0500	0.0400	0.0160	0.0245	0.0285	0.0188	0.0332	0.0277	0.0868	0.1050	0.1010	0.1240	0.0542
Date	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19
TP (mg/L)	0.0646	0.0346	0.1070	0.2700	0.0984	0.0331	0.0221	0.0324	0.0336	0.0269	0.0258	0.0515	0.0398

Table 4-6. Total Phosphorus Results at Station #153161, 2010-2019

Macroinvertebrate Index of Biotic Integrity

Macroinvertebrates were collected at this site annually in the fall of 2010 through 2018. Aquatic macroinvertebrates are commonly used as indicators of stream health because they have limited mobility and are continuously exposed to the stream conditions. WDNR has identified wadeable stream Macroinvertebrate Index of Biological Integrity (M-IBI) thresholds for four condition categories – poor, fair, good, and excellent (WDNR 2019). In three of the nine years, the M-IBI was in the "fair" category and in the "good" category in six out of nine years (see Chart 4-8).

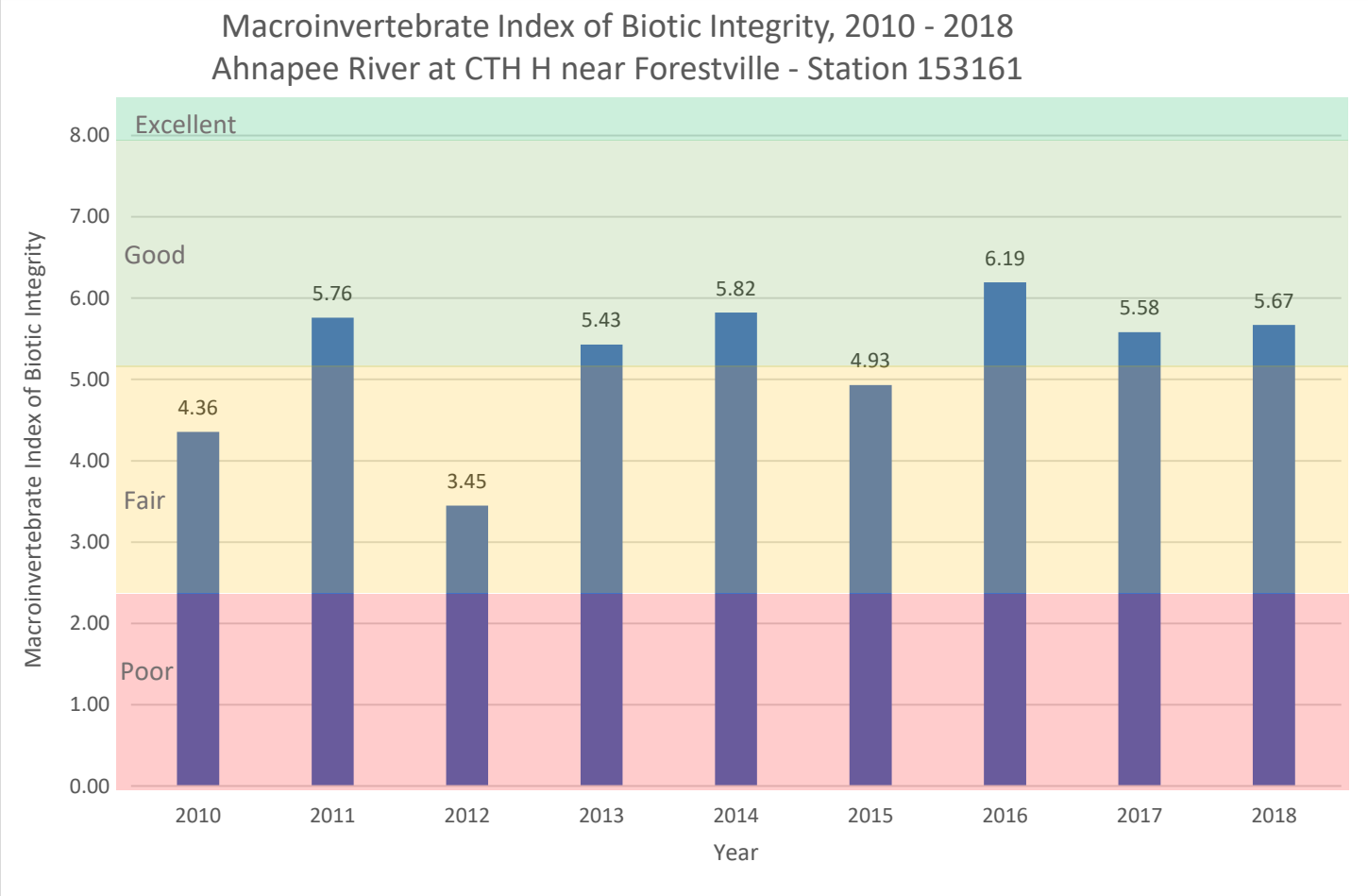

Chart 4-8. Macroinvertebrate Index of Biotic Integrity – Station 153161.

Future Monitoring

As indicated in the previous sections, several monitoring sites have provided data valuable in the assessment of the Upper Ahnapee Watershed, above and below the Forestville Millpond. The Wisconsin DNR monitoring station established as part of the Wadeable Trend Reference Stream program (Station #153161) will be maintained and monitoring will be continued throughout the duration of this plan by the WDNR. Additionally, as funding allows, the SWCD will evaluate conditions in the Forestville Millpond after the drawdown. Monitoring should include water chemistry data, as well as an aquatic plant survey in 2023 and bathymetric surveys in 2022 and 2023. The SWCD will partner with the WDNR to identify future monitoring frequency, locations and available funding sources.

5. Implementation of Agricultural Standards

Chapter 23 of Door County Code

The Door County *Agricultural Performance Standards and Animal Waste Storage Ordinance* was adopted by the Door County Board of Supervisors on August 24, 2004 and codified as Door County Code Chapter 23. This comprehensive ordinance was created to address the Statewide Agricultural Performance Standards and Manure Management Prohibitions established by the State in Chapter NR 151, Wisconsin Administrative Code. This ordinance also includes a revision of the 1987 Animal Waste Storage Ordinance. Subsequent updates have occurred in 2013, 2016 and 2018 to include updated performance standards.

The following activities are subject to the ordinance and will be the focus of the Door County Soil and Water Conservation Department throughout the Upper Ahnapee River Watershed, and all of the county:

Agricultural Performance Standards	Manure Management Prohibitions

• Sheet, Rill and Wind Erosion
• Manure Storage Facilities
  • New Construction and Alterations
  • Closure
  • Failing and Leaking Existing Facilities
• Clean Water Diversions
• Nutrient Management
• Tillage Setbacks
• Phosphorus Index
• Process Wastewater Handling
• Silurian Bedrock
	• No Overflow of Manure Storage Facilities
	• No Unconfined Manure Pile in a Water Quality Management Area
	• No Direct Runoff from a Feedlot or Stored Manure into Waters of the State
	• No Unlimited Access by Livestock to Waters of the State

A copy of Chapter 23 can be reviewed in Appendix D of this document.

Status of Chapter 23 Compliance

Implementation of Chapter 23 has been ongoing since the adoption of the ordinance in 2004. Since that time, 46% of the ag-related parcels have been inventoried for part or all of the above items, contingent on the performance standards in effect at that time (see Figure 5-1) and following an established implementation strategy. It should be noted that there have not yet been any parcels inventoried for compliance with the Silurian bedrock performance standard, as the update has only recently been adopted and supporting technical standards are currently under development.

The SWCD's strategy for agricultural performance standards and prohibitions implementation is outlined in the Land and Water Resource Management Plan, Chapter 3.1.9. This strategy includes several components: voluntary participation, required compliance through other programs and geographic prioritization to identify parcels most likely to impact surface and groundwater resources. While 98% of the cropland in the watershed has been included in a nutrient management plan, only 46% of the ag-relatd parcels have been inventoried for compliance with Chapter 23 (see Figure 6-1). The remainder of the agricultural parcels will also be a priority for inventory and compliance determinations following the established county-wide implementation strategy.

Of the ag-related parcels that have been inventoried, 65% have been determined to be compliant with Chapter 23 prior to adoption of the 2018 update (see Chart 5-1). Partial compliance acknowledges that not all of the performance standards have been inventoried on a given parcel and noncompliance items are a mix of livestock and cropland issues.

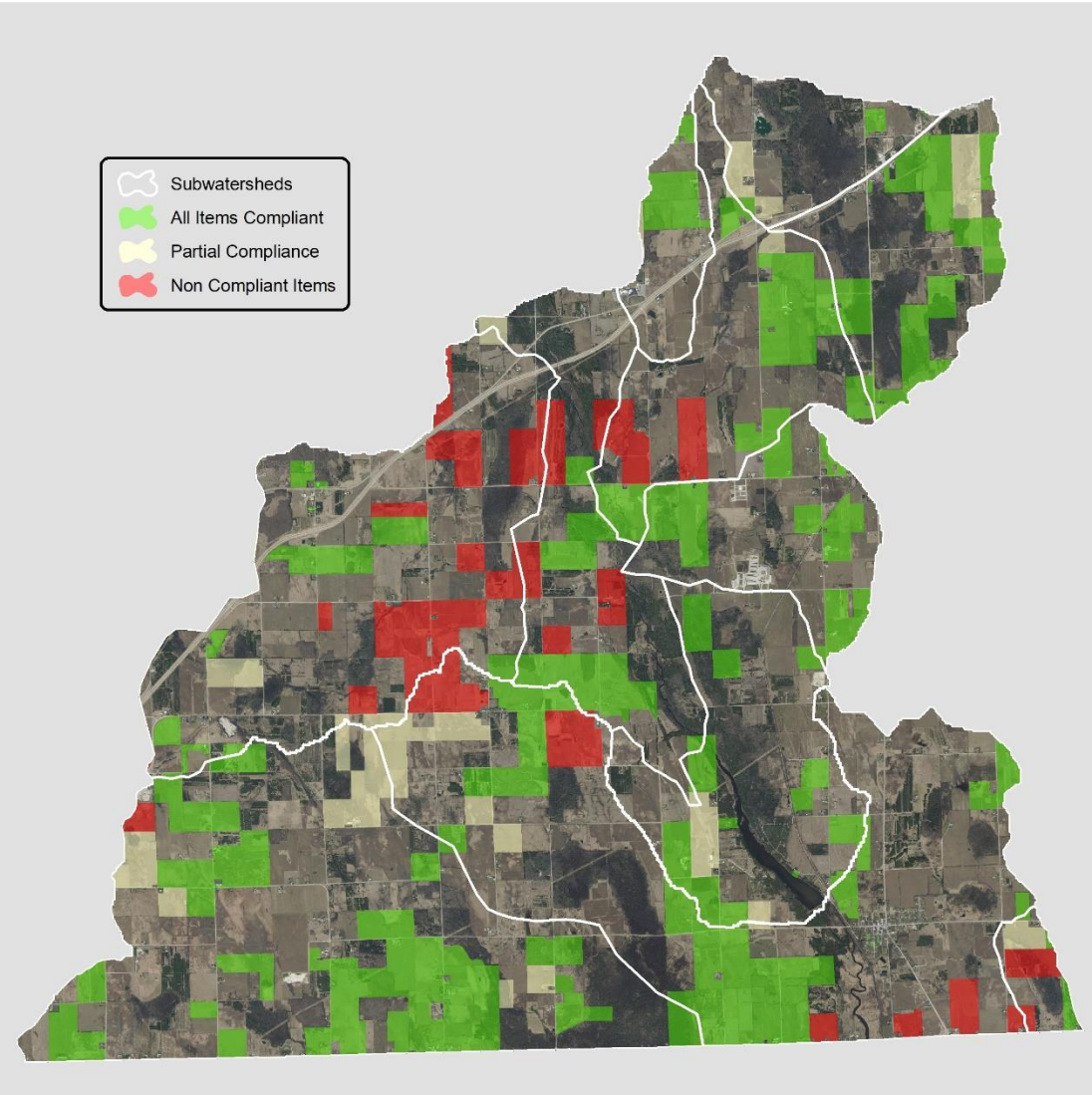

Figure 5-1. Distribution of Compliance with Chapter 23 on Sites Inventoried Prior to 2018 Update.

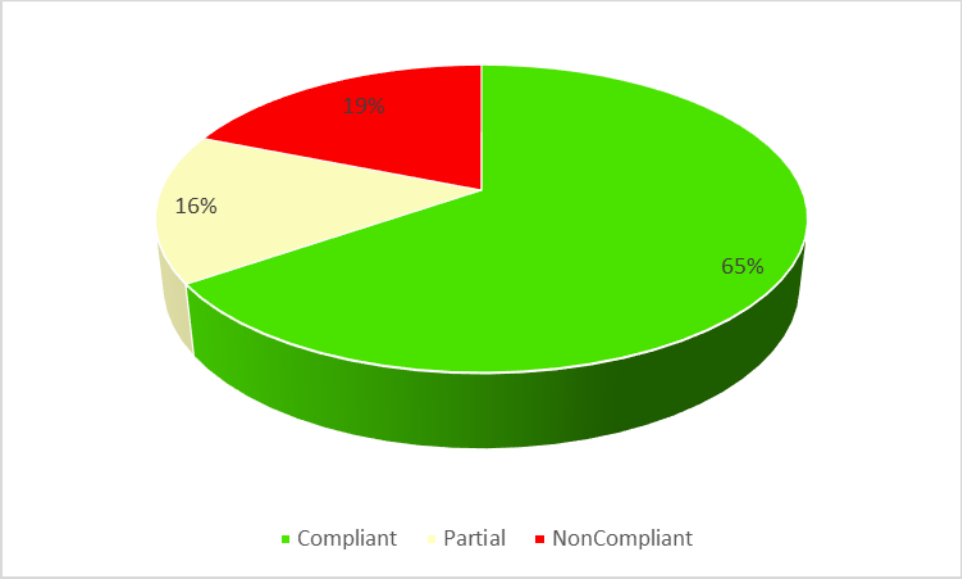

Chart 5-1. Distribution of Compliance with Chapter 23 on Sites Inventoried Prior to 2018 Update.

Noncompliant parcels that have received notifications in the Upper Ahnapee River Watershed are predominantly deficiencies in cropping practices to meet nutrient management requirements. Most of the owners and operators with outstanding compliance issues have been given deadlines to achieve compliance and, where appropriate, offers of cost-share assistance. Documented compliance tracking will be updated as compliance is achieved. These parcels will continue to be a priority to address water quality needs in the watershed.

6. Goals and Activities

Overview

The goals and activities established for this plan were adapted from the Door County Land and Water Resource Management Plan 2011-2020 (DC SWCD 2015). These were further refined to reflect considerations specific to the watershed and have the common purpose of improving and sustaining water quality and ecological integrity of the Upper Ahnapee River Watershed.

- Improve and maintain the drinking water supply within the Upper Ahnapee River Watershed to acceptable State standards.
- Protect and improve the surface water resources of the Upper Ahnapee River Watershed from nonpoint source pollution and maintain acceptable State surface water quality standards.
- Maintain the ecological integrity of the Ahnapee River Corridor, including associated upland forest habitat and wetlands.

The direction taken by the SWCD in addressing these concerns will be through a series of activities, long and short-term, that will be implemented through existing and future programs as well as through assistance to both voluntary and regulated landowners. This implementation will primarily involve the execution of practices and conservation measures that will provide the greatest benefit to the land and water resources of the Upper Ahnapee River Watershed, and Door County as a whole. Tables 6-1 through 6-3, on the following pages, outline specific activities, responsible agencies, milestones and timeframes for each of the identified goals. Principal agencies include:

- Door County Soil and Water Conservation Department (SWCD)
- Wisconsin Department of Natural Resources (WDNR)
- US Natural Resource Conservation Service (NRCS)
- WI Department of Agriculture, Trade and Consumer Protection (DATCP)
- DC Land Use Services – Sanitarian, Planning and Zoning
- Village of Forestville
- Door County Invasive Species Team
- Door County Facilities and Parks

A five year schedule, from 2020 through 2024, was selected for this watershed planning effort. This timeframe coincides with two ongoing projects at the time of writing this plan, the WDNR Northeast Lakeshore Total Maximum Daily Load (TMDL) and management of the dam in Forestville by Door County. WDNR anticipates holding a public hearing on the TMDL in summer 2021 and submitting the TMDL to the United States Environmental Protection Agency for approval in 2022. Door County plans to drawdown water levels at the Forestville Dam in November 2019 through the fall of 2021, and to complete follow up monitoring in 2022 and 2023 to evaluate the impact of the drawdown on conditions within the Forestville Millpond. Information generated by both of these projects when combined with five additional years of implementation efforts can be used to further refine the goals and necessary activities in this watershed. Priority for SWCD activities will also be given to parcels previously determined to have noncompliant activities and those that have not yet been inventoried.

Table 6-1: Goal: Improve and maintain the drinking water supply within the Upper Ahnapee River Watershed to acceptable State standards.			
Activity	Principal Agencies and/or Funding	Milestone	Time Frame
Implementation of agricultural performance standards through identification of priority farms and cropland and application of appropriate BMPs, with emphasis on Silurian bedrock areas.	SWCD, WDNR, NRCS, DATCP	Cropland noncompliance identified in 2019 resolved by seeking necessary cost share, establishing deadlines, and installing conservation practices and/or management changes.	2020-2024
		Following the Door County LWRMP implementation strategy, complete compliance inventory of 500 additional cropland acres each year for five years. Identify and install conservation practices to meet identified resource concerns, as funding allows.	2020-2024
		Annual review of approximately 60 nutrient management plans.	2020-2024
		Annual communication of common nutrient management plan deficiencies and Silurian bedrock performance standards with landowners and operators to improve plan preparation and implementation.	2020-2024
		Continued monitoring of 26 livestock (minimum 5/year) operations to ensure compliance with current standards.	Ongoing
Continued Operation and Maintenance compliance checks of installed BMPs to ensure optimal resource protection.	SWCD, NRCS, DATCP	Annual compliance review of 12 sites with cost-shared practices installed, with more sites added as conservation practices are installed.	2020-2024
Nutrient Management compliance checks.	SWCD	Targeted cropland inspection during and/or immediately after nutrient applications to review compliance with nutrient management plans and promote identified conservation needs. Minimum of 10 inspections/year. Follow up with landowner, operator and manure applicator as necessary to resolve identified deficiencies.	2020-2024

Table 6-1 (continued): Goal: Improve and maintain the drinking water supply within the Upper Ahnapee River Watershed to acceptable State standards.			
Activity	Principal Agencies and/or Funding	Milestone	Time Frame
Verify known mapped conduits to groundwater and inventory the Upper Ahnapee River Watershed for unidentified conduits to groundwater.	SWCD, WDNR, NRCS, DATCP	LiDAR analysis and field verification of watershed landscape to locate potential conduits to groundwater.	2020-2024
		Review of nutrient management plans and periodic field audits to ensure proper setbacks from identified features are met.	Ongoing
		Identify, locate and map cropland drain tile inlets/outfalls as a component of other inspection activities on all cropland.	
Encourage protection of marginal cropland or pastureland adjacent to waterways, streams, rivers, wetlands, and karst features.	SWCD, NRCS, WDNR, DATCP	Outreach to potentially eligible landowners within the watershed. Target 8 of 39 linear stream miles adjacent to cropland each year.	2020 - 2024
		Identify barriers to participation in existing programs and seek viable alternatives.	
		Compliance checks of existing CREP & equivalent buffers.	Ongoing
		Encourage landowners to use SWCD sample land use agreement.	
Identify and work with landowners to properly abandon unused wells.	SWCD, WDNR	Press release to local media.	Annually
		Outreach to landowners as wells are identified as a component of other inspection activities on all cropland.	Ongoing
Reduce impacts to water quality from nonmetallic mines through proper operation and reclamation procedures.	SWCD, WDNR	Annual review of the seven active nonmetallic mines within the watershed boundaries.	Annually
Repair, replacement, maintenance and proper installation of Private Onsite Wastewater Treatment Systems.	DC Land Use Services	Repair/replacement of failing systems.	Ongoing
		Oversight of maintenance and installation of existing and new systems.	

Table 6-2: Goal: Protect and improve the surface water resources of the Upper Ahnapee River Watershed from nonpoint source pollution and maintain acceptable State surface water quality standards.			
Activity	Principal Agencies and/or Funding	Milestone	Time Frame
Implementation of agricultural performance standards through identification of priority farms and cropland and application of appropriate BMPs.	SWCD, WDNR, NRCS, DATCP	Cropland noncompliance identified in 2019 resolved by seeking necessary cost share, establishing deadlines, and installing conservation practices and/or management changes.	2020-2024
		Following the Door County LWRMP implementation strategy, complete compliance inventory of 500 additional cropland acres each year for five years. Identify and install conservation practices to meet identified resource concerns, as funding allows	2020-2024
		Annual review of approximately 60 nutrient management plans.	2020-2024
		Annual communication of common nutrient management plan deficiencies and Silurian bedrock performance standards with landowners and operators to improve plan preparation and implementation.	2020-2024
		Continued monitoring of 26 livestock operations (minimum 5/year) to ensure compliance with current standards.	Ongoing

Table 6-2 (continued): Goal: Protect and improve the surface water resources of the Upper Ahnapee River Watershed from nonpoint source pollution and maintain acceptable State surface water quality standards.			
Activity	Principal Agencies and/or Funding	Milestone	Time Frame
Reduce soil erosion and nutrient loading from agricultural fields through proper soil conservation practices. .	SWCD, WDNR, NRCS, DATCP	Identify priority fields based on excessively high phosphorus levels and work with landowners and operators to mitigate identified loading. 7 of 35 operators with fields with soil test P over 36ppm contacted each year.	2020-2024
		Identify cropland practice needs through nutrient management plan review and field audits and work with landowners and operators to mitigate identified loading.	Ongoing
		Identify, locate and map cropland drain tile inlets/outfalls as a component of other inspection activities on all cropland.	
		Complete EVAAL and NDTI analysis. Modeling by WDNR staff with inventory and data collection by SWCD intern, as funding allows. Use analysis to target efforts in following years.	2020
		Identify deficiencies along 39 miles of riparian cropland and work with landowners and operators to mitigate identified loading on 10% of the riparian cropland resulting in 71 acres of riparian buffers.	2020-2024
		Work with landowners and operators to increase the efficiency of existing nutrient management implementation, as well as incorporation of elements such as cover crops and riparian buffers to reflect modeled results in Chapter 3: • Tier 1 – Appropriate nutrient management efforts (55% of cropland) – 9,032 Acres • Tier 2 - Appropriate nutrient management efforts AND additional cover crops (80% of cropland) – 13,137 Acres • Tier 3 - Appropriate nutrient management efforts AND cover crops AND vegetative buffers adjacent to surface water (90% of cropland) – 14779 Acres	2020-2024
Nutrient Management compliance checks	SWCD	Targeted cropland inspection during and/or immediately after nutrient applications to review compliance with nutrient management plans and promote identified conservation needs. Minimum of 10 inspections/year. Follow up with landowner, operator and manure applicator as necessary to resolve identified deficiencies.	2020-2024

Table 6-2 (continued): Goal: Protect and improve the surface water resources of the Upper Ahnapee River Watershed from nonpoint source pollution and maintain acceptable State surface water quality standards.			
Continued Operation and Maintenance compliance checks of installed BMPs.	SWCD, NRCS, DATCP	Annual compliance review of 12 sites with cost-shared practices installed.	Annually
Activity	Principal Agencies and/or Funding	Milestone	Time Frame
Encourage protection of marginal cropland or pastureland adjacent to waterways, streams, rivers, wetlands, and karst features.	SWCD, NRCS, WDNR, DATCP	Outreach to potentially eligible landowners within the watershed. Target 8 of 39 linear stream miles adjacent to cropland each year.	2020 - 2024
		Identify barriers to participation in existing programs and seek viable alternatives.	Ongoing
		Compliance checks of existing CREP & equivalent buffers.	
		Encourage landowners to use SWCD sample land use agreement	
Promote proper erosion and stormwater control on all public and private projects.	SWCD, DC Land Use Services, WDNR	Target new permits for new development.	Ongoing
Offer assistance to the Village of Forestville to ensure acceptable effluent limits are achieved at the Waste Water Treatment Plant.	Village of Forestville, WDNR, SWCD	Offer technical assistance to the Village of Forestville if they select alternative phosphorus compliance options, such as adaptive management or water quality trading, to meet permit phosphorus effluent limits.	2020-2024
Participate in TMDL development and implementation to ensure plan reflects watershed and meaningful results.	WDNR, SWCD	Revise 9 Key Element plan for the Upper Ahnapee River Watershed, as necessary, to reflect new information from TMDL analysis.	2024
Continued Monitoring of the Ahnapee River above and below the Forestville Dam	WDNR, SWCD	Continue to gather in stream data reflecting Total Phosphorus, Total Suspended Solids, Temperature, Dissolved Oxygen and pH	Ongoing
		As funding allows, update Aquatic Plant and Bathymetric Surveys of the Forestville Millpond	2022-2023

Table 6-3: Goal: Maintain the ecological integrity of the Ahnapee River Corridor, including associated upland forest habitat and wetlands.			
Activity	Principal Agencies and/or Funding	Milestone	Time Frame
Coordination of watershed efforts with other entities	SWCD, WDNR, Kewaunee County LWCD	Annual review and meeting with Wisconsin DNR and Kewaunee County LWCD to assess status and update priorities to ensure consistency with Total Maximum Daily Loading implementation priorities.	Ongoing
Encourage protection of marginal cropland or pastureland adjacent to waterways, streams, rivers, wetlands, and karst features.	SWCD, NRCS, WDNR, DATCP	Outreach to potentially eligible landowners within the watershed. Target 8 of 39 linear stream miles adjacent to cropland each year.	2020 - 2024
		Identify barriers to participation in existing programs and seek viable alternatives.	Ongoing
		Compliance checks of existing CREP & equivalent buffers.	
		Encourage landowners to use SWCD sample land use agreement.	
Protect the habitat and biodiversity of the native fauna and flora of the Upper Ahnapee River Watershed through the control of aggressive, invasive non-indigenous species.	SWCD, WDNR, Door County Invasive Species Team	Update inventory of county priority species in state, county and local road right-of-ways, state trails, county parks, quarries and riparian corridors.	2020-2024
		Perform manual and chemical control of priority invasive species using SWCD staff and private contractors.	Ongoing
		Educate landowners and municipal leaders about non-native species impacts, inventory and control methods.	Ongoing
Manage the Forestville dam to meet water quality and ecological goals.	SWCD, Door County Facilities & Parks	Complete drawdown of water levels in the Forestville Millpond.	2019-2021
		Evaluate the effectiveness of the drawdown by comparing 2017 data with updated bathymetric survey, aquatic vegetation survey, and water quality monitoring.	2022-2023

7. Monitoring and Evaluation

Overview

The monitoring and evaluation of the conditions in the Upper Ahnapee River Watershed will be an ongoing effort over the next five years, and beyond. The purpose will be to evaluate the effectiveness of activities identified within this plan at meeting the stated goals. Accordingly the timing of the monitoring and evaluation will need to be adjusted based on SWCD's success at completing activities within the Upper Ahnapee River Watershed. Additional consideration will need to be given to the Wisconsin Department of Natural Resources progress at developing a Total Maximum Daily Load (TMDL) and any associated implementation plan for the Ahnapee River so that monitoring and evaluation efforts align with that agency's efforts in the watershed.

Once appropriate, the strategy for monitoring and evaluation will incorporate the following elements:

- Administrative review and tracking
- Monitoring of surface water chemistry
- Monitoring of groundwater resources
- Pollutant load monitoring
- Progress meeting activities and milestones

Administrative Review and Tracking

SWCD will incorporate a focus on the Upper Ahnapee River Watershed in annual work plans as staff resources and funding allow and seek additional funding sources to target work within the watershed as opportunities arise. The majority of administrative review and tracking specific to the Upper Ahnapee River Watershed will occur as required by the funding source available for work in the watershed. SWCD tracks functions annually on a county-wide basis and does not separate accomplishments, financial expenditures, time and practice installations by watershed. Data on each of these items is available in county databases and GIS-based software and can be identified at some future point on an as-needed basis.

1. **Accomplishment Reporting**
   The SWCD will document the following information on an annual basis:
   - Number of Chapter 23 (NR 151) compliance inventories and notifications
   - Number of personal contacts made with landowners
   - Completed information and education activities
   - Number of farm conservation plans prepared for the project
   - Number of cost-share agreements signed
   - Number of farm conservation plan and cost-share agreement status reviews completed
   - Number of farms and acres of cropland checked for proper maintenance of BMPs

Progress will be shared with the Wisconsin DNR in an annual assessment of progress. Consideration will be given to percentage of cropland and livestock operations in the watershed that are meeting

compliance requirements outlined in NR 151 and Chapter 23 of the Door County Code. Annual review of remaining cropland and livestock compliance needs will be part of that assessment.

2. **Financial Expenditures**
   The SWCD will document the following financial data on an annual basis:
   - Number of cost-share agreements signed
   - Amount of money from all sources encumbered in cost-share agreements
   - Number of landowner reimbursement payments made for the installation of BMPs, and the total paid
   - Staff travel expenditures
   - Information and education expenditures
   - Total project expenditures for the SWCD staff
   - Staff training expenditures.

3. **Time Accounting**
   The SWCD will document summaries of staff time for the following:
   - Project and fiscal management
   - Clerical assistance
   - Landowner/operator outreach
   - Chapter 23 inventory and notifications
   - Pre-design and conservation planning activities
   - Technical assistance: practice design, installation, cost-share agreement status review and monitoring
   - Educational activities
   - Training activities

4. **Tracking**
   The SWCD will track progress and status of several goal-related items within the Upper Ahnapee River Watershed. These items are tracked county-wide annually and can be identified for the Upper Ahnapee River Watershed on an as-needed basis. Additional items will be tracked as they become evident. The following will be tracked in spreadsheet, database and/or GIS-based software:
   - Chapter 23 compliance status
   - Location of grant-funded BMP installation
   - Location of waste storage facilities and barnyard runoff control systems
   - Location of cropland included in a nutrient management plan, as well as operator, acreage, soil test P and field name information
   - Location of invasive species populations and control efforts to date
   - Location of existing nonmetallic mines and configuration of current footprints
   - Location of conduits to groundwater
   - Location of cropland that falls under the jurisdiction of the Silurian bedrock performance standards

Monitoring of Surface Water Chemistry

Monitoring done at station #153161 (see Figure 4-1), by the Wisconsin Department of Natural Resources was done from 2010 - 2019. This sampling will continue through the duration of this plan. Additional stations have been identified and have had sampling efforts at various times since 1976. For the purposes of this report, data from the 2017 Forestville Millpond project was used.

Future sampling at the sites included in the 2017 Forestville Millpond project in 2022 and/or 2023 will be necessary to evaluate the effectiveness of the drawdown of water levels in the Forestville Millpond. These future monitoring efforts will include some or all of the following parameters:

- Suspended Solids
- Total Phosphorus
- Temperature
- Dissolved Oxygen
- pH
- Chlorophyll A
- Nitrate + Nitrite
- Total Nitrogen

Monitoring efforts will be completed as funding and resources are available, and coordinated with existing monitoring efforts in the watershed to maximize data usability and reduce potential duplication of efforts. At a minimum, the SWCD will consult with the Wisconsin Department of Natural Resources to identify monitoring needs satisfied by the ongoing TMDL effort and attempt to supplement monitoring where data gaps exist. Communication with the Wisconsin DNR Water Quality Biologist has confirmed continued monitoring by the WDNR at Station #153161 at an annual cost of approximately $3,500.

Monitoring of Groundwater Resources

Follow-up of the well testing efforts that took place in the fall of 2019 will continue, as resources allow. Collection of data for the purpose of recognizing trends or areas of concern will continue to develop. Monitoring efforts are being planned for 2020, and funding is being sought to continue efforts beyond that.

Pollutant Load Evaluation and Monitoring

Current conditions within the watershed will continue to be monitored, and reductions in the amount of key pollutants as a result of BMP installation, land use changes and changes in management will be calculated with modeling and field verifications.

It is recognized that installed “soft” practices such as grassed waterways and sediment basins do not maintain the desired level of efficiency in pollutant reductions, especially without proper operation and maintenance. Proper operation and maintenance of “hard” practices such as manure storage and barnyard runoff control systems will remain key in the landowner/operator obligation for continued compliance. In addition to the above criteria, reference will be made to the EPA’s Technical Memorandum #1: Adjusting for Depreciation of Land Treatment When Planning Watershed Projects for additional considerations when evaluating the effectiveness of installed practices. This document can be

found at the following location: https://www.epa.gov/sites/production/files/2015-10/documents/tech_memo_1_oct15.pdf

Elements that will be estimated and tracked:

- Upland sediment and nutrients
- Runoff from barnyards
- Cropland nutrient applications
- Streambank setbacks

1. **Upland sediment and nutrients**
   - Sediment and nutrient loading will be modeled using the Spreadsheet Tool for Estimating Pollutant Load (STEPL) model, or other comparable modeling software, to compare current and existing conditions with those after the application of cropland BMPs. Input will be updated with current land use and practices.
   - Cropping practices and manure applications will be modeled using the most recent version of Snap-Plus. Current nutrient and sediment levels will be documented as well as modeled changes to reflect management changes to reduce loading.
   - Commitment has been made by Wisconsin DNR staff to using the Erosion Vulnerability Assessment for Agricultural Lands (EVAAL), GIS-based tool, as well as analysis of available Landsat imagery using the Normalized Difference Tillage Index (NDTI) to evaluate current loading and target potential reductions in the future. This will require additional inventory, dependent on funding to dedicate SWCD staff for that effort.
   - LiDAR and the use of Watershed Modeling Software (WMS) will aid in the identification and analysis of potential erosional features and the contributing watershed areas, as well as the design of remedial actions.

2. **Runoff from Barnyards**
   - Although all major livestock operations within the watershed have addressed barnyard runoff concerns, future changes and new issues that present themselves will be inventoried and modeled. Use of the Wisconsin Barnyard Runoff Model (BARNY) will incorporate pre and post-conditions and estimate phosphorus reductions based on management changes and installation of structural BMPs.

3. **Cropland Nutrient Applications**
   - Cropland receiving nutrients in the form of commercial fertilizers and/or manure will continue to be monitored through the review of annual nutrient management plan updates and modeling of management decisions through Snap-Plus. Documentation of existing conditions and the application of management changes can be compared to generate estimates of loading reductions.

4. **Streambank Setbacks**
   - Review of historic and current digital orthophotography, coupled with field verifications, will establish potential setback needs. These needs will be represented in the form of appropriate setbacks of tillage operations and nutrient applications.

- LiDAR information will aid in the location of erosional features contributing to sedimentation adjacent to surface waters.

Sediment and nutrient levels documented during the drafting of this plan will be used as a benchmark for comparison with future model estimates. Evaluation of the results will dictate any necessary reevaluation of efforts or additional targeting of resources.

It is recognized that resources may not be acquired when necessary, participation may not happen at the levels and pace desired, and results may not measure up to what was expected. This evaluation will allow SWCD staff to revisit the strategies outlined by this plan and determine changes that might be necessary to adapt to future evaluations of pollutant loading.

Progress Meeting Activities and Milestones

Throughout the duration of this plan, each year the SWCD will evaluate progress meeting the activities and milestones identified in Section 6. As in any plan, a best estimate of accomplishments is developed, but realistically there are many variables that can impact the results of a five-year plan. Many of the planned activities and milestones will be contingent on staff workload and available funding. As deficiencies in progress are recognized, adjustments will be made. Changes in workload or priorities will be communicated to the WDNR during annual meetings. An extensive evaluation of progress will be made in year four and adjustments in milestones or shifts in workload will be made accordingly, when the plan is revised

Evaluation of progress, or effectiveness, will have to include consideration of many variables and how they might have changed from initial inventory and modeling conditions to the post practice installation evaluation. These factors will impact the realization of expected load reductions and expected results. Some of the considerations that will be made when evaluating progress and effectiveness are:

- Changes in cropping characteristics including acreage, tillage and types of crops.
- Changes in livestock operations including the number of sites, the type of livestock and the methods of manure and runoff management.
- Status of compliance with Agricultural Performance Standards and Manure Management Prohibitions throughout the watershed.
- Acreage of cropland included in compliant Nutrient Management Plans and the percentage of plans that are being properly implemented.
- Frequency, timing and location of monitoring efforts.
- Effectiveness of the current drawdown effort at the Forestville Millpond and results of follow-up inventory and monitoring efforts.
- Updated inventory information including the location of conduits to groundwater and field erosion features such as gullies.
- Updated inventory and model information resulting from the Northeast Lakeshore TMDL study.

8. Fiscal Management

Each of the goals outlined in this plan will be approached through a combination of short and long-term activities. In the short-term, activities that fit within the available SWCD staff hours will be identified in the annual SWCD work plan. Over the long-term, activities projected over the five year period will require additional resources beyond those allocated in available SWCD staff hours and budget. The actual implementation schedule will be contingent upon available funding.

Presently the operating budget of the SWCD for the County as a whole is comprised of approximately 35% County appropriations and 65% external grant funds. The 2019 SWCD budget is $1,277,110 with anticipated revenue of $822,790 from state and federal grant programs. County appropriations provide the funds for SWCD core operations and a combination of long-term and annual grants provide additional support for a range of supportive conservation and environmental protection efforts.

The fiscal support of the SWCD, from combinations of both County sources and external grant funds, is anticipated to continue for the duration of the implementation of this Upper Ahnapee River Watershed plan. SWCD will continue to actively seek grants that support county-wide program efforts that will also assist in meeting the plan goals. This will be especially important as limitations placed upon county taxing ability place unknown future restrictions on county tax levy support for the SWCD.

The majority of the funds in the SWCD budget are cost-share funds that provide financial assistance directly to landowners for the installation of conservation best management practices. Depending on the source, some of the available cost-share funding may only be targeted to specific watersheds, pre-identified landowners, and/or specific conservation practices. In order to fully implement the goals of this plan it will be necessary for SWCD to obtain additional grant funding specific to the activities identified within the Upper Ahnapee River Watershed plan.

Addressing noncompliance with agricultural performance standards and prohibitions is an element of this plan and specifically requires that cost-share funds be made available to eligible landowners. Cost-share is required to cover a portion of the eligible costs (normally 70%, and up to 90% in cases of economic hardship). It is anticipated that these cost-share needs will not be addressed by a single source of funds, but rather by a combination of sources that may change from year to year depending on grant availability. As the majority of currently identified noncompliance issues are cropland performance standards, no costs associated with the construction of farmstead best management practices were estimated for this plan. Likewise, 98% of the cropland acres are currently covered by nutrient management plans and therefore no costs associated with nutrient management cost-share were estimated as part of this plan.

Traditional practices that align with the goal of reducing cropland phosphorus and sediment loads are listed in Table 8-1. Each are cost-shared according to different rates depending on whether the funding is offered through local, state or federal programs; with state grants being the primary source of cost-share funds distributed through SWCD. At this time, SWCD does not actively cost-share cropland best management practices due to the limited amount of available funds. In 2019, the maximum SWCD could cost share across the county is $7,000 of cover crops. This equates to 280 acres at the DATCP rate, and based on modeled reductions, would yield less than 1% reduction for both Total Phosphorus

and Total Suspended Solids, if all of the cost-shared acres were located within the Upper Ahnapee River Watershed.

	Flat Rate (Four Year)	Unit Cost – Cost-Shared at 70%
Contour Farming	$36/Acre	----
Cover Crop	$100/Acre – DATCP $280/Acre – DNR proposed	----
Critical Area Stabilization	----	$510.75/Acre
Diversions	----	$4.90/Lineal Foot
Field Stripcropping	$30/Acre	----
High Residue Management	$74/Acre	----
Nutrient Management	$40/Acre	----
Riparian Buffers	$400/Acre	----
Sediment Basins	----	$4.50/Cubic Yard
Stripcropping	$54/Acre	----
Waterway Systems	----	$5.07/Lineal Foot

Table 8-1. Typical Cost-Shared Cropland Practices (from ATCP 50 and SWCD Average Cost Calculations).

In addition to cropland practices, it is recognized that future inventory efforts of farmsteads and livestock facilities will reveal areas of concern and the need for installation of BMPs and remedial action at these locations in addition to cropland. Table 8-2 lists some appropriate conservation practices that could be installed to address operations that are noncompliant with the agricultural performance standards and manure management prohibitions. This is not an exhaustive list of conservation practices, but represents historic practices planned and installed by the SWCD to address these scenarios. Additional funding, not included in the fiscal consideration for this plan, will be necessary to install these future practices as resource concerns are identified.

Agricultural Performance Standard or Manure Management Prohibition	Effective Date	Conservation Practices
Cropland soil erosion must meet tolerable soil loss (T) calculated by RUSLE 2	October 1, 2002	Install contour buffer systems, proper crop rotations, conservation tillage, no-till planting, contour strip cropping, and contour farming. Related practices: grade stabilization structures, grassed waterways, critical area stabilization, and lined waterways.
Construction, maintenance and proper closure of manure storage facilities to prevent overflows and leakage.	October 1, 2002	Follow appropriate NRCS technical standards for construction, operations and maintenance and closure.
Runoff shall be diverted away from contacting feedlots, manure storage areas and barnyard areas within a Water Quality Management Area	October 1, 2002	Install roof runoff management systems, earthen diversion and underground outlets

Table 8-2. Conservation Practices Available to Meet Agricultural Performance Standards and Manure Management Prohibitions

Agricultural Performance Standard or Manure Management Prohibition	Effective Date	Conservation Practices
The application of manure, commercial fertilizer and other nutrients shall conform with a Nutrient Management Plan	• 2003 for new operations • 2005 for land within high priority watersheds • 2008 for all cropland	Develop and implement annual nutrient management plan for applying all nutrients. All soil tests must be completed by DATCP approved lab. Apply nutrients according to UWEX A-2809 publication. Install conservation practices to reduce runoff and nutrient loading.
Manure Management Prohibitions a. No overflow from manure storage facilities. b. No unconfined manure stacks with Water Quality Management Areas. c. No direct runoff from feedlots and manure storage facilities to waters of the state. d. No unlimited access of livestock to shore lands that prevents maintenance of adequate sod cover. (Livestock facilities)	October 1, 2002	• Design and construct facilities to technical standards, maintain existing facilities, repair or replace facilities, as needed. • Relocate manure stacks to more environmentally safe areas. • Install barnyard runoff control systems, roof runoff management systems, wastewater treatment strips, relocate animal feeding facilities. • Install access roads and cattle crossings, watering facilities, livestock fencing, riparian buffers, prescribed grazing, stream bank protection.
Crop producers may not conduct tillage operations that negatively impact stream bank integrity or deposit soil directly in surface waters.	January 1, 2011	Maintain a five to twenty foot setback from the top of surface water channels. Install vegetative riparian buffers.
Cropland, pastures, and winter grazing areas shall average a phosphorus index of 6 or less and may not exceed a phosphorus index of 12 in any individual year within the accounting period.	January 1, 2011	Develop and implement annual nutrient management plan for applying all nutrients to cropland, pastures and winter grazing areas within tolerable phosphorus index values.
There may be no significant discharge of process wastewater to waters of the state.	January 1, 2011	Follow appropriate NRCS technical standards for construction of practices to properly treat or collect and store process wastewater.
Silurian Bedrock Performance Standard Mechanical application of manure is prohibited in areas comprised of 24 inches or less of separation between the ground surface and bedrock or apparent water table. All appropriate setbacks and restrictions for areas designated as Silurian bedrock shall be met as described in NR 151.075 (Wis. Admin. Code)	July 1, 2018	Develop and implement annual nutrient management plan for applying all nutrients within the parameters outlined in NR 151.075 (Wis. Admin. Code) and NRCS Nutrient Management Standard 590. Follow appropriate NRCS technical standards for construction of practices to properly store manure to conform to Nutrient Management application requirements.

Table 8-2 continued. Conservation Practices Available to Meet Agricultural Performance Standards and Manure Management Prohibitions

Preliminary estimates indicate that between $1,043,500 and $1,781,400 is the minimum necessary to implement the management actions to meet the Upper Ahnapee River Watershed plan total phosphorus and total suspended solids load reduction goals. Table 8-3 lists the conservation practices that were included in the STEPL model and the minimum associated costs to meet the loads for "90% NMP Implementation + Cover Crop + Buffer".

Practice applied in STEPL model	Estimated Cost
Appropriate nutrient management efforts on 90% of cropland acres	$489,000 SWCD Conservationist FTE for five years • Additional costs for practices that support nutrient management will be identified as field-specific conservation plans are developed and the associated costs have not been estimated
Cover crops on 25% of cropland acres	$410,500 to $1,149,400 Cost share assistance for 4,105 acres of cover crops for four years
Vegetative buffers on 10% of field edges adjacent to surface water bodies	$143,000 Cost share assistance for 71 acres of vegetative buffers
Total Estimated Cost	$1,043,500 – $1,781,400

Table 8-3. Estimated Cost for Efforts Modeled in STEPL.

Adequate cost-share funding for landowners is only a portion of the financial resources needed to implement the goals and objectives of this plan. Personnel costs support the necessary technical assistance to the public as they manage the natural resources on their land, whether through a voluntary or regulatory program. Adoption of appropriate nutrient management plan implementation, beyond simply cost-sharing the nutrient management plan itself, is a time intensive effort that requires dedicated SWCD Conservationist time to promote conservation and monitor nutrient applications. The Wisconsin Department of Agriculture, Trade and Consumer Protection and County levy are the primary funding sources available for personnel, though some grants make limited funding available for administrative costs directly associated with installing conservation practices. Preliminary SWCD estimates indicate that implementation of the Upper Ahnapee River Watershed plan would take approximately 1 FTE of a Conservationist staff over five years at an estimated cost of approximately $489,000 (salary and fringe). Similar to the revenue sources for cost-share funds, the administrative revenue sources will vary depending on available grant funds.

Additional costs associated with appropriate nutrient management plan implementation will necessarily include other conservation practices, such as waterways to protect concentrated flow channels, which are not estimated here. These will be identified over the lifespan of this plan as field-specific conservation plans are developed and follow the cost-share rates listed in Table 9-1. Landowner and operator reluctance to install properly designed waterways has hindered SWCD ability to assist with installation of these practices as individuals challenge their need and instead attempt to demonstrate performance using changes in crop rotation and/or other cropland practices. In recent years SWCD staff have increased compliance oversight and communication with landowners and operators, an effort that will necessarily need to increase to ensure the plan goals are achieved.

Cover crop cost-share estimates were based on four years of funding, as allowed under state programs. Multiple years of funding account for variability in weather, crop rotations, and maximizes the likelihood

of landowner acceptance. Additional funding beyond the cost share may be needed to provide incentives to adopt these practices as they are entirely voluntary. The estimate in Table 9-2 was based on state rates through the Wisconsin Department of Agriculture, Trade and Consumer Protection ($25/acre/year for up to four years) and the Wisconsin Department of Natural Resources (proposed increase to $70/acre/year for up to four years). Other available funding sources may offer more desirable annual cost share rates. A recent emphasis on soil health initiatives through federal to local efforts may also assist in adoption of these practices.

In 2017 SWCD renewed the Conservation Reserve Enhancement Program contract with the Wisconsin Department of Agriculture, Trade and Consumer Protection. This program provides landowner incentives and funding to install buffers along wetlands, streams and eligible karst features. Providing that authorization for the program continues, it is not anticipated that funding will constrain signup of interested landowners. Cost estimates for vegetative buffers on 10% of field edges adjacent to surface water bodies listed in Table 9-3 were created using rates established by SWCD for a similar vegetated buffer program. This program provides incentive payments (ranging from $1,000 to $1,500 per acre depending on buffer width) and cost-shares installation costs (critical area stabilization at $510.75/acre). These incentive rates have not been updated since 2001 and would need to be re-evaluated before reviving this county program.

New Silurian bedrock standards were incorporated into the County ordinance in September 2018. These standards are specific to reducing the risk of pathogen contamination of groundwater and apply additional setbacks and manure application restrictions in areas that have twenty feet or less of soil over Silurian dolomite areas. These first of their kind “targeted standards” present a variety of unknown cost-share funding needs as many traditional practices may not be what is needed to assist landowners or operators to comply. SWCD staff efforts over the lifespan of this plan will be directed towards identifying viable and accepted strategies to meet these new standards and those costs cannot be identified at this time.

9. Information & Education

Objective

The overarching goal of the information and education (I & E) effort in the Upper Ahnapee River Watershed is to improve and protect water quality by maximizing landowner and operator awareness and participation in activities to lessen impacts to ground and surface water resources. These goals are consistent with those of SWCD for the County as a whole, such that county-wide activities will provide benefits to the Upper Ahnapee River Watershed.

The primary audience will be landowners and operators that have been identified as owning or operating land or facilities that are potentially impacting water resources. The secondary audiences will be landowners and operators that have no identified issues, suppliers of services within the watershed, interest groups, and the general public. For the purposes of this plan, the scope of these I & E activities will span 2020 – 2024.

Goals

To achieve the objective of improvement and protection of water quality, I & E elements associated with this plan will be structured around the following:

- Increased understanding of the sources and impacts of water impairment, especially nonpoint pollution, and the consequence to the Upper Ahnapee River Watershed
- Increased awareness and understanding of best management practices appropriate for the Upper Ahnapee River Watershed, including their results in water quality improvement

Activities

Press Releases

Press releases and announcements of I & E activities will be provided to the local newspaper and/or radio stations. Topics will include, but are not limited to:

- Urgency of following proper nutrient management guidelines during high runoff risk periods
- Sign up for CREP and equivalent riparian buffer opportunities
- The importance of locating and properly abandoning unused wells
- Recruitment of landowners to inventory and report invasive species on their properties

The SWCD will take the responsibility of contacting the news media. No release schedule will be established.

Website and Social Media

The SWCD maintains a website at http://map.co.door.wi.us/swcd/ . Informational materials related to the range of SWCD conservation programs is available to the public there including: Forestville Millpond Reports from 1996 and 2018, the Door County Land and Water Resource Management Plan, sample Land Lease Agreements for landowners, and a groundwater brochure “Protect the Water You Drink: Tips for Door County Landowners”. Although the website continues to be functional, its dated layout makes navigation difficult for the public and the software is no longer supported which hinders SWCD staff from making updates.

The Door County Invasive Species Team (DCIST) maintains a website at https://doorinvasives.org/ and a Facebook page that is updated by the DCIST Coordinator, a SWCD contractor. These are both used to engage the public in efforts to inventory and control invasive species.

From 2020 – 2024 the SWCD will:

- Revamp the SWCD website, provided funding and/or support is available through the Door County Technology Services Department. Updates will give the public a more intuitive website that staff can easily update with relevant information such as this Watershed Plan.
- Post information, such as the press releases mentioned above, once the SWCD website has been updated.
- Collaborate with the Public Health Department to improve access to drinking water brochures and well testing information on the Door County website.
- Continue to work through the DCIST coordinator to engage the public on invasive species efforts through website and social media presence.

Agricultural Best Management Practices

By far the most effective information and education efforts the SWCD engages in related to agricultural best management practices are one-on-one conversations with landowners and operators about their goals and resource concerns. SWCD will continue this approach of meeting with individuals at their sites to identify conservation opportunities within the Upper Ahnapee River Watershed. These conversations occur at multiple times through the year, including during annual Operation and Maintenance review of installed practices and development and implementation of their nutrient management plans. Additionally, formal training will be made available for development of plans.

From 2020 - 2024, the SWCD will:

- Collaborate with partners to host at least one Nutrient Management Farmer Education effort to provide nutrient management training to producers and plan writers to develop compliant nutrient management plans
- Review nutrient management plans submitted annually by April 1 of each year and consult with landowners and operators on the deficiencies and opportunities for improvement
- Develop target areas with concern to cropland overlying Silurian bedrock and reach out to landowners and operators in these areas to ensure compliance with appropriate standards
- Field reviews and manure hauling audits with landowners and operators to assess the adequacy of nutrient management efforts and promote installation of conservation practices to meet watershed goals
- Collaborate with partners who host field days, such as UW-Extension, Demonstration Farm network and/or Peninsula Pride, to promote appropriate nutrient management implementation and installation of conservation practices
- Utilize EVAAL, NDTI, ArcGIS and other modeling and mapping tools to create and disseminate information about plan goals and progress to interested parties including organized groups, agencies and the general public

Stream Crossing Signs

In an effort to increase public awareness, the SWCD currently maintains signs that identify locations where perennial and intermittent waters cross local, county and state roads. The names of the

associated rivers, creeks and tributaries are displayed on signs crafted by the Door County Highway Department. This effort will continue as existing signs are maintained and additional locations for stream identification are located.

Local Municipalities

The SWCD will continue to meet with groups to educate and provide input on the protection of resources within the watershed area. These efforts will include, but are not limited to meetings of the Towns of Forestville, Gardner, Nasewaupee and Brussels and the Village of Forestville, as necessary, to discuss nutrient management issues and concerns, activities listed in this plan and to discuss invasive species inventory and control efforts.

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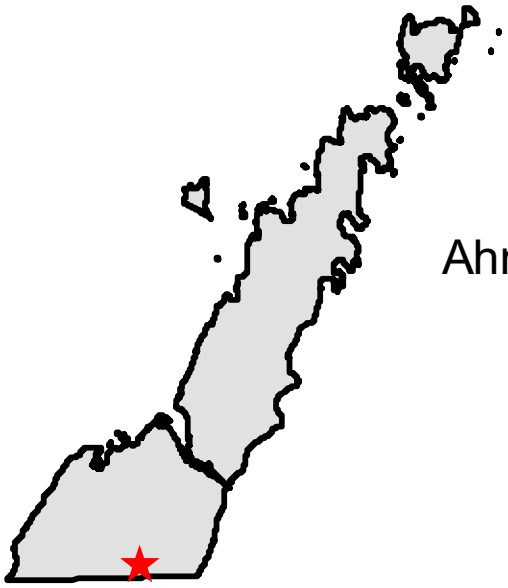
Wisconsin Department of Natural Resources
Chapters: NR 102, NR 104, NR 105, NR 347, NR 151.

Water Chemistry Raw Data

Suspended Solids - mg/L	15-May	30-May	12-Jun	17-Jul	31-Jul	22-Aug	30-Aug	16-Sep	30-Sep	15-Oct	28-Oct
Station #10047671	0.00	2.50	4.25	2.50	0	4.0	7.2	11.3	12.5	7.75	6
Station #10047672	4.75	3.25	5.50	3.60	3.0	5.6	2.6	2.4	0	14.8	0
Stations #10047673	0.00	3.50	6.75	3.00	2.8	7.8	2.8	0	0	9	2
Station #153161	0.00	4.67	7.25	8.00	11.3	12.0	10.2	4.4	2.6	7	3.6
FMP (1 foot)				22		22.5		5.8			
FMP (3 foot)								7.6			
FMP (5 foot)											
Total Phosphorus - mg/L	15-May	30-May	12-Jun	17-Jul	31-Jul	22-Aug	30-Aug	16-Sep	30-Sep	15-Oct	28-Oct
Station #10047671	0.0368	0.0360	0.0412	0.052	0.0196	0.0258	0.0333	0.165	0.334	0.13	0.0456
Station #10047672	0.0286	0.0431	0.0614	0.0662	0.0327	0.0392	0.0227	0.018	0.0201	0.261	0.0419
Stations #10047673	0.0290	0.0454	0.0652	0.0813	0.0369	0.0568	0.0270	0.0181	0.02	0.0793	0.0376
Station #153161	0.0204	0.0590	0.107	0.0974	0.1200	0.108	0.0904	0.023	0.0258	0.0576	0.0423
FMP (1 foot)				0.136		0.0851		0.0355			
FMP (3 foot)								0.0348			
				0.02		0.02		0.02			
	0.0750	0.0750	0.0750	0.0400	0.0750	0.0400	0.0750	0.0400	0.0750	0.0750	0.0750
Chlorophyll A - µg/L	15-May	30-May	12-Jun	17-Jul	31-Jul	22-Aug	30-Aug	16-Sep	30-Sep	15-Oct	28-Oct
FMP (1 foot)				59		41.7		5.1			
FMP (3 foot)								6.44			
FMP (5 foot)											
Nitrate + Nitrite - mg/L	15-May	30-May	12-Jun	17-Jul	31-Jul	22-Aug	30-Aug	16-Sep	30-Sep	15-Oct	28-Oct
FMP (1 foot)				0.909		0.815		2.00			
FMP (3 foot)								2.04			
FMP (5 foot)											
Total Nitrogen- mg/L	15-May	30-May	12-Jun	17-Jul	31-Jul	22-Aug	30-Aug	16-Sep	30-Sep	15-Oct	28-Oct
FMP (1 foot)				2.36		2.32		1.31			
FMP (3 foot)								1.22			
FMP (5 foot)											
Temp - C	15-May	30-May	12-Jun	17-Jul	31-Jul	22-Aug	30-Aug	16-Sep	30-Sep	15-Oct	28-Oct
Station #10047671	14.4	16.0	18.1	16.1	22.57	16.55		18.19	14.46	12.2	7
Station #10047672	11.4	16.5	20.2	17.7	22.91	18.91		20.21	12.4	11.9	6.98
Stations #10047673	11.6	16.6	20.2	17.4	22.67	18.93		20.35	12.09	11.9	6.99
Station #153161	12.8	17.6	20.7	17.6	19.95	20.02		17.64	10.81	11.4	7.45
Ambient Temperature											
Sub-Lethal Criteria											
Acute Criteria											
FMP (1 foot)				25.43		23.95		23.78	18.4		
FMP (3 foot)				21.98		23.79		23.58	18.39		
FMP (5 foot)				21.66		23.76		23	18.28		
Air Temp - C	15-May	30-May	12-Jun	17-Jul	31-Jul	22-Aug	30-Aug	16-Sep	30-Sep	15-Oct	28-Oct
Station #10047671	14	14	21	16	22	20	19	29	11	11	4
Station #10047672	14	14	21	16	22	20	19	29	11	11	4
Stations #10047673	14	14	21	16	22	20	19	29	11	11	4
Station #153161	14	14	21	16	22	20	19	29	11	11	4
FMP (1 foot)				16		20		29	11	11	4
FMP (3 foot)				16		20		29	11	11	4
FMP (5 foot)				16		20		29	11	11	4
Dissolved Oxygen - mg/L	15-May	30-May	12-Jun	17-Jul	31-Jul	22-Aug	30-Aug	16-Sep	30-Sep	15-Oct	28-Oct
Station #10047671	8.8	9.0	8.7	6.13	3.37	4.14		3.79	1.78	8	4.1
Station #10047672	8.7	8.8	7.9	5.6	5.82	3.8		9.98	10.52	8.2	4
Stations #10047673	8.9	9.2	7.8	5.4	5.5	3.62		10.14	10.47	9.4	1.3
Station #153161	10.3	7.2	5.5	5.4	5.94	2.88		10.09	10.17	9.5	3.9
FMP (1 foot)				6.23		3.2		10.48	10.11		
FMP (3 foot)				4.42		3.29		10.39	10.11		
FMP (5 foot)				3.93		3.43		10.82	10.17		
			5.0	5		5		5	5		
pH	15-May	30-May	12-Jun	17-Jul	31-Jul	22-Aug	30-Aug	16-Sep	30-Sep	15-Oct	28-Oct
Station #10047671	8.5	8.3	8.3	7.4	7.13	7.92		6.17	6.18	6.2	8.02
Station #10047672	8.4	8.6	8.3	7.7	8.28	8.06		7.16	8.07	6.9	7.96
Stations #10047673	8.4	8.7	8.5	7.6	8.16	8.04		6.98	6.81	5.9	8.02
Station #153161	8.4	7.8	8.3	6.6	7.87	7.79		6.8	6.43	5.9	7.96
FMP (1 foot)				8.11		8.29		6.66	8.14		
FMP (3 foot)				7.82		8.39		7.63	8.32		
FMP (5 foot)				7.72		8.42		8.05	8.37		



Sampling & Analysis Plan for the Ahnapee River/Forestville Millpond Dredging Project

Door County Soil and Water Conservation Department
Brian Forest
920-746-2366
bforest@co.door.wi.us

Appendix B

Sampling & Analysis Plan
for the
Ahnapee River/Forestville Millpond Dredging Project

August 23, 2017

Parameters to be analyzed:

Parameter (All intervals of each core sample)	**Analytical Method**	**Detection Level**
PCBs	Megabore Column Chromatography	0.024 µg/g
Total Phosphorus	EPA 365.1	0.00500 mg/L
Mercury	SW846 7471	0.015 mg/Kg
Lead	EPA SW846 3050B (digestion) EPA SW846 6010B (analysis ICP)	1.0 mg/Kg
Copper	EPA SW846 3050B (digestion) EPA SW846 6010B (analysis ICP)	0.5 mg/Kg
Arsenic	EPA SW846 3050B (digestion) EPA SW846 6010B (analysis ICP)	1.0 mg/Kg
Oil & Grease	EPA SW846 9071A	5.0 mg/Kg
Particle Size (Sand/Silt/Clay)	Hydrometer	% Distribution
Parameter (Target Dredge Depth plus 2-feet increment of sample 1 only)	**Analytical Method**	**Detection Level**
Chlordane	Capillary Column Chromatography	0.0085 µg/g
Dieldrin	Capillary Column Chromatography	0.012 µg/g
DDT	Capillary Column Chromatography	0.014 µg/g
DDD	Capillary Column Chromatography	0.010 µg/g
DDE	Capillary Column Chromatography	0.0050 µg/g

Sampling Location Map:

- Please see attached for six samples to be collected for analysis and additional eight cores to be collected for future analysis

Planned sectioning of cores at each sample location:

- Cores will be comprised of material from the sediment surface (0 feet) to 6 or 8 feet, depending on total depth of sediment to bedrock. If bedrock is not encountered, cores will be collected to the proposed dredge depth plus 2 feet.
- Each core will be examined for stratigraphic layering. If present, the cores will be analyzed based on the stratigraphic units.
- If there is no stratigraphic layering present, each core will be sectioned and analyzed in 2-foot increments: 0 – 2 feet, 2 – 4 feet, 4 – 6 feet and 6 – 8 feet.
    - Sample #1 will be located adjacent to the dam structure will be segmented as outlined above, plus one additional sample at the target dredge depth plus 2 feet. This sample will be analyzed for the following: Chlordane, Dieldrin, DDT, DDD & DDE. If results indicate the presence of these pesticides, and additional information is necessary, additional analyses will be performed on the stored samples taken from other cores adjacent to the dam structure. These will test for the above pesticides, as well as the following: Aldrin, Endrin, Heptachlor, Lindane and Toxaphene.

Sampling methods & handling procedures:

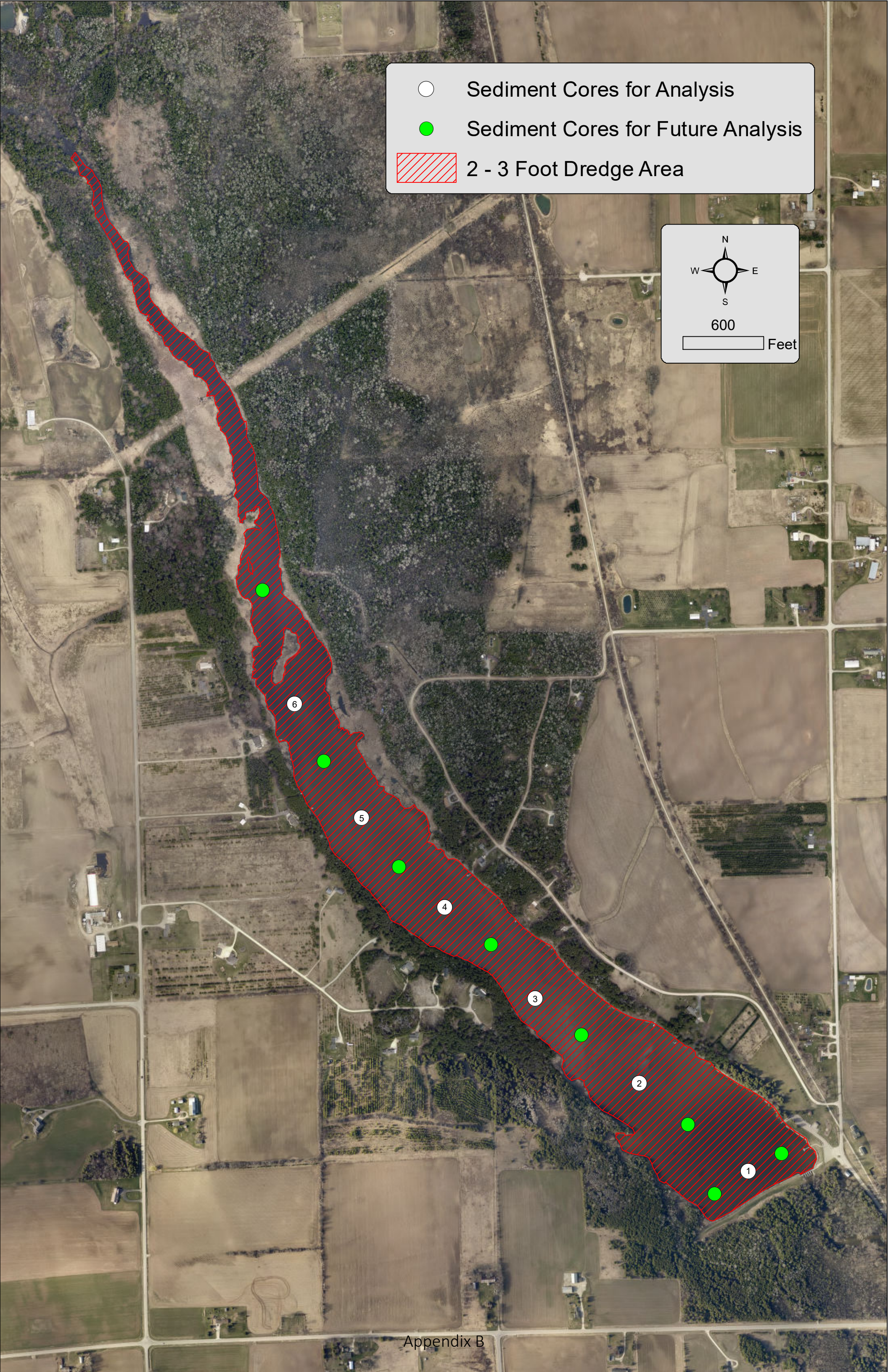
- The contractor will obtain samples with a core sampler in a vertical, continuous length of sediment, at the designated locations
- Each sediment core will be accompanied by a field report documenting the GPS coordinates, length of the interval, odor, texture and color of the representative strata

- Documentation for each core location will also include water depth and total sediment thickness.
- Sample storage equipment and methods will be done in the following manner:
    - A clean pair of new, non-powdered, disposable gloves will be worn each time a different location is sampled and the gloves should be donned immediately prior to sampling. The gloves should not come in contact with the media being sampled and should be changed any time during sample collection when their cleanliness is compromised.
    - Sample containers with samples suspected of containing high concentrations of contaminants will be stored separately.
    - All background samples will be collected and placed in separate ice chests or shipping containers.
    - Sample collection activities will proceed progressively from the least suspected contaminated area to the most suspected contaminated area if sampling devices are to be reused.
    - Samples of waste or highly contaminated media will not be placed in the same ice chest as environmental (i.e., containing low contaminant levels) or background samples.
    - If possible, one member of the field sampling team will take all the notes and photographs, fill out tags, etc., while the other members collect the samples. Samplers will use new, verified and certified-clean disposable or nondisposable equipment cleaned according to procedures contained in SESD Operating Procedure for Field Equipment Cleaning and Decontamination, SESDPROC-205, or SESD Operating Procedure for Field Cleaning and Decontamination at the FEC, SESDPROC-206, for collection of samples for trace metals or organic compound analyses.
    - Detergent will be a standard brand of phosphate-free laboratory detergent such as Liquinox® or Luminox®.
    - Samples collected for PCB, pesticide and other organic analyses will be collected and processed using metallic equipment
    - Samples collected for other chemical analyses will be collected and processed using non-metallic equipment
    - Cores that are stored for future analyses will be kept at -80°

Contactor and Certified Lab information:

Contractor: UW – Oshkosh Environmental Research & Innovation Center
783 Pearl Avenue, Oshkosh WI, 54901
(920) 424-3148

Certified Lab: Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive, Madison WI, 53718
(920) 224-6202


Sediment Cores for Analysis
Sediment Cores for Future Analysis
2 - 3 Foot Dredge Area
N
W
E
S
600
Feet
6
5
4
3
2
1

Appendix B

6. Sediment Core Analysis

The use of sediment cores provides the opportunity to understand the makeup of the sediment that resides in the Millpond, as well as provides insight into the options for future action in the management decisions to be made. Analysis of accumulated sediment also provided quantification of possible contaminants that may exist.

Figure 6-1. Location of Sediment Cores

Six coring locations were identified (see Figure 6-1) and a plan which outlined procedure and analysis to be done was submitted to the Wisconsin Department of Natural Resources for review. Locations were chosen to provide a representative assemblage of the Millpond sediment. A partnership of the SWCD and UW-Oshkosh staff collaborated on October 31 and November 5 of 2017 to collect the samples. A Livingstone-type rod piston corer was used with split tubes to extrude the cores for visual inspection and collection of sample material (see Figure 6-2).

Each core was examined for stratigraphic layers, and representative samples for analysis were taken from each layer. Each sample was split into three layers with the top being loose unconsolidated material, the middle "muckier" sediments and the bottom layer was more compact (see Figure 6-3).

Figure 6-2. Sediment Core Collection

Figure 6-3. Sediment Core #3

Each core was taken and a representative sample was taken from each stratified layer in the profile, they were packaged accordingly to create eighteen discrete samples. The samples were shipped to the Wisconsin State Laboratory of Hygiene for analysis of the parameters in Table 6-1.

Parameter (All intervals of each core sample)	**Analytical Method**	**Detection Level**
PCBs	Megabore Column Chromatography	0.024 µg/g
Total Phosphorus	EPA 365.1	0.00500 mg/L
Mercury	SW846 7471	0.015 mg/Kg
Lead	EPA SW846 3050B (digestion) EPA SW846 6010B (analysis ICP)	1.0 mg/Kg
Copper	EPA SW846 3050B (digestion) EPA SW846 6010B (analysis ICP)	0.5 mg/Kg
Arsenic	EPA SW846 3050B (digestion) EPA SW846 6010B (analysis ICP)	1.0 mg/Kg
Oil & Grease	EPA SW846 9071A	5.0 mg/Kg
Particle Size (Sand/Silt/Clay)	Hydrometer	% Distribution
Chlordane	Capillary Column Chromatography	0.0085 µg/g
Dieldrin	Capillary Column Chromatography	0.012 µg/g
DDT	Capillary Column Chromatography	0.014 µg/g
DDD	Capillary Column Chromatography	0.010 µg/g
DDE	Capillary Column Chromatography	0.0050 µg/g

Table 6-1. Parameters Analyzed in Sediment Cores

Each parameter tested has a number of thresholds that are significant to the interpretation of results:

- Limit of Detection (LOD) – The lowest concentration of a measurement that can be detected by an instrument at a specified level of confidence
- Limit of Quantification (LOQ) – The lowest concentration at which the results can be reported with a high degree of confidence and are acceptable for a specified use
- Threshold Effect Concentration (TEC) – The lowest concentration effect level, adverse ecological effects are not expected from concentrations below this level
- Midpoint Effect Concentration (MEC) – This value is the midpoint between the TEC and the PEC
- Probable Effect Concentration (PEC) – The upper concentration effect level, adverse ecological effects are expected to occur more often than not from concentrations above this level

A quantification of the level of concern can be deciphered from the value of the measured concentration relative to the TEC, MEC and PEC, as established in the Consensus-Based Sediment Quality Guidelines; Level 1 represents values that fall below the TEC and Level 4 represents values that exceed the PEC (see Figure 6-4).

		Threshold				Midpoint				Probable		
Level 1	→	Effect	←	**Level 2**	→	Effect	←	**Level 3**	→	Effect	←	**Level 4**
		Concentration				Concentration				Concentration		

Figure 6-4. Levels of Concern in Relation to Concentration of Contaminant

Heavy Metals

An assessment of the ecological health of a waterbody includes the investigation of heavy metals that may be present in the accumulated sediments. It is generally accepted that there are two origins of heavy metals in lake sediment environments: natural process (i.e. erosion and sedimentation, weathering of bedrock or biological decomposition) and human processes. Both of these origins can negatively impact an ecosystem, but only deposits derived from human activities are considered contaminants. Introduction of contaminants can occur through both terrestrial and atmospheric sources. Sediment core analysis from the Millpond included identification of Arsenic, Copper, Lead and Mercury concentrations in each sample. Each of the metals tested were present and did reach the Limit of Detection, but not all registered concentrations that surpassed the Limit of Quantification. Most of the samples were below the Threshold Effect Concentration, with the exception of three out of eighteen samples that showed Copper concentrations and two out of eighteen samples that showed Mercury concentrations in excess of the Threshold Effect Concentration but below the Midpoint Effect Concentration (see Table 6-2) These elevated values do not present serious concern for impacts to ecological health, as they are still below the Probable Effect Concentration.

Core #	Depth (cm)	Arsenic (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)
1-1	0-20	1.93	20.10	9.18	0.05
1-2	24-70	3.30	23.30	11.10	0.05
1-3	70-100	4.94	28.30	17.10	0.10
2-1	0-37	1.74	25.40	10.50	0.09
2-2	37-45	2.54	24.90	13.20	0.10
2-3	45-56	3.90	56.90	10.90	0.12
3-1	0-46	1.52	23.10	12.50	0.09
3-2	46-65	4.71	33.60	9.27	0.24
3-3	65-86	2.96	29.40	4.86	0.11
4-1	0-22	1.57	22.70	12.00	0.09
4-2	17-39	3.34	23.40	13.80	0.11
4-3	39-52	3.64	25.70	10.50	0.11
5-1	0-20	2.93	20.60	10.90	0.10
5-2	29-49	3.60	21.00	9.01	0.11
5-3	49-60	5.91	27.00	8.83	0.16
6-1	0 - 20	1.33	24.30	12.20	0.10
6-2	17-35	2.31	22.00	14.50	0.10
6-3	35-57	3.99	42.90	11.30	0.20
Limit of Detection		1.00	0.50	1.00	0.01
Limit of Quantification		2.98	1.59	2.98	0.04
Threshold Effect Concentration		9.8	32	36	0.18
Midpoint Effect Concentration		21.4	91	83	0.64
Probable Effect Concentration		33	150	130	1.1

Level 1
Level 2
Level 3
Level 4

Table 6-2. Concentration of Heavy Metals in Core Samples

Pesticides and PCBs

All collected samples were analyzed for Polychlorinated Biphenyls (PCBs) and one layer from Core #1, closest to the dam, was analyzed for several pesticides. Four of the eighteen samples showed PCB

concentrations above the Limit of Detection, but did not surpass the Limit of Quantification. There was no detection of the tested pesticides in any of the analyzed samples.

Total Phosphorus

High concentrations of phosphorus are a common cause of eutrophication in fresh water lakes, reservoirs and impoundments. Phosphorus contributions in a waterbody can be from both external phosphorus sources, as well as its release and retention in the sediments. Accumulated sediments act as a sink where legacy phosphorus can be stored, and also as an ongoing source of phosphorus for the overlying water. Recycling of phosphorus from the underlying sediments that have been enriched by years of high nutrient inputs can cause a lake to remain eutrophic well after external inputs of phosphorus have been decreased. Determination of Total Phosphorus concentrations that have accumulated in the Millpond sediments is necessary for an understanding of the nutrient budget of the waterbody as a whole, as well as to provide guidance on the next steps needed to address issues in the Millpond. Total Phosphorus concentrations were quite high in all of the analyzed sample, with values ranging from 764 mg/kg to 1,870 mg/kg (see Chart 6-1); the Limit of Quantification for Phosphorus is 119 mg/kg.

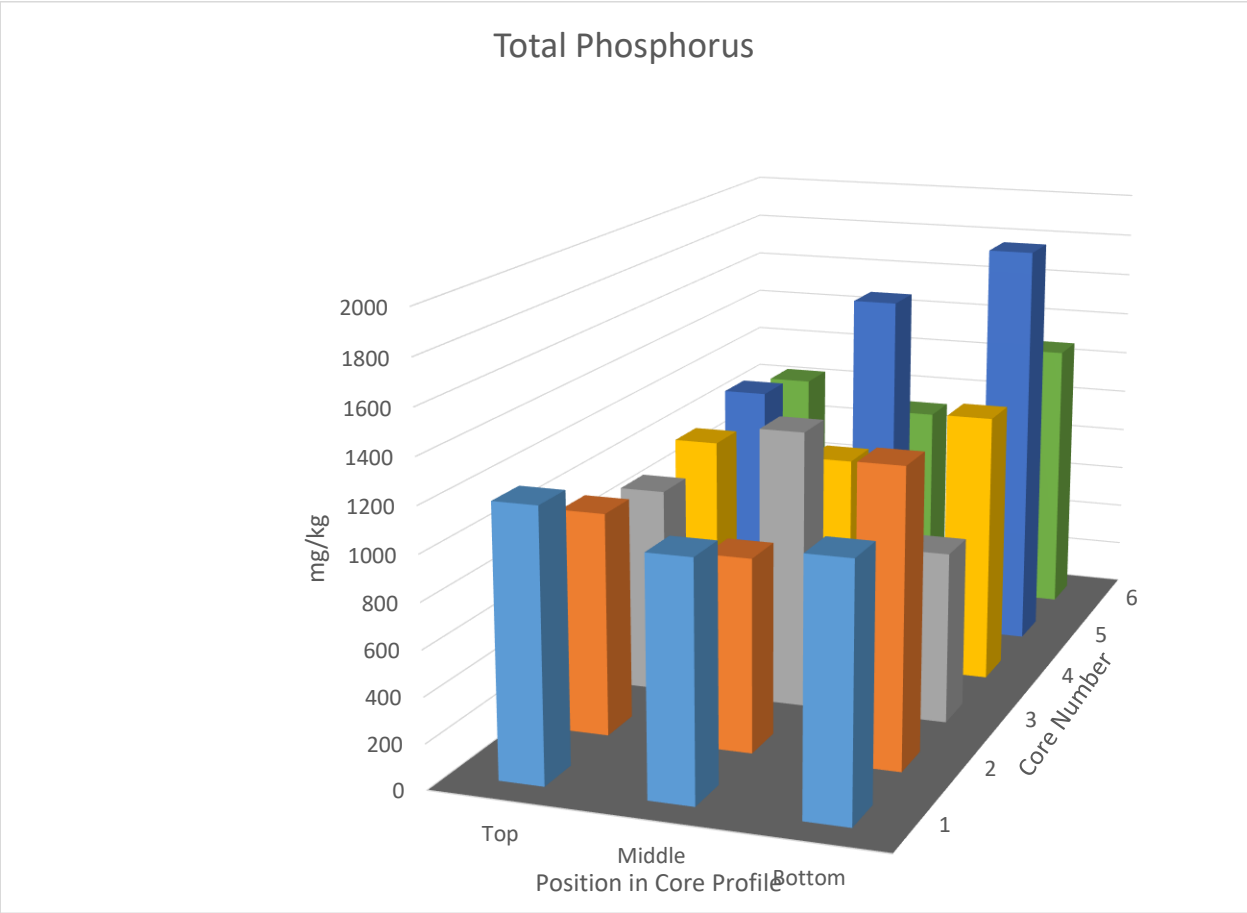


Chart 6-1. Total Phosphorus in Sediment Cores

Oil and Grease

Oil and grease are part of large group of contaminant sources named polycyclic aromatic hydrocarbons (PAHs). High concentrations of PAHs can bring considerable stress to aquatic organisms and their associated ecosystems, as well as pose a threat to human health. Most PAHs do not dissolve in water, but bind to sediments and accumulate on the bed of lakes, reservoirs or streams; accumulated sediments can be suspended in the water column and PAHs will be transported. PAHs typically originate from urban and suburban nonpoint sources and can be derived from road runoff, sewage and atmospheric circulation. Many of the samples analyzed revealed somewhat elevated concentrations of oil and grease (see Chart 6-2). While there is not a specific threshold value that has been identified, the Wisconsin DNR Wastewater Permit Program uses a value of 1,000 parts per million (ppm) when evaluating discharge limits. Concentrations determined through sediment core analysis ranged from 165 mg/kg (ppm) to 3,730 mg/kg (ppm).

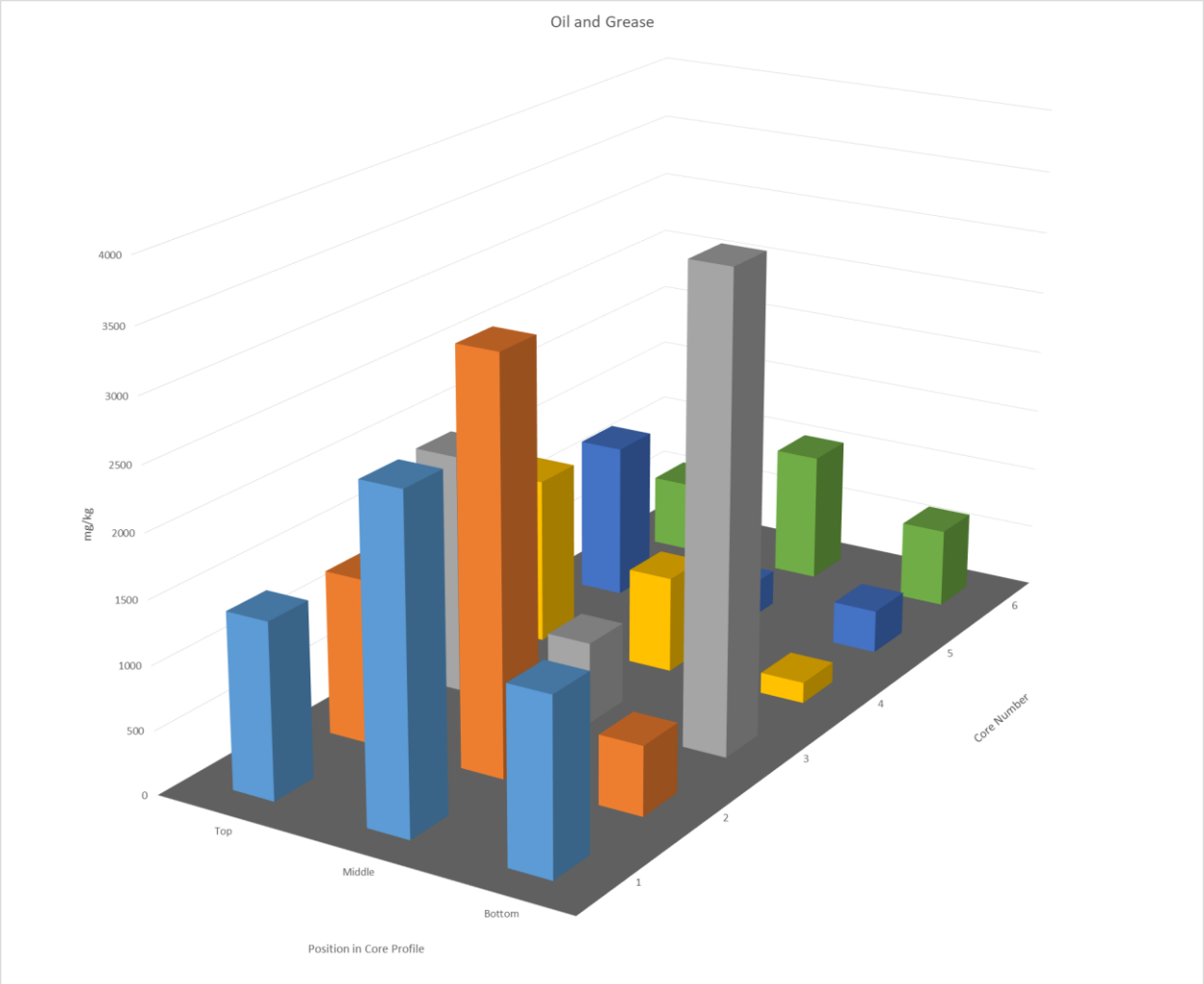


Chart 6-2. Oil and Grease Concentrations

Particle Size Analysis (Sand/Silt/Clay)

One of the parameters generated from material collected in sediment cores is a breakdown of the constituent mineral components of the sediment; the analysis is represented by a ratio of the sand, silt and clay particles present. Analysis of the Millpond cores classifies most of the samples as silty loam with some falling into the classification of sandy loam and clay loam (see Figure 6-5).

Figure 6-5. Particle Size Distribution

A cross section of the sediment cores shows a representation of the accumulation of sediments above the native soil (see Figure 6-6). In the six cores taken, silt and much deposits ranged from 1’-2” to 2’-3”. This information, when coupled with bathymetry data, provides representation of the conditions on the bottom of the Millpond.

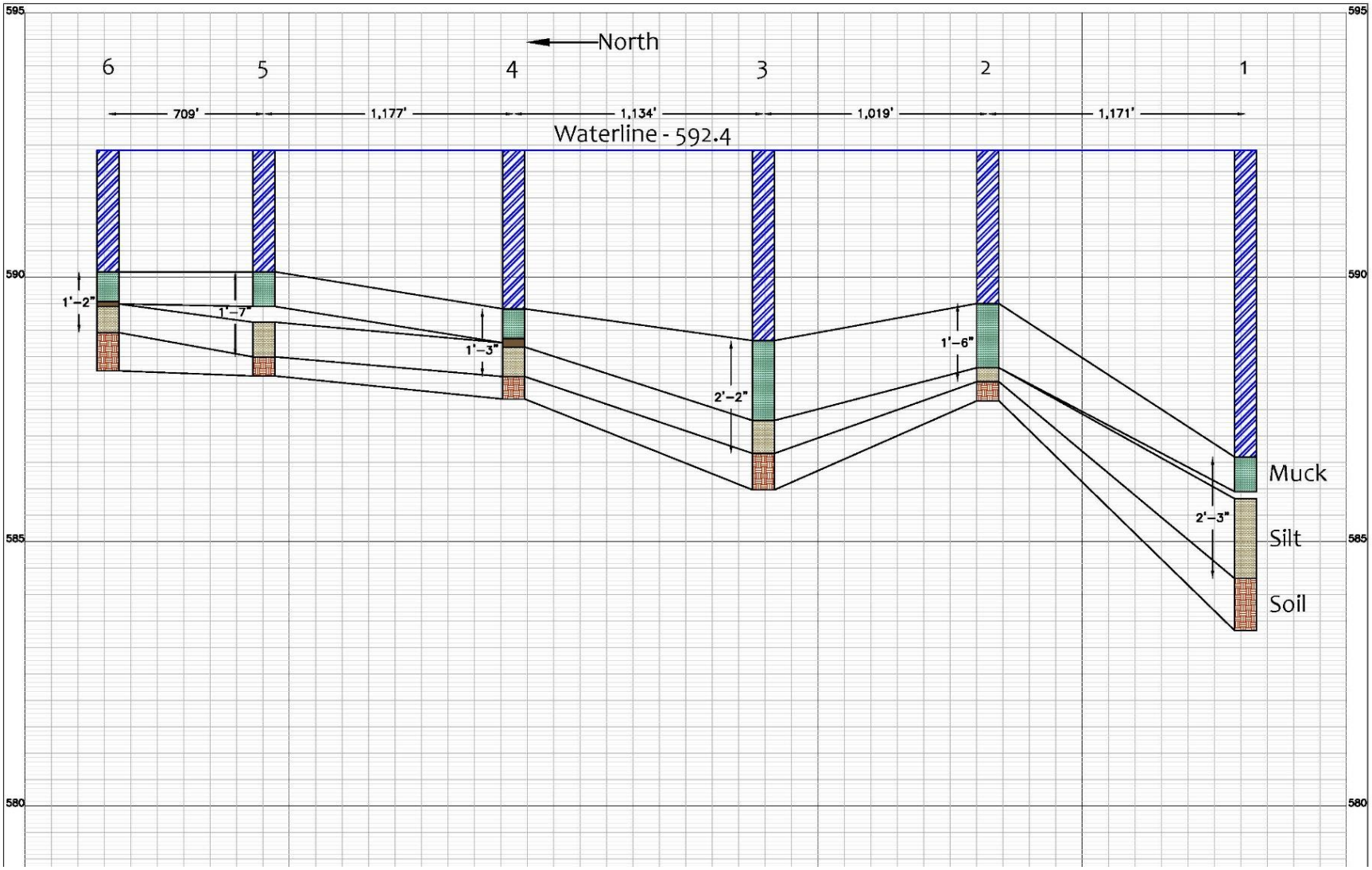


Figure 6-6. Cross Sections of Sediment Cores

Summary of Results

A thorough understanding of the composition of accumulated sediments is important for identification of their chemical makeup, as well as planning for potential relocation in a dredging scenario. Part of the process for moving ahead with sediment cores was to establish a Sampling and Analysis Plan, approved by the Wisconsin DNR, and in which the protocol for the coring process was set. Additional coring locations have been identified, and if the need for further analysis presented itself the protocol has been established.

Heavy metals were detected, but in a very random sampling, and at levels that do not warrant concern, thus no likely impact on disposal of materials that may be proposed to be removed. Total Phosphorus levels were elevated, as expected in a situation in which many decades of activity in an agricultural landscape have contributed a steady supply of nutrients and sediment. Research has illustrated that internal loading of phosphorus from accumulated sediments can continue to play a role in water quality in shallow lakes. Oil and grease concentrations were elevated in many of the samples, but context is difficult as there is not a specified threshold for those parameters.

Overall, the accumulated sediments in the Millpond fall into a classification of a silty loam, with a high percentage of very fine particles. This is to be expected with the high degree of suspended sediments and poor clarity resulting from turbid waters. From the information gathered in the samples, there is roughly two feet of loose, unconsolidated material overlying the more competent soils in the subsurface.

CHAPTER 23
AGRICULTURAL PERFORMANCE STANDARDS AND ANIMAL WASTE STORAGE ORDINANCE

This Ordinance (2018-17; September 27, 2018) supersedes Chapter 23 Door County Code – "Animal Waste Storage Facility Ordinance" (Ordinance No. 4-87, enacted 02/19/87)

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1.03 Findings and Declaration of Policy.
1.04 Purpose.
1.05 Applicability.
1.06 Interpretation.
1.07 Severability Clause.
1.08 Relationship to Other Laws.
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1.11 Definitions.

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1.20 Delegation of Authority.
1.21 Administrative Duties.
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Subchapter III – Agricultural Performance Standards and Prohibitions
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Subchapter I – Introduction

1.01 Authority. This section is adopted under authority granted by Sections 59.01, 59.02, 59.03, 59.04, 59.54, 59.69, 59.70, 66.0113, 92.07, 92.09, 92.11, 92.15, and 92.16 Wisconsin Statutes.

1.02 Title. This Ordinance shall be known as, referred to, and may be cited as the "Door County Agricultural Performance Standards and Animal Waste Storage Ordinance" and is hereinafter referred to as the Ordinance.

1.03 Findings and Declaration of Policy. (1) The Door County Board of Supervisors recognizes the importance of protecting our ground and surface water resources and finds that proper management of agricultural practices contributes to the protection of: ground and surface waters; public health; plant, animal, and aquatic life; and the property tax base of Door County.

(2) The Door County Board of Supervisors recognizes the importance of agricultural activities to the social, economic, historic, and cultural significance and subsistence of Door County residents and transients.

(3) The residents of Door County have the right to implement agricultural activities on the land surface, where as these activities are implemented in a responsible manner so as not to adversely affect ground and surface waters; public health; and plant, animal, and aquatic life of Door County.

(4) The citizens of Door County have the right to implement agricultural practices and shall not have nuisance actions brought against them, in accordance with Section 823.08 Wisconsin Statutes, unless the agricultural use or practice is a substantial threat to public health or safety.

(5) The dominant aim of this ordinance is to promote the public health, safety, convenience and general welfare.

1.04 Purpose. This Ordinance establishes the right to farm responsibly, implements Agricultural Performance Standards and Prohibitions and supersedes Ordinance No. 4-87 Animal Waste Storage Facility Ordinance to reflect new standards.

1.05 Applicability. This ordinance applies to the entire geographical area of Door County, except as

otherwise provided by law.

1.06 Interpretation. In their interpretation and application, the provisions of this Ordinance shall be held to be minimum requirements and shall be liberally construed in favor of Door County, and shall not be deemed a limitation or repeal of any other power granted by the Wisconsin Statutes.

1.07 Severability Clause. If any section, provision, or portion of this Ordinance is ruled invalid by a court, the remainder of the Ordinance shall not for that reason be rendered ineffective.

1.08 Relationship to Other Laws.

(1) The enactment of this ordinance shall not preclude the County of Door from enacting any other ordinance or providing for the enforcement of any other law or ordinance relating to the same or any other matters.

(2) The procedures and remedies set forth herein may be used in the alternative or in consonance with or in lieu of any other remedy or procedure authorized by law.

(3) Neither commencement of an action, nor legal remedy granted, under this ordinance may be deemed former jeopardy for purposes of concurrent or subsequent criminal proceedings relating to the same or any other matter.

1.09 Authority Cited. References herein to the Wisconsin Statutes or Wisconsin Administrative Code are to those in effect as of the date this ordinance is enacted <u>or</u> the Statutes or Code as subsequently amended or revised.

1.10 Effective Date. This Ordinance shall become effective upon its enactment and publication by the Door County Board of Supervisors.

1.11 Definitions.

(1) "Adequate sod, or self-sustaining vegetative cover" means maintenance of sufficient vegetation types and densities such that the physical integrity of the streambank or lakeshore is preserved. Self-sustaining vegetative cover includes grasses, forbs, sedges and duff layers of fallen leaves and woody debris.

(2) "Agricultural facility" means a structure associated with an agricultural practice.

(3) "Agricultural land use" means the use of land for agricultural practices.

(4) "Agricultural practice" means any activity associated with an agricultural use.

(5) "Agricultural use" includes the meaning given in s. 91.01(2), Wis. Stats.

(6) "Animal feeding operation" means a lot or facility, other than a pasture or grazing area, where animals have been, are or will be stabled or confined, and will be fed or maintained for a total of 45 days or more in any 12-month period. Two or more animal feeding operations under common ownership or common management are a single operation if at least one of the following is true:

(a) The operations are adjacent.

(b) The operations utilize common systems for the landspreading of manure or other wastes, including a manure management plan or landspreading acreage.

(c) Manure, barnyard runoff or other wastes are commingled in a common storage facility prior to landspreading.

(7) "Animal unit" (a) means a unit of measure used to determine the total number of single animal types or combination of animal types, as specified in § NR 243.05, Wis. Adm. Code, that are at an animal feeding operation.

(8) "Applicant" means any person who applies for a permit under this Ordinance.

(9) "Best management practices" or "BMPs" means structural or non-structural measures, practices, techniques or devices employed to avoid or minimize soil, sediment or pollutants carried in runoff to waters of the state.

(10) "Board of Adjustment" means the Door County Board of Adjustment, created and appointed under s. 59.694 Wis. Stats.

(11) "Closed Depression" means a topographical basin where water ponds to a seasonal high water mark, has no external drainage, and drainage may occur either through direct conduits to groundwater or low areas where water ponds and infiltrates into the groundwater. Closed depressions may be identified using topographic maps and visual interpretation, ArcGIS tools, or other methods. A seasonal high water mark may include, but is not limited to, areas that collect and retain water for extended time periods (days or weeks) that result in areas of reduced or no crop growth. (§ NR 151.015(2), Wis. Adm. Code)

(12) "Concentrated flow channel" means a natural channel or constructed channel that has been shaped or graded to required dimensions and established in perennial vegetation for the stable conveyance of runoff. Concentrated flow channel may also include non-vegetated channels caused by ephemeral erosion, intermittent streams, drainage ditches, and drainage ends identified on the NRCS soil survey and may be identified as contiguous up-gradient deflections of contour lines on the USGS 1:24,000 scale topographic map. (§ NR 151.015(2m), Wis. Adm. Code)

(13) "Conservation practice" means a best management practice designed to reduce or prevent soil or sediment loss to the waters of the state. (§ NR 151.015(3), Wis. Adm. Code)

(14) "Crop producer" means an owner or operator of an operation engaged in crop related agricultural practices specified in s. 281.16 (1) (b), Stats. (§ NR 151.015(4), Wis. Adm. Code)

(15) "Cropland practice" means the method, activity or management measure used to produce or harvest crops. (§ NR 151.015(5), Wis. Adm. Code)

(16) "Direct conduits to groundwater" includes the meaning given in § NR 151.002(11m), Wis. Adm. Code.

(17) "Direct runoff" includes any of the following:

(a) Runoff from a feedlot that can be predicted to discharge a significant amount of pollutants to surface waters of the state or to a direct conduit to ground water.

(b) Runoff of stored manure, including manure leachate, that discharges a significant amount of pollutants to surface waters of the state or to a direct conduit to ground water.

(c) Construction of a manure storage facility in permeable soils or over fractured bedrock without a liner designed in accordance with s. NR 154.04 (3).

(d) Discharge of a significant amount of leachate from stored manure to waters of the state. (§ NR 151.015(7), Wis. Adm. Code)

(18) "Established crop" means a growing annual crop, perennial crop, or cover crop that provides vegetative cover of the soil. (§ NR 151.015(7m), Wis. Adm. Code)

(19) "Exceptional resource waters" means waters listed in § NR 102.11, Wis. Adm. Code.

(20) "Idle manure storage facility" means a manure storage facility where the operations cease or manure has not been added or removed for 24 months.

(21) "Incorporation" has the meaning given in § NR 243.03(28).

(22) "Infield bedrock verification" means determining bedrock depth using available data which may include well construction reports, location of drill cores or other subsurface investigations, location of quarries and natural bedrock outcrops, geophysical investigations, and uneven crop growth patterns that are linked to fracture traces in the field. (§ NR 151.015(8h), Wis. Adm. Code)

(23) "Injection" has the meaning given in s. NR 243.03(29).

(24) "Karst feature" means an area or surficial geologic feature subject to bedrock dissolution so that it is likely to provide a conduit to groundwater, and may include caves, enlarged fractures, mine features, exposed bedrock surfaces, sinkholes, springs, seeps or swallets. (§ Trans 401.06(8)(b)1, Wis. Adm. Code)

(25) "Land Conservation Committee" means

(a) the committee created by a county board under § 92.06, Wis. Stats. "Land conservation committee" includes employees or agents of a county land conservation committee whom, with committee authorization, act on behalf of the committee.

(b) that committee of the Door County Board of Supervisors which oversees the Soil and Water Conservation Department.

(26) "Landowner" means any person holding fee title, an easement or other interest in property, which allows the person to undertake cropping, livestock management, land disturbing construction activity or maintenance of storm water BMPs on the property. See also § ATCP 50.01(15), Wis. Adm. Code.

(27) "Liquid manure" has the meaning given in s. NR 243.03(32) when applied to facilities subject to Ch. NR 243, and the meaning given in UW A2809 for all other agricultural facilities where manure is generated.

Notes: Copies of the University of Wisconsin – Extension publication A2809 Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin dated 2012 (A2809) may be inspected at the office of the Wisconsin Department of Natural Resources, the Wisconsin Department of Agriculture, Trade and Consumer Protection and the legislative reference bureau, Madison, Wisconsin. A2809 is also available electronically at:
http://learningstore.uwex.edu/assets/pdfs/A2809.pdf
§ NR 243.03(32), Wis. Adm. Code)

(28) "Livestock" means all domestic animals including bovine animals, sheep, goats, poultry, swine, farm-raised deer, equine animals, farm-raised game birds, camelids, ratites and fish, or any fenced-in animals.

(29) "Livestock facility" means a structure or system constructed or established on a livestock operation. (§ NR 151.015 (9), Wis. Adm. Code)

(30) "Livestock operation" has the meaning given in § 281.16 (1) (c), Wis. Stats. (§ NR 151.015 (11), Wis. Adm. Code)

(31) "Livestock producer" means an owner or operator of a livestock operation. (§ NR 151.015 (10), Wis. Adm. Code)

(32) "Livestock Structure" means a building or other structure used to house or feed livestock, to confine livestock for feeding, to store livestock feed, or to collect or store waste generated at a livestock facility...and includes a barn, milking parlor, feed storage facility, feeding facility, animal lot or waste storage facility (§ ATCP 51.01(20), Wis. Adm. Code).

(33) "Long term no-till" means no-till farming that has been implemented a minimum of 3 consecutive years. (§ NR 151.015(11m), Wis. Adm. Code)

(34) Manure" means livestock excreta...and includes the following when intermingled with excreta in normal farming operations: debris including bedding, water, soil, hair, and feathers; processing derivatives including separated sand, separated manure solids, precipitated manure sludges, supernatants, digested liquids, composted bio solids, and process water; and runoff collected from barnyards, animal lots, and feed storage areas. (§ ATCP 50.01(20), Wis. Adm. Code)

(35) "Manure management system" has the meaning given in § ATCP 50.62(1)(b), Wis. Adm. Code. (§ ATCP 50.01(21), Wis. Adm. Code)

(36) "Manure storage facility" means an impoundment made by constructing an embankment or excavating a pit or dugout or by fabricating a structure to contain manure and other animal or agricultural wastes. (§ ATCP 50.01(22) & § 50.62(1)(c), Wis. Adm. Code)

(37) "Manure storage structure" has the meaning given in § ATCP 50.62(1)(d), Wis. Adm. Code.

(38) "Margin of safety level" has the meaning given it in § NR 243.03(37), Wis. Adm. Code.

(39) "Mechanical application" means surface application, injection, or incorporation of manure on cropland or pastures using manure hauling vehicles or equipment. (§ NR 151.015 (13j), Wis. Adm. Code)

(40) "Navigable waters" or "navigable waterway" means any body of water which is navigable under the laws of this state.

(41) "Nonpoint source" means a land management activity which contributes to runoff, seepage or percolation which adversely affects or threatens the quality of waters of this state and which is not a point source under § 283.01(12), Wis. Stats. (§ NR 120.02 (24), Wis. Adm. Code)

(42) "Nonpoint source water pollution" means pollution of the waters of the state that does not result from a point source.

(43) "NRCS" means the Natural Resources Conservation Service of the U.S. Department of Agriculture.

(44) "Nutrient Management Plan" (NMP) means a written plan outlining the amounts, timing, locations, methods and other aspects regarding the land application of manure, commercial and other fertilizers, and process wastewater. A NMP includes a plan required under § ATCP 50.04(3) or § 50.62(5)(f), Wis. Adm. Code; and a farm NMP prepared or approved by a qualified nutrient management planner. A NMP must comply with § ATCP 50.04(3), Wis. Adm. Code. (§ ATCP 50.01(28), Wis. Adm. Code)

(45) "Operator" means a person responsible for the oversight or management of equipment, facilities or livestock at a livestock operation, or is responsible for land management in the production of crops.

(46) "Ordinary high water mark" means the point on the bank or shore up to which the presence and action of surface water is so continuous as to leave a distinctive mark such as by erosion, destruction or prevention of terrestrial vegetation, predominance of aquatic vegetation, or other easily recognized characteristic. Where the bank or shore at any particular place is of such character that it is difficult or impossible to ascertain where the point of ordinary high-water mark is, recourse may be had to the opposite bank of a stream or to other places on the shore of a lake or flowage to determine whether a given stage of water is above or below the ordinary high-water mark. (§ NR 115.03(6) & § 151.002(30), Wis. Adm. Code)

(47) "Outstanding resource waters" means waters listed in § NR 102.10, Wis. Adm. Code.

(48) "Overflow" means discharge of manure to the environment resulting from flow over the brim of a facility or from flow directed onto the ground through a man-made device including a pump or pipe. (§ NR 151.015 (15e), Wis. Adm. Code)

(49) "Pasture" means land on which livestock graze or otherwise seek feed in a manner that maintains the vegetative cover over the grazing area. Pasture may include limited areas of bare soil such as cattle lanes and supplemental feeding areas provided the bare soil areas are not significant sources of pollution to waters of the state. (§ NR 151.015 (15m), Wis. Adm. Code)

(50) "Pathogens" has the meaning given in § NR 204.03(38), Wis. Adm. Code. (§ NR 151.015 (15n), Wis. Adm. Code)

(51) "Percent fines" means the percentage of a given sample of soil, which passes through a # 200 sieve. (§ NR 151.002 (32), Wis. Adm. Code)

(52) "Performance standard" means a narrative or measurable number specifying the minimum acceptable outcome for a facility or practice. (§ NR 151.002 (33), Wis. Adm. Code)

(53) "Permit" means the signed, written statement issued by the Door County Soil and Water Conservation Department under this ordinance authorizing the applicant to construct, install, reconstruct, substantially alter, or close a manure storage facility.

(54) "Permitee" means any person to whom a permit is issued under this Ordinance.

(55) "Phosphorus index" or "P-index" means Wisconsin's agricultural land management planning

tool for assessing the potential of a cropped or grazed field to contribute phosphorus to the surface water. (§ NR 151.015 (15s), Wis. Adm. Code)

(56) "Pre-tillage" means using mechanical equipment to reduce soil preferential flow paths, worm holes, root holes, and cracks by turning and mixing the soil prior to and at least 2 inches below the depth of manure application. (§ NR 151.015 (15w), Wis. Adm. Code)

(57) "Process wastewater" has the meaning given in § NR 243.03(53), Wis. Adm. Code. (§ NR 151.015 (16), Wis. Adm. Code)

(58) "Runoff" means storm water or precipitation including rain, snow, ice melt or similar water that moves on the land surface via sheet or channelized flow. (§ NR 151.002 (40), Wis. Adm. Code)

(59) "Silurian bedrock" means the area in Wisconsin where the bedrock consists of Silurian dolomite with a depth to bedrock of 20 feet or less. This area comprises portions of the following counties: Brown, Calumet, Dodge, Door, Fond du Lac, Kenosha, Kewaunee, Manitowoc, Milwaukee, Outagamie, Ozaukee, Racine, Sheboygan, Walworth, Washington, and Waukesha. Areas where Silurian bedrock occurs in Wisconsin can be identified by the most current NRCS, Wisconsin Geological Natural History Survey, Department of Agriculture, Trade and Consumer Protection, Department of Natural Resources, county maps, or infield bedrock verification methods. (§ NR 151.015 (17), Wis. Adm. Code)

(60) "Site that is susceptible to groundwater contamination" under s. 281.16 (1) (g), Stats., means any one of the following:

(a) An area within 250 feet of a private well.

(b) An area within 1000 feet of a municipal well.

(c) An area within 300 feet upslope or 100 feet downslope of a direct conduit to groundwater.

(d) A channel that flows to a direct conduit to groundwater.

(e) An area where the soil depth to groundwater or bedrock is less than 2 feet.

(f) An area where the soil does not exhibit one of the following soil characteristics:

1. At least a 2–foot soil layer with 40% fines or greater above groundwater and bedrock.

2. At least a 3–foot soil layer with 20% fines or greater above groundwater and bedrock.

3. At least a 5–foot soil layer with 10% fines, or greater above groundwater and bedrock. (§ NR 151.015 (18), Wis. Adm. Code)

(61) "Soil and Water Conservation Department" means the Door County Soil and Water Conservation Department (SWCD). SWCD is responsible for the administration and enforcement of this ordinance.

(62) "Soil texture" means the surface texture of the Silurian bedrock soil map unit. (§ NR 151.015 (18g), Wis. Adm. Code)

(63) "Solid manure" has the meaning given in s. NR 243.03(58) when applied to facilities subject to Ch. NR 243, Wis. Adm. Code and the meaning given in UW A2809 for all other agricultural facilities where manure is generated.

Notes: Copies of the University of Wisconsin – Extension publication A2809 Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin dated 2012 (A2809) may be inspected at the office of the Wisconsin Department of Natural Resources, the Wisconsin Department of Agriculture, Trade and Consumer Protection and the legislative reference bureau, Madison, Wisconsin. A2809 is also available electronically at:
http://learningstore.uwex.edu/assets/pdfs/A2809.pdf
(§ NR 151.015 (17), Wis. Adm. Code)

(64) "Stored manure" means manure that is kept in a manure storage facility or an unconfined manure pile. (§ NR 151.015 (19), Wis. Adm. Code)

(65) "Substantially altered" means a change initiated by an owner or operator that results in a relocation of a structure or facility or significant changes to the size, depth or configuration of a structure or facility including:

(a) Replacement of a liner in a manure storage structure.

(b) An increase in the volumetric capacity or area of a structure or facility by greater than 20%.

(c) A change in a structure or facility related to a change in livestock management from one species of livestock to another such as cattle to poultry.
(§ NR 151.015 (20), Wis. Adm. Code)

(66) "Technical standard" means a document that specifies design, predicted performance and operation and maintenance specifications for a material, device or method.

(67) "Tolerable soil loss" or "T" means the maximum rate of erosion, in tons per acre per year, allowable for particular soils and site conditions that will maintain soil productivity. (§ NR 151.015 (21), Wis. Adm. Code)

(68) "Unconfined manure pile" means a quantity of manure that is at least 175 ft3 in volume and which covers the ground surface to a depth of at least 2 inches and is not confined within a manure storage facility, livestock housing facility or barnyard runoff control facility or covered or contained in a manner that prevents storm water access and direct runoff to surface water or leaching of pollutants to groundwater. (§ NR 151.015 (22), Wis. Adm. Code)

(69) "UW A2809" means the 2012 version of the

University of Wisconsin – Extension Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin (A2809).

Notes: Copies of the University of Wisconsin – Extension publication A2809 Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin dated 2012 (A2809) may be inspected at the Wisconsin Department of Natural Resources, the Wisconsin Department of Agriculture, Trade and Consumer Protection and the legislative reference bureau, Madison, Wisconsin. A2809 is also available electronically at:
http://learningstore.uwex.edu/assets/pdfs/A2809.pdf

(70) "Water quality management area" or "WQMA" means any of the following:

(a) The area within 1,000 feet from the ordinary high–water mark of navigable waters that consist of a lake, pond or flowage, except that, for a navigable water that is a glacial pothole lake, "water quality management area" means the area within 1,000 feet from the high–water mark of the lake.

(b) The area within 300 feet from the ordinary high–water mark of navigable waters that consist of a river or stream.

(c) A site that is susceptible to groundwater contamination or that has the potential to be a direct conduit for contamination to reach groundwater.
(§ NR 151.015 (24), Wis. Adm. Code and § 281.16(1)(g), Wis. Stats.)

(71) "Waters of the state" means those portions of Lake Michigan and Lake Superior within the boundaries of Wisconsin, all lakes, bays, rivers, streams, springs, ponds, wells, impounding reservoirs, marshes, water courses, drainage systems and other surface water or groundwater, natural or artificial, public or private within the state or under its jurisdiction, except those waters which are entirely confined and retained completely upon the property of a person. (§ 281.16(1)(h) & § 283.01(20), Wis. Stats.)

(72) "Winter grazing area" means a cropland or pasture where livestock feed or dormant vegetation or crop residue, with or without supplementary feed, during the period of October 1 to April 30.
(§ NR 151.015 (25), Wis. Adm. Code)

(73) "WPDES permit" means a Wisconsin pollutant discharge elimination system permit issued under Ch. 283, Stats. (§ NR 243.03(49), Wis. Stats.)

Subchapter II – Administration.

1.20 Delegation of Authority. Door County hereby designates the Door County Soil and Water Conservation Department to administer and enforce this Ordinance.

1.21 Administration. The provisions of this Ordinance shall be administered by the Door County Soil and Water Conservation Department under the oversight of the Land Conservation Committee.

1.22 Entry and Inspection Authority. The Door County Soil and Water Conservation Department is authorized to enter upon any lands affected by this Ordinance to inspect the land to determine compliance with this Ordinance pursuant to the authority granted by § 92.07 (14), Wis. Stats. If permission cannot be received from the applicant or permittee, entry by the Door County Soil and Water Conservation Department shall be according to § 66.0119 and 66.0119 (3), Wis. Stats. Refusal to grant permission to enter lands affected by this Ordinance for purposes of inspection shall be grounds for order of non-compliance, permit denial or revocation.

1.23 Enforcement Authority.

(1) County may issue a citation, pursuant to and in accordance with § 66.0113 Wis. Stats. and Ch. 35 Door County Code.

(2) A cease and desist order may be issued by the Door County Soil and Water Conservation Department. The cease and desist order: may order that all operations on the property that do not conform to this Ordinance immediately cease; and must be reasonably specific and concrete, so as to fairly apprise wrongdoer of specific violation of this Ordinance and necessary remedial measures.

(3) County may institute other proceedings in any court of competent jurisdiction and pursue any remedy or relief afforded by law, including a civil forfeiture or injunction.

Subchapter III – Agricultural Performance Standards and Prohibitions

1.30 Activities Subject to Agricultural Performance Standards and Prohibitions.

(1) CROPPED LANDS. All land where crops or feed are grown shall be subject to Agricultural Performance Standards and Prohibitions.

(2) LIVESTOCK OPERATION. All livestock producers shall be subject to Agricultural Performance Standards and Prohibitions. Livestock producers and operations within water quality management areas (WQMA's) have more comprehensive requirements.
(§ 281.16(1)(c), Wis. Stats.)

(3) MANURE HANDLING, STORAGE AND APPLICATION. All manure shall be handled, stored and applied to lands in accordance with Agricultural Performance Standards and Prohibitions.

(4) APPLICATIONS OF MANURE, COMMERCIAL FERTILIZERS AND OTHER NUTRIENTS TO AGRICULTURAL LANDS. All crop producers and livestock producers that apply manure or other nutrients directly or through contract to agricultural fields shall be applied in conformance with a nutrient management plan criteria established in § NR 151.07, Wis. Adm. Code.

1.31 Performance Standards and Prohibitions.

(1) SHEET, RILL AND WIND EROSION. All land where crops or feed are grown, including pastures, shall be managed to achieve a soil erosion rate equal to, or less than, the "tolerable" (T) rate established for that soil. This standard first applies to pastures beginning July 1, 2012. Wind erosion rates shall be calculated via the Wind Erosion Equation (WEQ) established by NRCS, and shall be equal to, or less than, the "tolerable" (T) rate established for that soil. (§ NR 151.02, Wis. Adm. Code)

(2) MANURE STORAGE FACILITIES.

(a) *Applicability.* All livestock producers building new manure storage facilities, substantially altering manure storage facilities, or choosing to abandon their manure storage facilities shall comply with this section.

(b) *New construction and alterations.*

1. New or substantially altered manure storage facilities shall be designed, constructed and maintained to minimize the risk of structural failure of the facility, minimize leakage of the facility in order to comply with groundwater standards. The levels of materials in the storage facility may not exceed the margin of safety level.

2. Storage facilities that are constructed or significantly altered on or after January 1, 2011, shall be designed and operated to contain the additional volume of runoff and direct precipitation entering the facility as a result of a 25–year, 24–hour storm.

3. A new manure storage facility means a facility constructed after October 1, 2002.

4. A substantially altered manure storage facility is a manure storage facility that is substantially altered after October 1, 2002.

(c) *Closure.*

1. Closure of a manure storage facility shall occur when an operation where the facility is located ceases operations, or manure has not been added or removed from the facility for a period of 24 months. Manure facilities shall be closed in a manner that will prevent future contamination of groundwater and surface waters.

2. The owner or operator may retain the facility for a longer period of time by demonstrating to the Soil and Water Conservation Department that all of the following conditions are met:

a. The facility is designed, constructed and maintained in accordance with 1.31(2)(b) of this ordinance.

b. The facility is designed to store manure for a period of time longer than 24 months.

c. Retention of the facility is warranted based on anticipated future use.

(d) *Existing facilities.*

1. Manure storage facilities in existence as of October 1, 2002, that pose an imminent threat to public health or fish and aquatic life or groundwater shall be upgraded, replaced or abandoned in accordance with this section.

2. Levels of materials in storage facilities may not exceed the margin of safety level.

(3) CLEAN WATER DIVERSIONS (§ NR 151.06, Wis. Adm. Code)

(a) All livestock producers within a water quality management area shall comply with this section.

(b) Runoff shall be diverted away from contacting feedlot, manure storage areas and barnyard areas within water quality management areas except that a diversion to protect a private well under § NR 151.015 (18)(a), Wis. Adm. Code is required only when the feedlot, manure storage area or barnyard area is located upslope from the private well.

(4) NUTRIENT MANAGEMENT (§ NR 151.07, Wis. Adm. Code)

(a) All crop producers and livestock producers that apply manure or other nutrients directly or through contract to agricultural fields shall comply with this section.

(b) This performance standard does not apply to the application of industrial waste and byproducts regulated under Ch. NR 214, Wis. Adm. Code municipal sludge regulated under Ch. NR 204, Wis. Adm. Code and septage regulated under Ch. NR 113, Wis. Adm. Code provided the material is not commingled with manure prior to application.

(c) Manure, commercial fertilizer and other nutrients shall be applied in conformance with a nutrient management plan as established in § ATCP 50.04 (3), Wis. Adm. Code.

1. The nutrient management plan shall be designed to limit or reduce the discharge of nutrients to waters of the state for the purpose of complying with state water quality standards and groundwater standards.

2. Nutrient management plans for croplands in watersheds that contain impaired surface waters or in watersheds that contain outstanding or exceptional resource waters shall meet the following criteria:

a. Unless otherwise provided in this paragraph, the plan shall be designed to manage soil nutrient concentrations so as to maintain or reduce delivery of nutrients contributing to the impairment of impaired surface waters and to outstanding or exceptional resource waters.

b. The plan may allow for an increase in soil nutrient concentrations at a site if necessary to meet crop demands.

c. For lands in watersheds containing exceptional or outstanding resource waters, the plan may allow an increase in soil nutrient concentrations if the plan documents that any potential nutrient delivery to the exceptional or outstanding resource waters will not alter the background water quality of the exceptional or outstanding resource waters. For lands in watersheds containing impaired waters, the plan may allow an increase in soil nutrient concentrations if a low risk of delivery of nutrients from the land to the impaired water can be demonstrated.

3. In this standard, impaired surface waters are waters identified as impaired pursuant to 33 USC 1313 (d) (1) (A) and 40 CFR 130.7. Outstanding or exceptional resource waters are identified in Ch. NR 102.

(d) This section is in effect on January 1, 2005 for existing croplands under s. NR 151.09 (4) that are located within any of the following:

1. Watersheds containing outstanding or exceptional resource waters.

2. Watersheds containing impaired waters.

3. Source water protection areas defined in § NR 243.03 (61), Wis. Adm. Code.

(e) This section is in effect on January 1, 2008 for all other existing croplands under § NR 151.09 (4), Wis. Adm. Code.

(f) This section is in effect for all new croplands under § NR 151.09 (4), Wis. Adm. Code on October 1, 2003.

(5) MANURE MANAGEMENT PROHIBITIONS.

(a) All livestock producers shall comply with this section.

(b) A livestock operation shall have no overflow of manure storage facilities.

(c) A livestock operation shall have no unconfined manure pile in a water quality management area.

(d) A livestock operation shall have no direct runoff from a feedlot or stored manure into the waters of the state.

(e) 1. A livestock operation may not allow unlimited access by livestock to waters of the state in a location where high concentrations of animals prevent the maintenance of adequate sod or self–sustaining vegetative cover.

2. This prohibition does not apply to properly designed, installed and maintained livestock or farm equipment crossings.

(6) TILLAGE SETBACK PERFORMANCE STANDARD (§ NR 151.03, Wis. Adm. Code)

(a) The purpose of this standards is to prevent tillage operations from destroying stream banks and depositing soil directly in surface waters. In this section, "surface water" has the meaning given in § NR 102.03(7), Wis. Adm. Code.

(b) No crop producer may conduct a tillage operation that negatively impacts stream bank integrity or deposits soil directly in surface waters.

(c) No tillage operations may be conducted within 5 feet of the top of the channel of surface waters. Tillage setbacks greater than 5 feet but no more than 20 feet may be required to meet this standard.

(d) Crop producers shall maintain the area within the tillage setback required under sub. (c) in adequate sod or self-sustaining vegetative cover that provides a minimum of 70% coverage.

(e) This section does not apply to grassed waterways installed as conservation practices.

(7) PHOSPHORUS INDEX PERFORMANCE STANDARD (§ NR 151.04, Wis. Adm. Code)

(a) All crop and livestock producers shall comply with this section.

(b) Croplands, pastures, and winter grazing areas shall average a phosphorus index of 6 or less over the accounting period and may not exceed a phosphorus index of 12 in any individual year within the accounting period.

(c) Except as provided under par. (e), for purposes of compliance with this section the phosphorus index shall be calculated using the version of the Wisconsin Phosphorus Index available as of January 1, 2011.

Notes: •The Wisconsin Phosphorus Index is maintained by the University of Wisconsin department of soil science and can be found at http://wpindex.soils.wisc.edu/

•Soil test phosphorus concentration may be used to help identify fields that are high priority for evaluation with the Wisconsin Phosphorus Index. For example, croplands with soil test phosphorus concentrations of 35 parts per million or greater should be given higher priority for evaluation.

•Best management practices developed by the Department of Agriculture, Trade and Consumer Protection may be used alone or in combination to meet the requirements of this section.

(d) The accounting period required under par. (a) shall meet the following conditions:

1. The accounting period shall begin once a nutrient management plan meeting the requirements of § NR

151.07 and § ATCP 50.04(3), Wis. Adm. Code is completed.

2. During the first 8 years of implementation of this standard by a producer, computation of the phosphorus index may be based on a combination of planned crop management and historic data. Planned crop management data is based on projected management and crop rotations. Historic data is based on management and crop rotations that have actually occurred.

3. Once the nutrient management plan under § NR 151.07 and § ATCP 50.04(3), Wis. Adm. Code is developed, historic data shall be used for each year as it becomes available.

(e) If the phosphorus index is not applicable to a particular crop or situation, an equivalent calculation approved by the department shall be used to meet the requirements of this section.

Note: •The requirement provides for alternative methods to calculate a phosphorus index. Some strategies for assessing and reducing phosphorus index values, algorithms, and software can be found at http:/wpindex.soils.wisc.edu/

(f) Producers may not apply nutrients or manure directly, through mechanical means, to surface waters as defined in § NR 102.03(7), Wis. Adm. Code.

(g) The phosphorus index requirement under sub. (b) first takes effect for pastures beginning July 1, 2012.

(8) PROCESS WASTEWATER HANDLING PERFORMANCE STANDARD (§ NR 151.055, Wis. Adm. Code)

(a) All livestock producers shall comply with this section.

(b) There may be no significant discharge of process wastewater to waters of the state.

(c) The department shall consider all of the following factors when determining whether a discharge of process wastewater is a significant discharge to waters of the state:

1. Volume and frequency of the discharge.

2. Location of the source relative to receiving waters.

3. Means of process wastewater conveyance to waters of the state.

4. Slope, vegetation, rainfall, and other factors affecting the likelihood or frequency of process wastewater discharge to waters of the state.

5. Available evidence of discharge to a surface water of the state or to a direct conduit to groundwater as defined under § NR 151.002(11m), Wis. Adm. Code.

6. Whether the process wastewater discharge is to a site that is defined as a site susceptible to groundwater contamination under § NR 151.015(18), Wis. Adm. Code.

7. Other factors relevant to the impact of the discharge on water quality standards of the receiving water or to groundwater standards.

Notes: Existing technical standards contained in the U.S. Department of Agriculture Natural Resources Conservation Service field office technical guide may be used for managing process wastewater. When such standards are not applicable, the landowner or operator is expected to take reasonable steps to reduce the significance of the discharge in accordance with the agricultural performance standard and prohibition compliance requirements of this chapter. The Wisconsin Department of Agriculture, Trade and Consumer Protection is responsible under s. 281.16(3)(c), Stats., for developing additional management practices if needed.

(9) SILURIAN BEDROCK PERFORMANCE STANDARD (§ NR 151.075, Wis. Adm. Code)

(a) All crop producers and livestock producers that mechanically apply manure directly or through contract or other agreement to cropland or pasture areas that meet the definition of Silurian bedrock in 1.11(60) supra and under § NR 151.015(17), Wis. Adm. Code must comply with this section.

(b) Mechanical manure application may not cause the fecal contamination of water in a well.

(c) Manure may not be mechanically applied on areas of cropland or pastures that have 24 inches or less of separation between the ground surface and apparent water table.

(d) Manure must be applied in conformance with a nutrient management plan that meets the requirements under all the following:

1. The plan must be consistent with s. NR 151.07, Wis. Adm. Code.

2. The plan must be consistent with NRCS Technical Standard 590, dated December 2015 or the most current version of NRCS Technical Standard 590.

Note: *Copies of the NRCS Nutrient Management Standard 590, dated December 2015, including the Technical Note (TN−1) referenced in the standard, may be inspected at the offices of the Wisconsin Department of Natural Resources, the Wisconsin Department of Agriculture, Trade and Consumer Protection, Door County Soil & Water Conservation Department and the Legislative Reference Bureau, Madison Wisconsin. NRCS 590 (and TN−1) is also available electronically at:* *https://efotg.sc.egov.usda.gov/references/public/WI/590_Standard−(2015−12).pdf and* *https://efotg.sc.egov.usda.gov/references/public/WI/Conservation_Planning−TN−1.pdf*

3. The plan must be designed and implemented

consistent with this section and § NR 151.075, Wis. Adm. Code to manage manure so as to reduce the risk of pathogen delivery to groundwater and prevent exceedances of groundwater water quality standards.

4. The plan must use NRCS soil survey maps/information or other methods as a planning tool to identify Silurian bedrock within or adjacent to cropland and pastures.

(e) Manure may not be mechanically applied on croplands or pastures until infield bedrock verification or Silurian bedrock map information is used to identify areas where the Silurian bedrock soil depth is less than 5 feet. If infield bedrock verification uses drill cores or other subsurface investigations, they must be backfilled with soil within 72 hours of being created.

Note: Silurian bedrock map information developed by the Wisconsin Department of Agriculture, Trade and Consumer Protection and/or Department of Natural Resources, may be used alone or in combination to meet the requirements of s. NR 151.075, Wis. Adm. Code, and this section.

Note: Silurian bedrock map information, available from the University of Wisconsin department of soil science, can be found at

https://snapplus.wis.edu/maps/.

(f) Manure may not be mechanically applied on croplands or pastures where the Silurian bedrock soil depth is less than 5 feet until such fields are evaluated and ranked for risk of pathogen delivery to groundwater. Areas determined to have a high risk for pathogen delivery to groundwater must be avoided or must be lowest priority for manure application.

(g) Mechanical application of manure and headland stacking of manure is prohibited on soils with 5 feet or less to Silurian bedrock when soils are frozen or snow covered.

(h) Mechanical application of manure is prohibited within Silurian bedrock having soil depths less than 5 feet when rainfall greater than one inch is forecast within 24 hours of planned application.

(i) Mechanical application of manure is prohibited for soils with less than 2 feet to Silurian bedrock.

(j) For soils with 2 to 3 feet to Silurian bedrock, all the following apply:

1. No mechanical application of solid manure unless all the following are met:

a. Solid manure is incorporated within 72 hours to no more than 4 inches below ground.

b. At least one of the following is implemented:

1) Solid manure is applied at a rate no greater than 15 tons/ acre/year, or the rate that supplies the crop nitrogen recommendation from UW A2809, whichever is less.

2) Solid manure is applied in compliance with UW A2809 and within 10 days of the planting date or applied on a perennial or established crop.

3) Solid manure is composted or treated to reduce pathogen levels via practices to a fecal coliform bacteria density of less than 500,000 colony−forming units or most probable number per gram total solids on a dry weight basis.

Note: *Copies of the University of Wisconsin - Extension publication A2809 Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin, dated 2012 (A2809) may be inspected at the office of the Wisconsin Department of Natural Resources, the Wisconsin Department of Agriculture, Trade and Consumer Protection and the Legislative Reference Bureau, Madison, Wisconsin. A2809 is also available electronically at:*

http://learningstore.uwex.edu/assets/pdfs/A2809.pdf.

2. No mechanical application of liquid manure unless all the following are met:

a. Pre-tillage is completed, unless exempt under par. 3. or 4.

b. Liquid manure is injected or incorporated within 24 hours to no more than 4 inches below ground, unless exempt under par. 3.

c. At least one of the following is implemented:

1) Total liquid manure applications is applied in compliance with UW A2809, or limited to *Table 1* (attached hereto as *Addendum 1* and incorporated herein by reference as if fully set forth), whichever is less, to prevent hydraulic overloading of the soil.

2) Liquid manure is applied in compliance with UW A2809 and within 10 days of the planting date or applied on a perennial or established crop.

3) Liquid manure is treated to substantially reduce pathogen levels via practices to a fecal coliform bacteria density of less than 500,000 most probable number or colony-forming units per 100 milliliter sample.

Note: *Copies of the University of Wisconsin — Extension publication A2809 Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin, dated 2012 (A2809) may be inspected at the office of the Wisconsin Department of Natural Resources, the Wisconsin Department of Agriculture, Trade and Consumer Protection and the Legislative Reference Bureau, Madison, Wisconsin. A2809 is also available electronically at:*

http://learningstore.uwex.edu/assets/pdfs/A2809.pdf.

3. Pre-tillage, incorporation or injection is not required if cropland or pastures meet long term no-till or have a perennial or established crop. Each

surface application of liquid manure must not exceed 6,750 gallons per acre.

4. Pre-tillage is not required if demonstrated to the department that a field cannot meet § NR 151.02, Wis. Adm. Code over an eight-year crop rotation using a combination of the following practices: tillage, crops, contouring, filter strips, or cover crops.

(k) For soils with 3-5 feet to Silurian bedrock, all the following apply:

1. No mechanical application of solid manure unless all the following are met:

a. Incorporated with 72 hours to no more than 6 inches below ground.

b. At least one of the following is implemented:

1) Manure is applied in accordance with UW A2809 annual application rate, or at a rate of 15 tons/acre/year, whichever is less.

2) Manure is applied in compliance with UW A2809 and within 10 days of the planting date or applied on a perennial or established crop.

3) Manure is composted or treated to reduce pathogen levels via practices to a fecal coliform bacteria density of 500,000 colony-forming units, or most probable number per gram total solids on a dry weight basis.

Note: *Copies of the University of Wisconsin - Extension publication A2809 Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin, dated 2012 (A2809) may be inspected at the office of the Wisconsin Department of Natural Resources, the Wisconsin Department of Agriculture, Trade and Consumer Protection and the Legislative Reference Bureau, Madison, Wisconsin. A2809 is also available electronically at:* *http://learningstore.uwex.edu/assets/pdfs/A2809.pdf.*

2. No mechanical application of liquid manure unless all the following are met:

a. Pre-tillage is completed unless exempt under par. 3. or 4.

b. Liquid manure is injected or incorporated within 24 hours to no more than 6 inches below ground, unless exempt under par. 3.

c. At least one of the following is implemented:

1) Total liquid manure application is applied in compliance with UW A2809, or limited to sub. (j) 2. c. *Table 1* rates, whichever is less, to prevent hydraulic overloading of the soil.

2) Liquid manure is applied in compliance with UW A2809 and within 10 days of the planting date or applied on a perennial or established crop.

3) Liquid manure is treated to substantially reduce pathogen levels via practices to a fecal coliform bacteria density of less than 500,000 most probable number or colony-forming units per 100 milliliter sample.

Note: *Copies of the University of Wisconsin — Extension publication A2809 Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin, dated 2012 (A2809) may be inspected at the office of the Wisconsin Department of Natural Resources, the Wisconsin Department of Agriculture, Trade and Consumer Protection and the Legislative Reference Bureau, Madison, Wisconsin. A2809 is also available electronically at:* *http://learningstore.uwex.edu/assets/pdfs/A2809.pdf.*

3. Pre-tillage, incorporation or injection is not required if cropland or pastures meet long term no-till or have a perennial or established crop. Each surface application of liquid manure must not exceed 6,750 gallons per acre.

4. Pre-tillage is not required if demonstrated to the department that a field cannot meet § NR 151.02, Wis. Adm. Code over an eight-year crop rotation using a combination of the following practices: tillage, crops, contouring, filter strips, or cover crops.

(l) For soils with 5 to 20 feet Silurian bedrock, all the following apply:

1. No mechanical application of liquid manure unless all the following are met:

a. Pre-tillage is completed unless exempt under par. 2. or 3.

b. Liquid manure is injected or incorporated with 24 hours to no more than 6 inches below ground, unless exempt under par. 2.

c. At least one of the following is implemented:

1) Total liquid manure application is applied in compliance with UW A2809, or limited to sub. (j) 2. c. *Table 1* rates, whichever is less, to prevent hydraulic overloading of the soil.

2) Liquid manure is applied in compliance with UW A2809 and within 10 days of the planting date or applied on a perennial or established crop.

3) Liquid manure is treated to substantially reduce pathogen levels via practices to a fecal coliform bacteria density of less than 500,000 most probable number of colony-forming units per 100 milliliter sample.

Note: *Copies of the University of Wisconsin - Extension publication A2809 Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin, dated 2012 (A2809) may be inspected at the office of the Wisconsin Department of Natural Resources, the Wisconsin Department of Agriculture, Trade and Consumer Protection and the Legislative Reference Bureau, Madison, Wisconsin. A2809 is also available electronically at:*

http://learningstore.uwex.edu/assets/pdfs/A2809.pdf.

2. Pre-tillage, incorporation or injection is not required if cropland or pastures meet long term no-till or have a perennial or established crop. Each surface application of liquid manure must not exceed 10,000 gallons per acre.

3. Pre-tillage is not required if demonstrated to the department that a field cannot meet s. NR 151.02, Wis. Adm. Code over an eight-year crop rotation using a combination of the following practices: tillage, crops, contouring, filter strips, or cover crops.

Note: *Silurian bedrock map information for soils with 5 to 20 feet to Silurian bedrock, developed by the Wisconsin Department of Agriculture, Trade and Consumer Protection and/or Department of Natural Resources, may be used alone or in combination to meet the requirements of this section.*

(m) Mechanical manure applications are prohibited within any of the following:

1. 1000 feet of a community water system as defined in § NR 811.02, Wis. Adm. Code.

2. 250 feet of a private water system or a non-community water system as defined in § NR 812.07, Wis. Adm. Code.

3. An area within 300 feet upslope or 100 feet downslope of a direct conduit to groundwater as defined in § NR 151.002(11m), Wis. Adm. Code.

4. 100 feet of a concentrated flow channel that leads to a water system included in par. 1. or 2. or direct conduit to groundwater in par. 3.

(n) Mechanical manure applications are prohibited on or within 100 feet of Silurian bedrock in a closed depression unless the manure is injected or incorporated with 24 hours or prior to precipitation capable of producing runoff, whichever comes first. The prohibition of mechanical application of manure does not apply to areas following long term no-till practices or with a perennial or established crop.

(o) No surface application of manure on slopes of 6 percent or greater in cropland and pasture areas that have concentrated flow channels that drain to a closed depression in Silurian bedrock, unless the material is incorporated with 24 hours or prior to precipitation capable of producing runoff, whichever comes first. The prohibition of surface application of manure does not apply to areas following long term no-till practices or with a perennial or established crop.

(p) Practices must retain land applied manure on the soil where they are applied with minimal movement to maintain setback distances specified in subs (m) and (n).

1.32 Cost-sharing required. An owner or operator of an agricultural facility or practice that is in existence before the effective date of the performance standard or prohibition, may not be required to comply with the performance standards, prohibitions, conservation practices or technical standards under this ordinance unless cost-sharing is available from any source, to the owner or operator. A determination that cost-sharing is available to meet the performance standards, prohibitions, conservation practices or technical standards under this subsection will be determined in accordance with § NR 151.09 (4) (d) or § NR 151.095 (5) (d), Wis. Adm. Code when funding is provided under § 281.65, Wis. Stats., and will be determined in accordance with Ch. ATCP 50, Wis. Adm. Code when funds are from any other source. Cost-sharing under this section is only required for the minimum practice(s) necessary to meet the performance standards and prohibitions.

1.33 Implementation and Enforcement Procedures for Cropland Performance Standards.

(1) LANDOWNER AND OPERATOR REQUIREMENTS.

(a) *Introduction.* This section identifies compliance requirements for landowners and operators based on whether the cropland is existing or new and whether cost sharing is required and made available to the landowner or operator. This section will also identify circumstances under which an owner or operator of cropland is required to comply with the cropland performance standards. In this section, "cropland performance standards" means performance standards in § NR 151.005, 151.02, 151.03, 151.04, 151.07, and 151.075.

(b) *General requirements.* If any cropland is meeting a cropland performance standard on or after the effective date of the standard, the cropland performance standard shall continue to be met by the existing landowner or operator, heirs or subsequent owners or operators of the cropland. If a landowner or operator alters or changes the management of the cropland in a manner that results in noncompliance with the performance standard, the landowner or operator shall bring the cropland back into compliance, regardless of whether cost-sharing is made available. This paragraph does not apply to croplands completing enrollment determined to be existing under the conservation reserve or conservation reserve enhancement program administered by the United States Department of Agriculture.

(c) *Existing cropland requirements.*

1. A landowner or operator of an existing cropland, defined under sub. (2) (b), shall comply with a cropland performance standard if all of the following have been done by the Soil and Water Conservation Department:

a. Except as provided in subd. 2. and 3., a determination is made that cost sharing has been made available in accordance with section 1.32 on or after the effective date of the performance standard or prohibition.

b. The landowner or operator has been notified in accordance with sub. (3) or (4).

2. A landowner or operator of existing cropland, defined under sub. (2) (b), shall comply with a cropland performance standard, regardless of whether cost sharing is available, in situations where the best management practices and other corrective measures needed to meet the performance standards do not involve eligible costs.

3. A landowner or operator of an existing cropland that voluntarily proposes to construct or reconstruct a manure storage system shall comply with section 1.30 (4), regardless of whether cost sharing is made available, if the nutrient management plan is required pursuant to a local permit for the manure storage system.

(d) *New cropland requirements.* A landowner or operator of a new cropland, defined under sub. (2) (b), shall comply with the cropland performance standards, regardless of whether cost sharing is available.

(2) SOIL AND WATER CONSERVATION DEPARTMENT DETERMINATIONS.

(a) *Scope of determinations.* If croplands are not in compliance with a cropland performance standard, the Soil and Water Conservation Department shall make determinations in accordance with the procedures and criteria in this subsection.

(b) *Cropland status.* The Soil and Water Conservation Department shall classify non–complying croplands to be either new or existing for purposes of administering this ordinance. In making the determination, the Soil and Water Conservation Department shall base the decision on the following:

1. An existing cropland is one that meets all of the following criteria:

a. The cropland was being cropped as of the effective date of the performance standard or prohibition.

b. The cropland is not in compliance with a cropland performance standard in this subchapter as of the effective date of the standard. The reason for non–compliance of the cropland may not be failure of the landowner or operator to maintain an installed best management practice in accordance with a cost–share agreement or contract.

2. An existing cropland also includes land enrolled on October 1, 2002, in the conservation reserve or conservation reserve enhancement program administered by the United States Department of Agriculture. This subdivision does not apply to croplands re-enrolled after October 1, 2002.

3. A new cropland is one that does not meet the definition under subd. 1. or 2., including:

a. Land without a previous history of cropping that is converted to cropland after the effective date of the performance standard or prohibition. “Without a previous history of cropping” means land where crops have not been grown and harvested for agricultural purposes in the last 10 years prior to the conversion to cropland.

b. Cropland that is in existence and in compliance with a performance standard on or after the effective date of the performance standard or prohibition and that undergoes a change in a cropland practice that results in noncompliance with the performance standards.

4. Change in ownership may not be used as the sole basis for determining whether a cropland is existing or new for purposes of administering this subsection.

(c) *Eligible costs.* If cost sharing is required to be made available under sub. (1) (c), the Soil and Water Conservation Department shall determine the total cost of best management practices and corrective measures needed to bring a cropland into compliance with performance standards and shall determine which of those costs are eligible for cost-sharing.

(3) NOTIFICATION REQUIREMENTS AND COMPLIANCE PERIODS FOR EXISTING CROPLANDS WHEN COST-SHARING IS REQUIRED.

(a) *Landowner notification.*

1. The Soil and Water Conservation Department shall notify a landowner or operator in writing of the determinations made under sub. (2) and implementation requirements for existing croplands where cost sharing is required for compliance.

2. The notice shall be sent certified mail, return receipt requested or personal delivery.

3. The following information shall be included in the notice:

a. A description of the cropland performance standard being violated.

b. The cropland status determination made in accordance with sub. (2) (b).

c. The determination made in accordance with sub. (2) (c) as to which best management practices or other corrective measures that are needed to comply with cropland performance standards are eligible for cost sharing.

d. The determination made in accordance with section 1.32 that cost sharing is available for eligible costs to achieve compliance with cropland performance standards, including a written offer of

cost sharing.

e. An offer to provide or coordinate the provision of technical assistance.

f. A compliance period for meeting the cropland performance standard.

g. An explanation of the possible consequences if the landowner or operator fails to comply with provisions of the notice, including enforcement or loss of cost sharing, or both.

h. An explanation of local appeals procedures.

(b) *Compliance period.*

1. A landowner or operator that receives the notice under par. (a) shall install or implement best management practices and corrective measures to meet the performance standards in the time period specified in the notice, if cost sharing is available in accordance section 1.32.

2. The compliance period identified in the notice in par. (a) shall be determined by the Soil and Water Conservation Department as follows:

a. The compliance period shall begin on the postmark date of the notice or the date of personal delivery.

b. The length of the compliance period shall be from 60 days to 3 years unless otherwise provided for in this subdivision.

c. The length of the compliance period may be less than 60 days if the site is an imminent threat to public health, fish and aquatic life.

d. The Soil and Water Conservation Department may authorize an extension up to 4 years on a case–by–case basis provided that the reasons for the extension are beyond the control of the landowner or operator. A compliance period may not be extended to exceed 4 years in total.

3. Once a landowner or operator achieves compliance with a cropland performance standard, compliance with the standard shall be maintained by the existing landowner or operator and heirs or subsequent owners, regardless of cost sharing.

(4) NOTIFICATION REQUIREMENTS AND COMPLIANCE PERIODS FOR EXISTING CROPLANDS IN SITUATIONS WHEN NO ELIGIBLE COSTS ARE INVOLVED.

(a) *Landowner notification.*

1. The Soil and Water Conservation Department shall notify a non–complying landowner or operator of existing croplands of the determinations made under sub. (2).

2. The notice shall be sent certified mail, return receipt requested, or via personal delivery.

3. The following information shall be included in the notice:

a. A description of the cropland performance standard that is being violated and the determination that corrective measures do not involve eligible costs under sub. (2) (c).

b. The cropland status determination made in accordance with sub. (2) (b).

c. A compliance period for achieving the cropland performance standard. The compliance period may not exceed the time limits in par. (b).

d. An explanation of the consequences if the landowner or operator fails to comply with provisions of the notice.

e. An explanation of local appeals procedures.

(b) *Compliance period.*

1. The compliance period for existing croplands where best management practices and other corrective measures do not involve eligible costs shall be in accordance with the following:

a. The compliance period shall begin on the postmark date of the notice or the date of personal delivery.

b. The length of the compliance period shall be from 60 days nor more than 3 years unless otherwise provided for in this subsection.

c. The length of the compliance period may be less than 60 days if the site is an imminent threat to public health, fish and aquatic life.

2. Once compliance with a cropland performance standard is attained, compliance with the standard shall be maintained by the existing landowner or operator and heirs or subsequent owners.

(c) *Combined notices.* The Soil and Water Conservation Department may meet multiple notification requirements under par. (a), sub. (3) and section 1.34 within any single notice issued to a landowner or operator.

1.34 Implementation and Enforcement Procedures for Livestock Performance Standards and Prohibitions.

(1) LIVESTOCK OWNER AND OPERATOR REQUIREMENTS.

(a) *Introduction.* This section identifies compliance requirements for a livestock owner or operator based on whether a livestock facility is existing or new and whether cost sharing is required to be made available to a livestock owner or operator. This section will also identify circumstances under which an owner or operator of a livestock facility is required to comply with livestock performance standards and prohibitions. In this section, "livestock performance standards and prohibitions" means the performance standards and prohibitions in ss. NR 151.005, 151.05, 151.055, 151.06 and 151.08.

(b) *General requirements.* If any livestock facility is meeting a livestock performance standard or

prohibition on or after the effective date of the livestock performance standard or prohibition, the livestock performance standard or prohibition shall continue to be met by the existing owner or operator, heirs or subsequent owners or operators of the facility. If an owner or operator alters or changes the management of the livestock facility in a manner that results in noncompliance with a livestock performance standard or prohibition, the owner or operator shall bring the livestock facility back into compliance regardless of cost–share availability.

(c) *Existing livestock facility requirements.*

1. An owner or operator of an existing livestock facility, defined under sub. (2) (b), shall comply with a livestock performance standard or prohibition if all of the following have been done by the Soil and Water Conservation Department:

a. Except as provided in subd. 2., a determination is made that cost sharing has been made available in accordance with section 1.32 on or after the effective date of the livestock performance standard or prohibition.

b. The owner or operator of the livestock facility has been notified in accordance with sub. (3) or (4).

2. An owner or operator of an existing livestock facility, defined under sub. (2) (b), shall comply with the livestock performance standards and prohibitions, regardless of whether cost sharing is available, in situations where best management practices and other corrective measures needed to meet the performance standards do not involve eligible costs.

(d) *New livestock facility requirements.* An owner or operator of a new livestock facility, defined under sub. (2) (b), shall comply with the livestock performance standards and prohibitions, regardless of whether cost sharing is available.

(2) SOIL AND WATER CONSERVATION DEPARTMENT DETERMINATIONS.

(a) *Scope of determinations.* If a livestock facility is not in compliance with a livestock performance standard or prohibition, the Soil and Water Conservation Department shall make determinations in accordance with the procedures and criteria in this subsection.

(b) *Livestock facility status.* The Soil and Water Conservation Department shall classify a non–complying livestock facility on an operation to be either new or existing for purposes of administering this ordinance. In making the determination, the Soil and Water Conservation Department shall base the decision on the following:

1. An existing livestock facility is one that meets all of the following criteria:

a. The facility is in existence as of the effective date of the livestock performance standard or prohibition.

b. The facility is not in compliance with a livestock performance standard or prohibition in this subchapter as of the effective date of the livestock performance standard or prohibition. The reason for noncompliance of the livestock facility may not be failure of the owner or operator to maintain an installed best management practice in accordance with a cost–share agreement or contract.

2. A new livestock operation or facility is one that does not meet the definition under subd. 1., including:

a. A livestock operation or facility that is established or installed after the effective date of the livestock performance standard or prohibition, including the placement of livestock structures on a site that did not previously have structures, or placement of animals on lands that did not have animals as of the effective date of the livestock performance standard or prohibition, unless the land is part of an existing rotational grazing or pasturing operation.

b. For a livestock operation that is in existence as of the effective date of the livestock performance standard or prohibition that establishes or constructs or substantially alters a facility after the effective date of the livestock performance standard or prohibition, the facilities constructed, established or substantially altered after the effective date of the livestock performance standard or prohibition are considered new, except as specified in subd. 3.

c. A livestock facility that is in existence and in compliance with a livestock performance standard or prohibition on or after the effective date of the livestock performance standard or prohibition and that undergoes a change in the livestock facility that results in noncompliance with the livestock performance standard or prohibition. This includes manure storage facilities that fail to meet the requirements of § NR 151.05 (3), Wis. Adm. Code and were either: constructed on or after October 1, 2002; or were constructed prior to October 1, 2002, and subject through October 1, 2002, to the operation and maintenance provisions of a cost share agreement.

3. Pursuant to the implementation procedures in this section, if the Soil and Water Conservation Department or a municipality directs an owner or operator of an existing livestock facility to construct a facility as a corrective measure to comply with a performance standard or prohibition on or after the effective date of the livestock performance standard or prohibition, or directs the owner or operator to

reconstruct the existing facility as a corrective measure on or after the effective date of the livestock performance standard or prohibition, the constructed facilities are not considered new for purposes of installing or implementing the corrective measure.

4. A livestock facility that meets the criteria in subd. 1. and has subsequently been abandoned shall retain its status as an existing livestock facility if livestock of similar species and number of animal units are reintroduced within 5 years of abandonment.

5. Change in ownership may not be used as the basis for determining whether a livestock facility is existing or new for purposes of administering this subsection.

(c) *Eligible costs.* If cost sharing is required to be made available under sub. (1) (c), the Soil and Water Conservation Department shall determine the total cost of best management practices and corrective measures needed to bring a livestock facility into compliance with a livestock performance standard or prohibition and shall determine which of those costs are eligible for cost sharing.

(3) NOTIFICATION REQUIREMENTS AND COMPLIANCE PERIODS FOR EXISTING LIVESTOCK FACILITIES WHEN COST-SHARING IS REQUIRED.

(a) *Owner or operator notification.*

1. The Soil and Water Conservation Department shall notify an owner or operator in writing of the determinations made under sub. (2) and implementation requirements for existing livestock facilities where cost sharing is required for compliance.

2. The notice shall be sent certified mail, return receipt requested or personal delivery.

3. The following information shall be included in the notice:

a. A description of the livestock performance standard or prohibition being violated.

b. The livestock facility status determination made in accordance with sub. (2) (b).

c. The determination made in accordance with sub. (2) (c) as to which best management practices or other corrective measures needed to comply with a livestock performance standard or prohibition are eligible for cost sharing.

d. The determination made in accordance with section 1.32 that cost sharing is available for eligible costs to achieve compliance with a livestock performance standard or prohibition, including a written offer of cost sharing.

e. An offer to provide or coordinate the provision of technical assistance.

f. A compliance period for meeting the livestock performance standard or prohibition.

g. An explanation of the possible consequences if the owner or operator fails to comply with provisions of the notice, including enforcement or loss of cost sharing, or both.

h. An explanation of local appeals procedures.

(b) *Compliance period.*

1. An owner or operator that receives the notice under par. (a) shall install or implement best management practices and corrective measures to meet a performance standard or prohibition in the time period specified in the notice, if cost sharing is available in accordance with section 1.32.

2. The compliance period identified in the notice in par. (a) shall be determined by the Soil and Water Conservation Department as follows:

a. The compliance period shall begin on the post–mark date of the notice or the date of personal delivery.

b. The length of the compliance period shall be not less than 60 days nor more than 3 years unless otherwise provided for in this subdivision.

c. The length of the compliance period may be less than 60 days if the site is an imminent threat to public health or fish and aquatic life.

d. The Soil and Water Conservation Department may authorize an extension up to 4 years on a case–by–case basis provided that the reasons for the extension are beyond the control of the owner or operator of the livestock facility. A compliance period may not be extended to exceed 4 years in total.

3. Once an owner or operator achieves compliance with a livestock performance standard or prohibition, compliance with the standard or prohibition shall be maintained by the existing owner or operator and heirs or subsequent owners or operators, regardless of cost sharing.

(4) NOTIFICATION REQUIREMENTS AND COMPLIANCE PERIODS FOR EXISTING LIVESTOCK FACILITIES IN SITUATIONS WHEN NO ELIGIBLE COSTS ARE INVOLVED.

(a) *Owner or operator notification.*

1. The Soil and Water Conservation Department shall notify a non–complying owner or operator of an existing livestock facility of the determinations made under sub. (2).

2. The notice shall be sent certified mail, return receipt requested or personal delivery.

3. The following information shall be included in the notice:

a. A description of the livestock performance standard or prohibition that is being violated and the determination that corrective measures do not

involve eligible costs under sub. (2) (c).

b. The livestock operation status determination made in accordance with sub. (2) (b).

c. A compliance period for meeting the livestock performance standard or prohibition. The compliance period may not exceed the time limits in par. (b).

d. An explanation of the consequences if the owner or operator fails to comply with provisions of the notice.

e. An explanation of local appeals procedures.

(b) *Compliance period.*

1. The compliance period for existing livestock facilities where best management practices and other corrective measures do not involve eligible costs shall be in accordance with the following:

a. The compliance period shall begin on the postmark date of the notice or the date of personal delivery.

b. The length of the compliance period shall not be less than 60 days nor more than 3 years unless otherwise provided for in this subdivision.

c. The length of the compliance period may be less than 60 days if the site is an imminent threat to public health, or fish and aquatic life.

2. Once compliance with a livestock performance standard or prohibition is attained, compliance with the performance standard or prohibition shall be maintained by the existing owner or operator and heirs or subsequent owners or operators.

(c) *Combined notices.* The Soil and Water Conservation Department may meet multiple notification requirements under par. (a), sub. (3) and section 1.33 within any single notice issued to the owner or operator.

1.35 Variances. (§ *NR 151.097, Wis. Adm. Code*)

(1) REQUESTS. Requests for a variance to the performance standards shall be made in writing to the Soil and Water Conservation Department, and accompanied by payment of the applicable fee. Requests shall be reviewed by the Soil and Water Conservation Department prior to submittal to Department of Natural Resources and shall include:

(a) clearly-stated rationale and justification for requesting the variance.

(b) any permit applications required by this ordinance.

(c) any facility or operational plans as required by this ordinance.

(2) ECONOMIC HARDSHIP. A variance shall not be granted solely on the basis of economic hardship.

(3) CONDITIONS. The Soil and Water Conservation Department may recommend a variance to Department of Natural Resources only if all of the following conditions are met:

(a) Compliance with the performance standard or technical standard is not feasible due to site conditions. This condition does not apply to research activities conducted as part of a planned agricultural research and farming curriculum.

(b) The landowner or operator will implement best management practices or other corrective measures that ensure a level of pollution control that will achieve a level of water quality protection comparable to that afforded by the performance standards in this subchapter.

(c) The conditions for which the variance is requested are not created by the landowner or operator or their agents or assigns. This condition does not apply to research activities conducted as part of a planned agricultural research and farming curriculum.

(4) PROCESS. The Soil and Water Conservation Department shall use the following process when administering a variance request:

(a) The landowner or operator shall submit the variance request and applicable fee to the Soil and Water Conservation Department within 60 days of receiving the notice.

(b) The Soil and Water Conservation Department shall immediately forward any variance requests that it receives to the Department of Natural Resources. The Soil and Water Conservation Department shall send any recommendations concerning acceptance of the variance request to the Department of Natural Resources within 10 working days of receiving the variance request.

(c) The Department of Natural Resources shall make its determination based on the factors in § NR 151.097(3), Wis. Adm. Code.

(d) The Department of Natural Resources shall notify the landowner or operator and the Soil and Water Conservation Department of its determination. If the variance is granted, the Department of Natural Resources or Soil and Water Conservation Department shall send to the landowner or operator an amended notice.

(e) The period of time required to make a ruling on a variance request does not extend the compliance periods allowed under § NR 151.09 and 151.095, Wis. Adm. Code.

Subchapter IV – Manure Storage Construction Permit

1.40 Permit Required. (1) No existing or proposed manure storage facility or parts thereof, may be located, installed, moved, substantially altered, or its use changed, including closure, without a Manure

Storage Construction Permit as provided in this Ordinance, without compliance with the provisions of this Ordinance, and without compliance with USDA-NRCS Technical Guide as adopted as part of this Ordinance. The specific conditions under which a permit is required are shown in Table 2.

TABLE 2 Permits required for manure storage facilities	
New	All construction of manure storage facilities as of the effective date of this Ordinance.
Existing	All substantial alteration, repair, or replacement of existing manure storage facilities.
	All closure of idle, failing, or leaking manure storage facilities; including voluntary closures of existing systems.

(2) With the exception of the closure of manure storage facilities, those receiving Manure Storage Construction Permit issued under authority of this Ordinance shall be required to implement an approved nutrient management plan and verify the ability of the applicant to comply with USDA-NRCS Technical Standard for Nutrient Management (590). Manure storage facility closures are required to remove and properly dispose of all accumulated manures and contaminated soil in the manure storage facility in compliance with USDA-NRCS Technical Standard for Nutrient Management (590).

(3) The requirements of this Ordinance shall be in addition to any other Ordinance regulating animal manure and nutrient management. In the case of conflict, the most stringent provisions shall apply.

1.41 Exception to Permit Requirements.

(1) Emergency minor repairs to facilities such as fixing a broken pipe or equipment, leaking dykes or the removal of stoppages may be performed without a permit. Such work shall be reported to the Door County Soil and Water Conservation Department as soon as possible for a determination as to whether a permit will be required or additional alterations or repairs to the facility are required. The Door County Soil and Water Conservation Department shall render a decision within thirty (30) days of receiving the request.

(2) Permit applicants may request that the Door County Soil and Water Conservation Department waive specific manure storage construction plan components in Section 1.43 (1) if manure storage facility alterations, repairs or replacements render the construction plan components unnecessary. Although specific manure storage construction plan components may be waived, the constructed manure storage facility shall remain in compliance with section 1.31.

1.42 Fee. A non-refundable fee for a Manure Storage Construction Permit under this Ordinance shall be calculated as required in a fee schedule set by the Land Conservation Committee.

Permit application packets can be obtained from the Door County Soil and Water Conservation Department, 421 Nebraska Street, Sturgeon Bay or by calling (920) 746-2214.

1.43 Construction Requirements.

(1) MANURE STORAGE CONSTRUCTION PLAN REQUIREMENTS. Each application for a Manure Storage Construction Permit under this section shall include a manure storage construction plan. The exception is any manure storage facility closure, which shall only follow the requirements of sub. (2). The plan shall meet or exceed the minimum established limits and specific criteria within USDA-NRCS Technical Standard for Waste Storage Facility (313) and Pond Sealing or Lining Compacted Soil Treatment (520), Geomembrane or Geosynthetic Clay Liner (521), and Concrete (522); and additional Technical Standards, including, but not limited to, Critical Area Planting (342), Fence (382), Roof Runoff Structure (558), Nutrient Management (590), and Manure Transfer (634) where they apply. The plan shall include:

(a) A general location map drawing of the manure storage facility which shall include:

1. The location of the manure storage facility in relation to buildings, homes, property lines, roads, wells, karst features, public or private drainage ditches and creeks, flowages, rivers, streams, lakes, or wetlands within one thousand (1000) feet of the proposed facility.
2. The scale of the drawing and the north arrow.
3. The date the general location map was prepared.

(b) An engineering design drawing of the manure storage facility which shall include:

1. Specific design components that shall comply with USDA-NRCS Technical Standard for Waste Storage Facility (313), and additional applicable Technical Standards.
2. A recoverable benchmark(s) including elevation(s) expressed in feet and tenths.
3. The scale of the drawing and the north arrow. The engineering design drawing shall be drawn to a scale no smaller than one (1) inch equals one forty (40) feet.

4. The date the engineering design drawing was prepared.

(c) A narrative of the general criteria required within USDA-NRCS Technical Standard for Waste Storage Facility (313), and additional applicable Technical Standards such as management assessment, site assessment and operation and maintenance procedures for installed practices.

(d) Any other additional information required by the Door County Soil and Water Conservation Department to protect water quality and determine compliance with this Ordinance.

(2) MANURE STORAGE FACILITY CLOSURE PLAN REQUIREMENTS. Closure of a manure storage facility shall occur when an operation where the facility is located ceases operations, or manure has not been added or removed from the facility for a period of 24 months. Manure storage facilities shall be closed in a manner that will prevent future contamination of groundwater and surface waters. Applications for a Manure Storage Construction Permit under this section shall include a manure storage closure plan to be submitted with the permit application. The plan shall include:

(a) A general location map drawing of the manure storage facility which shall include:

1. The location of the manure storage facility in relation to buildings, homes, property lines, roads, wells, karst features, public or private drainage ditches and creeks, flowages, rivers, streams, lakes, or wetlands within one thousand (1000) feet of the existing facility.

2. The scale of the drawing and the north arrow.

3. The date the general location map was prepared.

(b) A description of the method and specifications in transferring manure into and from the manure storage facility to ensure proper closure of transfer systems.

(c) Provisions to remove or permanently plug the manure transfer system serving the manure storage facility.

(d) Provisions to remove and properly dispose of all accumulated manure in the manure facility in compliance with USDA-NRCS Standard for Nutrient Management (590).

(e) For all earthen waste impoundments, plan requirements and provisions shall be in compliance and consistent with USDA-NRCS Technical Standard for Closure of Waste Impoundments (360).

(f) *Safety provisions.* Manure storage facility closures and conversions shall implement safety measures to ensure the protection of the public from hazardous conditions.

(g) *Use conversion option.* The manure storage facility may be converted to other uses, where as it is demonstrated the conversion will not result in a degradation of ground and/or surface waters or be a threat to public health, safety or general welfare. A detailed description of intended alternative use must be described for all manure storage facility conversions for determination if conversions will be allowed.

(h) Any other additional information required by the Door County Soil and Water Conservation Department to protect water quality and determine compliance with this Ordinance.

1.44 Review of Application. (1) The Door County Soil and Water Department shall receive and review all permit applications. Prior to approval or disapproval of the permit application, the applicant shall submit a copy of the proposed plan(s) to the Door County Soil and Water Department for review if appropriate. The Door County Soil and Water Department shall determine if the proposed facility meets the required standards set forth in Section 4 of this Ordinance. Within thirty (30) days after receiving the completed application and fee, the Door County Soil and Water Department shall inform the applicant in writing whether the permit application is approved or disapproved.

(2) If additional information is required, the Door County Soil and Water Department has thirty (30) days from the receipt of the additional information in which to approve or disapprove the permit application. If, in addition to the applicant's information, the Door County Soil and Water Department requires comment from an outside agency, the Door County Soil and Water Department has thirty (30) days from receipt of the comments from the referral agency.

(3) The Door County Soil and Water Department personnel may conduct a site inspection prior to approving or disapproving the application. If the Door County Soil and Water Department fails to approve or disapprove the permit application in writing within thirty (30) days of the receipt of the permit application, receipt of additional applicant information or the receipt of referral agency comments, as appropriate, the application shall be deemed approved and the applicant may proceed as if a permit had been issued.

1.45 Permit Conditions. All permits issued under this Ordinance shall be issued subject to the following conditions and requirements:

(1) Design, construction, and management shall be carried out in accordance with the manure storage facility or manure storage closure plan and applicable standards specified in Subchapter III of this Ordinance.

(2) The permittee shall give two (2) working days notice to the Door County Soil and Water Conservation Department before starting any construction activity authorized by the permit.

(3) Approval in writing must be obtained from the Door County Soil and Water Conservation Department prior to any modifications to the approved manure storage facility or closure plan.

(4) The permittee and, if applicable, the contractor, shall certify in writing by signing the certification sheet that the facility was installed as planned and designed. A copy of the signed certification sheet shall be given to the Door County Soil and Water Conservation Department within thirty (30) days of completion of installation. The Door County Soil and Water Conservation Department personnel may conduct site inspection during and following construction to determine that the facility was installed as planned and designed.

(5) Activities authorized by permit must be completed within one (1) year from the date of issuance after which such permit shall be void.

1.46 Permit Revocation. The Door County Soil and Water Conservation Department may revoke any permit issued under this Ordinance if the holder of the permit has misrepresented any material fact in the permit application, manure storage facility or closure plans, or if the holder of the permit violates any of the conditions of the permit.

Subchapter V – Violations and Appeals

1.50 Violations.

(1) PENALTIES.

(a) Any person violating this ordinance shall:

1. Forfeit not less than $10.00 nor more than $500.00 for each offense; and;

2. Institute those remedial measures, summarily and/or within a defined time period, necessary to correct any violation.

3. Be enjoined or restrained from further violation.

4. Pay the fees, costs and disbursements incurred by County associated with prosecution of the action.

(b) Each day a violation exists or continues constitutes a separate offense.

1.51 Appeals.

(1) GENERAL PROVISIONS.

(a) *What can be appealed.*

1. Final compliance determination made in writing by Soil and Water Conservation Department (SWCD).

2. Final permit application decisions made in writing by SWCD.

3. Final permit modification or denial decision made in writing by SWCD.

4. Final permit suspension or revocation decisions made in writing by SWCD.

(b) *Who may appeal.*

1. Person aggrieved by the decision.

2. A person is aggrieved by the decision if such adversely impacts the substantial interests of that person.

(c) *How an appeal is taken.*

1. Payment of fee for filing a Notice of Appeal.

2. Filing a Notice of Appeal with the Board of Adjustment (BOA), with a copy to SWCD.

3. Notice must identify appellant, specify the decision sought to be reviewed, and designate the factual and legal bases for the appeal.

4. Fee must be paid and Notice of Appeal filed within thirty (30) days from issuance of the decision, or an appeal is barred.

(d) *Stay.*

1. The appeal, ordinarily, stays all proceedings in furtherance of the decision appealed from.

2. The appeal does not stay all proceedings if, after the appeal is filed, SWCD certifies to the BOA that a stay would pose an imminent threat to the environment, public health or public safety.

(e) *Standard of review.*

1. Certiorari (i.e. an inquiry, based on the record, into whether the SWCD could have reasonably made the decision that it did).

2. SWCD's decisions shall be accorded due deference.

3. The standards set forth in this ordinance are controlling.

(f) *Burden of proof.*

1. The burden of proof rests with the appellant.

2. The appellant must submit evidence sufficient to support granting the appeal.

(g) *Hearings.*

1. BOA shall fix the time for and location of hearing an appeal. The hearing shall commence within forty-five (45) days of the fee being paid and Notice of Appeal being filed.

2. Process.

a. Opening Remarks by Appellant and then by SWCD. These opening remarks are intended to acquaint the BOA with the case and set out, in a general way, each side's case.

b. Appellant presents real and testimonial evidence first.

c. SWCD presents real and testimonial evidence second.

d. Appellant may offer rebuttal real and

testimonial evidence.

e. Closing remarks by appellant and then by SWCD. These closing remarks are intended to be a brief summation of each side's position on the contested issues and the reasons each is entitled to prevail.

f. Appellant and SWCD may cross-examine witnesses of the other side.

g. BOA may swear witnesses.

h. BOA will mark and preserve exhibits.

i. BOA may cause the proceedings to be taken by a stenographer or by a recording device. The expense thereof to be paid by the parties to the proceeding. Any record of hearing will be retained by BOA.

j. The rules of evidence should be adhered to, but do not strictly apply.

k. The hearing shall be informal in nature.

(h) *Final Determination/Judicial Review.*

1. BOA may affirm or reverse in whole or part or it may modify the decision on review.

2. Within forty-five (45) days of completion of the hearing BOA shall mail or deliver to each side its written determination stating the reasons therefore. This determination shall be a final determination.

3. Any party to the proceeding may seek judicial review thereof pursuant to and in accordance with Section 68.13 Wisconsin Statutes.

(i) *Assessment/Refund of Costs and Fees.*

1. If the Appellant prevails <u>and</u> at the BOA's sole discretion, the filing fee may be refunded in whole or part.

2. Otherwise, each party must pay its own costs and fees.

(j) *Screening mechanism.*

1. This mechanism is intended to protect the BOA's impartiality, to maintain BOA's appearance of fairness, and to allow BOA to hear and adjudicate appeals hereunder.

2. Because of the appearance of impartiality and actual bias are of equal importance, BOA members shall refrain from:

a. Having any direct or personal connection with a pending appeal.

b. Outside of the hearing, have discussions with or receive evidence from SWCD staff, the landowner or land user, <u>or</u> any other person with respect to the substance of a pending appeal. If a BOA member's impartiality can reasonably be questioned, the BOA member will have to recuse oneself from consideration of the appeal.

(Ordinance #2004-15; 08/24/04)
(Ordinance #2013-02; 01/28/13)
(Ordinance #2016-10; 05/24/16)
(Ordinance #2018-17; 09/27/18)

ADDENDUM 1

Table 1. Silurian Bedrock Maximum Liquid Manure Application Rates			
Soil Texture	**2 to 3 Feet Depth (gal/ac/yr)**	**3 to 5 Feet Depth (gal/ac/wk)**	**5 to 20 Feet Depth (gal/ac/wk)**
Sand	6,750	6,750	13,500
Sandy Loam	13,500	13,500	27,000*
Loam	13,500	13,500	27,000*
Silt Loam	13,500	13,500	27,000*
Clay Loam	13,500	13,500	20,000*
Clay	6,750	6,750	13,500

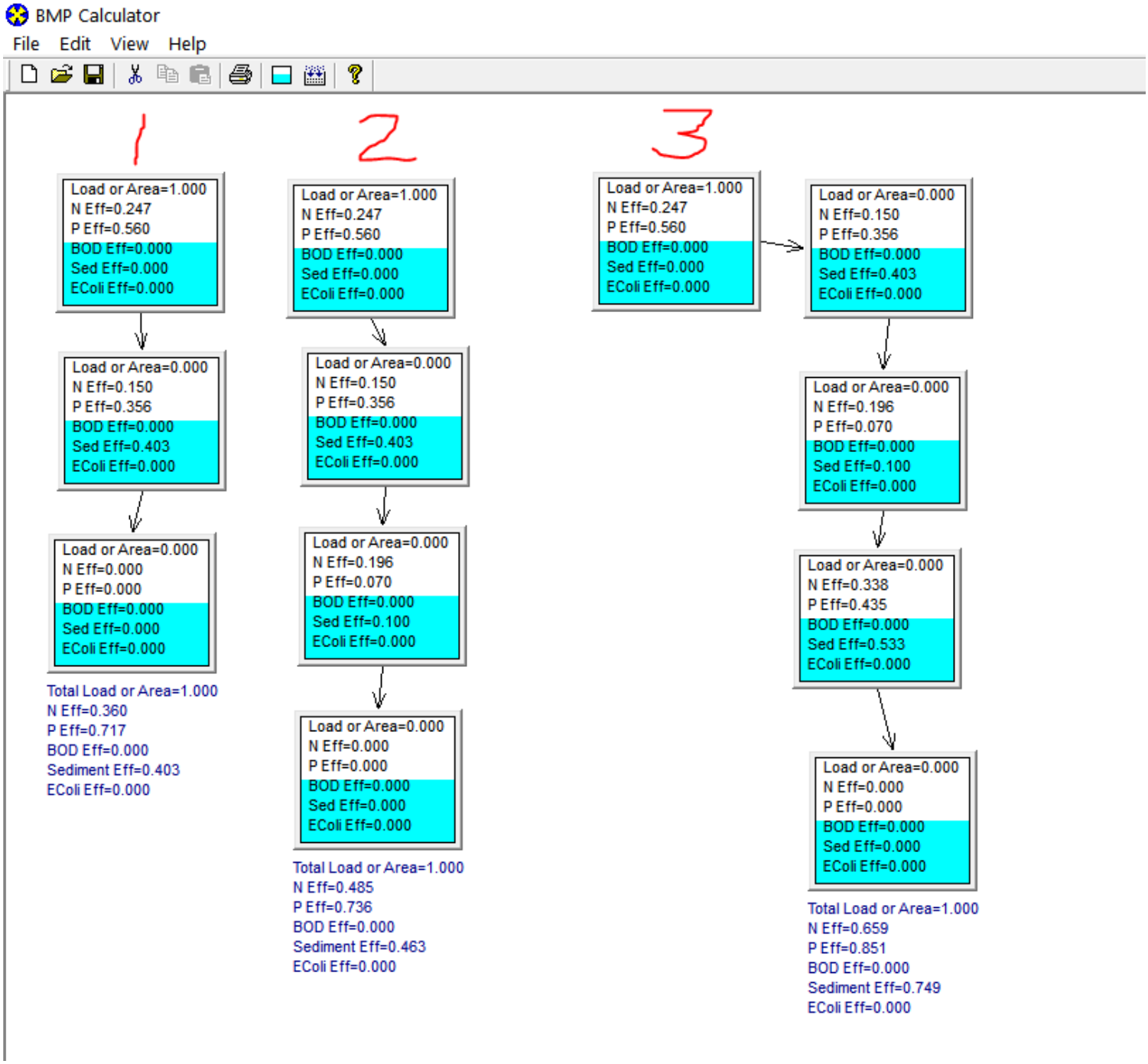
*It is anticipated that this rate would exceed the UW A2809 annual (crop year) application rate.

Door County – Upper Ahnapee River – 9E Plan – BMP Combined Efficiencies

Tier 1: 590/Conservation Tillage

Tier 2: 590/Conservation Tillage + Cover Crop2

Tier 3 590/Conservation Tillage + Cover Crop 2 + Buffer – Grass (35ft wide)



Estimated Area-Weighted Combined Efficiency of Multiple BMPs Across a Watershed							
Treatment	**Area (ac)**	**Select a BMP Type**	**N**	**P**	**BOD**	**Sediment**	**E. coli**
1	1650.00	0 No BMP	0.000	0.000	0.000	0.000	0.000
Tier 1	9075.00	Combined BMPs-Calculated	0.360	0.717	0.000	0.403	0.000
Tier 2	4125.00	Combined BMPs-Calculated	0.485	0.074	0.000	0.463	0.000
Tier 3	1650.00	Combined BMPs-Calculated	0.659	0.851	0.000	0.749	0.000
5		0 No BMP	0.000	0.000	0.000	0.000	0.000
6		0 No BMP	0.000	0.000	0.000	0.000	0.000
7		0 No BMP	0.000	0.000	0.000	0.000	0.000
8		0 No BMP	0.000	0.000	0.000	0.000	0.000
9		0 No BMP	0.000	0.000	0.000	0.000	0.000
10		0 No BMP	0.000	0.000	0.000	0.000	0.000
11		0 No BMP	0.000	0.000	0.000	0.000	0.000
12		0 No BMP	0.000	0.000	0.000	0.000	0.000
13		0 No BMP	0.000	0.000	0.000	0.000	0.000
14		0 No BMP	0.000	0.000	0.000	0.000	0.000
15		0 No BMP	0.000	0.000	0.000	0.000	0.000
16		0 No BMP	0.000	0.000	0.000	0.000	0.000
17		0 No BMP	0.000	0.000	0.000	0.000	0.000
18		0 No BMP	0.000	0.000	0.000	0.000	0.000
19		0 No BMP	0.000	0.000	0.000	0.000	0.000
20		0 No BMP	0.000	0.000	0.000	0.000	0.000
Total Land Use Area	16500.00	Enter the calculated value in Table 7. located in "BMPs" tab, under the appropriate watershed -->	**0.385**	**0.498**	**0.000**	**0.412**	**0.000**