March 8, 2016

DOUGLAS COUNTY LAND CONSERVATION COMMITTEE
Tuesday, March 15, 2016, 10:00 a.m., Courthouse, Room 207C, 1313 Belknap Street, Superior, Wisconsin

Please call the Chair or County Clerk's Office (715-395-1569) if you are unable to attend.

MEMBERS: Mark Liebaert, Chair
Rae Ann Anderson
Amy Colby, FSA
Sue Hendrickson, Vice Chair
Larry Luostari

A G E N D A

(Committee to maintain a two-hour meeting limit *or* take action to continue meeting beyond that time.)

1. Roll call.
2. Approval of minutes from the December 15, 2015, meeting (attached).
3. Action items:
   a. Wildlife Damage and Abatement Program (to be distributed):
      1) Report; and
      2) Approval of contracts.
   b. Watershed-based Plan for wetland restoration and conservation in the Lake Superior Basin:
      1) Presentation;
      2) Approval of watershed plan (attached);
      3) Approval of feasibility study (attached); and
      4) Approval of next steps.
4. Informational items:
   a. Correspondence: Minnesota Pollution Control Agency, January 27, 2016, regarding First Amendment (Aquatic Habitat Restoration Project) (attached);
   b. Farmland Preservation Plan revision update;
   c. Reports:
      1) Agency; and
      2) Staff (attached).
5. Future agenda items.

cc:
Andy Lisak
Cameron Bertsch
County Board Supervisors
Gary Haughn
Matt Steiger
Scott Peterson
Sue O'Halloran
Molly Wick
Christine Ostern
Sue Sandvick
Roger Wilson
Steve LaValley
Nancy Larson
Darienne McNamara
Lisa Schultz
DCALS
Steve Rannenberg
Douglas County Website
Paul LaLiberte
Shelley Nelson (Telegram)
Carl Beckman
Jason Serck
Brock Flowers
Dave Schultz

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Copied

3-8-16

Name *Date*

DOUGLAS COUNTY LAND CONSERVATION COMMITTEE
Tuesday, December 15, 2015, 10:00 a.m., Courthouse, Room 207C, 1313 Belknap Street, Superior, Wisconsin

Meeting called to order by Chair Mark Liebaert.

ROLL CALL: Present – Mark Liebaert, Sue Hendrickson, Amy Colby. Absent – Larry Luostari, Rae Ann Anderson. Others present – Christine Ostern, Terry White, Sue O'Halloran, Amy Eliot, Henry Nehls-Lowe, Joe Graham, Kathy Ronchi, Ken Zurian, Brian Becker, Molly Wick, Matt Steiger, John Robinson, Mary Munn, Doug Finn, Kaci Lundgren, Committee Clerk.

APPROVAL OF MINUTES: Motion by Hendrickson, second Colby, to approve minutes from the October 20, 2015, meeting. Motion carried.

ACTION ITEMS:
Recommendations for Management of Hog Island Site: John Robinson and Joe Graham, DNR, and Henry Nehls-Lowe, Department of Health Services, presented history of site. Assessment of isthmus area in spring 2016 to be done; additional funding necessary for toxicity and/or further testing. More information to be available in spring.

Watershed-based Plan for Wetland Restoration and Conservation in the Lake Superior Basin - Presentation: Brief history of plan given.

Review of Draft Plan: Draft plan distributed; to include adopted plan with Land and Water Resource Management Plan.

ACTION: Motion by Hendrickson, second Colby, to approve final Watershed-based Plan for Wetland Restoration and Conservation in the Lake Superior Basin, Douglas County, with intent to amend Land and Water Resource Management Plan. Motion carried.

Farmland Preservation Plan Revision - Update: Group to be formed for input on plan and present to committee in fall 2016 with final approval to County Board prior to end of 2016.

ACTION: Motion by Liebaert, second Hendrickson, to recommend appointment of work group. Motion carried.

Resolution Supporting Aquatic Invasive Species Grant Application: Budgeted money referred to in grant is in-kind and donated funds; no county funding.

ACTION (RESOLUTION): Motion by Hendrickson, second Liebaert, to approve resolution and refer to County Board. Motion carried unanimously.

Environmental Reserve Fund Request for Attendance at 2016 National Mitigation and Ecosystem Banking Conference: Information from conference will be beneficial to many areas of the county.

ACTION (REFERRAL): Motion by Hendrickson, second Liebaert to approve $1,500 in funding for Mike Gardner to attend 2016 National Mitigation and Ecosystem Banking Conference from Environmental Reserve Fund and refer to Administration Committee. Motion carried.

Budgetary Transfer: In the past, budgetary line items have been adjusted when grant monies are received; transfers to be done before end-of-year to cover for partial grant budgets.

ACTION (REFERRAL): Motion by Hendrickson, second Liebaert, to approve budgetary transfer as presented and refer to Administration Committee. Motion carried.

INFORMATIONAL ITEMS:
Shafer Beach Nourishment Project Update: Widening of beach for Piping Plover discussed; potential sources of sediment/material for expansion to be sought. Superior entry is currently only suitable area to obtain material but is not in location covered by original funding source; EPA to potentially fund project.

ACTION: Motion by Liebaert, second Hendrickson, to extend meeting beyond two-hour limit. Motion carried.

Reports - Staff: Included with agenda.

FUTURE AGENDA ITEMS: Lake Superior Basin Watershed Wetland Project; Hog Island update; Farmland Preservation Plan.

ADJOURNMENT: Motion by Hendrickson, second Colby, to adjourn. Motion carried. Meeting adjourned at 12:15 p.m.

Submitted by,

Kaci Lundgren, Committee Clerk

A Watershed Approach to Wetland Management in the Lake Superior Basin

Headwaters of the Middle River *Douglas County, WI.*

Land and Water Conservation Department

Douglas County, Wisconsin

February 2016

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Executive Summary

The watershed-based plan for wetland management developed for the Lake Superior Basin of Douglas County utilizes the best available scientific information to identify watersheds that indicate high vulnerability to increased surface water runoff due to large storm events, recommends actions to reduce this risk, and is consistent with community land use goals. This plan presents an opportunity to work with landowners, both public and private, to implement land management practices that will maintain a strong agricultural community, improve watershed health, reduce the risks associated with flooding and encourage economic growth and development. A primary goal of this plan is to enable Douglas County stakeholders to provide input into the location of future wetland mitigation sites that will improve watershed health within the Lake Superior basin and improve the overall resiliency of Douglas County communities to climate change. Through this process watersheds demonstrating the highest risk of increased runoff have been identified and would be the focus of future funding for wetland mitigation projects including restoration, preservation, enhancement, riparian buffers and land conservation management activities

The Douglas County Lake Superior Watershed Planning committee met eight times over an 18 month period to learn about watershed processes, wetland functions, wetland mitigation regulations and other land use issues. In addition, a technical advisory committee was convened that included wetland and soil scientists, landscape spatial analysts and natural resource regulators to provide input on the development of the wetland functional analysis for the Lake Superior basin. The final recommendations of this group are compiled in the landscape prioritization for watershed-based planning that describes landscape characteristics and priorities for the location of future projects that meet watershed needs and are consistent with community land use goals.

Based on the criteria and prioritization process developed by the Watershed Planning Committee, the watersheds (HUC12) with the largest amount of wetland loss and subwatersheds (HUC14) with greater than 30-40% open land cover have been listed as the highest priority for wetland restoration and preservation. Public and private land parcels that meet the criteria for either restoration or preservation, as described by the subwatershed criteria, will be compiled and utilized to develop a request for landowner participation. A listing of landowners who are willing to participate will be developed, additional site-level criteria will be used to evaluate parcel suitability and recommendations will be finalized and approved by the appropriate entities. Sites meeting the identified criteria will be eligible for wetland restoration and protection projects as funding becomes available. Project site location criteria will include, at a minimum, an evaluation of the following landscape/land use characteristics.

Wetland *restoration* criteria includes all identified potentially restorable wetland (PRWs) areas that:

- are located within or adjacent to transitional agricultural land
- have identified pour points and catchments that intersect highways and roads
- have a direct hydrologic connection to streams and rivers
- are located in proximity to current wetlands with significant surface water detention function
- are located in proximity to public land currently managed for conservation and/or preservation of unique habitats

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Wetland *preservation* criteria includes current wetlands that:

- have a moderate to high function for storm water detention (SWD), especially in the headwaters and floodplain areas in all Lake Superior Basin watersheds of Douglas County.
- are located in proximity to public land currently managed for conservation and/or preservation of unique habitats

Several key land conservation and management strategies have been identified that should be implemented to address the watershed goal of reduction in surface water runoff. In addition to identification of the wetland areas that provide the best opportunities for restoration and protection, the results of the landscape analysis that includes the drainage paths, flow networks and potentially restorable stream reaches provides valuable information when identifying the best management practices that would result in the most efficient use of available resources. They include:

- managing timber harvests to maintain a minimum of 40% forest cover in watersheds (HUC 14)
- implementation of wetland preservation and restoration projects in priority subwatersheds and the watersheds within which they are located.
- implementation of stream and riparian/floodplain restoration and protection projects in priority locations identified as potentially restorable stream reaches.

Additional priorities for restoration include watersheds that the priority subwatersheds are located within and additional preservation priorities include headwater and floodplain wetlands. Since wetland restoration and preservation are dependent on the availability of public land and/or willing landowners the inclusion of the larger watershed scale would provide additional opportunities for locating wetland projects that would provide the greatest benefits within these watersheds. In addition, the historic information on wetland loss suggests that all Lake Superior Basin watersheds would benefit from the preservation and restoration of surface water detention wetlands to improve watershed health.

Farmland preservation has community and economic significance for Douglas County and conservation of existing farmland is an important consideration when evaluating potential wetland restoration sites. Wetland restoration projects in the region have demonstrated that transitional agricultural areas have a high restoration potential when surface water drainage patterns are re-established. In addition, historic information shows a pattern of smaller wetlands on the landscape that provided surface water runoff retention at multiple locations in the drainage network. This information will provide assistance in the identification of smaller wetland restoration sites that could potentially be located adjacent to current agricultural areas. This should be an alternative approach to the current practice of developing large wetland mitigation banks on farmland that results in a cumulative loss of agricultural land.

In order to address the watershed issue of increased surface water runoff it is recommended that the management strategies described in this watershed-based plan be approved by the Land and Water Conservation Committee as a goal to be added to the 2010-2020 Land and Water Resource Management Plan. In addition, recommendations from this plan should be coordinated with other Douglas County plans that include Comprehensive Land Use, Farmland Preservation, Hazard Mitigation and Forestry Planning. These strategies should be based on the currently available land cover/land use data and should be updated every 5 years.

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A Watershed-Based Plan for Wetland Restoration and Conservation in the Lake Superior Basin of Douglas County, Wisconsin

Project Background

Development of watershed approach for wetland planning in Douglas County

A watershed-based planning approach is a process for the identification of priority wetland preservation, restoration and enhancement opportunities that restore and maintain ecosystem functions and improve watershed health. This approach is described in the *Watershed Approach Handbook* (The Nature Conservancy and Environmental Law Institute 2014) and is defined as "an analytical process for making compensatory mitigation decisions that support the sustainability or improvement of aquatic resources in a watershed. It involves consideration of watershed needs and how locations and types of compensatory mitigation projects address those needs."(ELI/TNC 2014). This watershed-based plan was developed for the Lake Superior basin of Douglas County, WI. and provides a framework for land and water management activities in the Lake Superior Basin (LSB) of Douglas County that addresses an identified priority watershed issue. This planning process incorporated input from stakeholders, natural resource managers and regulators in order to identify areas within the Lake Superior basin where wetland restoration and preservation projects could be established to address watershed needs and meet community goals. This plan was developed to meet the federal and state regulatory requirements and provide local input into the location of future wetland restoration and mitigation projects in the county and provide direction for those planning projects that impact wetlands in the county.

Based on the best available information, this plan identifies watersheds that indicate high vulnerability to increased surface water runoff due to large storm events, recommends actions to reduce this risk, and is consistent with community land use goals. However, restoration of potentially restorable wetlands and preservation of surface water detention wetlands in headwater and floodplain areas should be considered to be beneficial in *all* Lake Superior watersheds regardless of their ranking to aid in 'slowing the flow' of surface water on the landscape. This plan presents an opportunity to work with landowners, both public and private, to implement land management practices that will maintain a strong agricultural community, improve watershed health, reduce the risks associated with flooding and improve the overall resiliency of Douglas County communities to climate change.

Land use changes and loss of wetlands in LSB watersheds impacts Lake Superior freshwater resources by reducing water storage capacity and increasing the volume and velocity of runoff. This contributes to flashy stream flow conditions that erode and further incise stream channels, undercut banks and create turbidity and sedimentation problems. Severe storm events in May and June, 2012 resulted in flooding and significant damage to infrastructure in Douglas County and the City of Superior. Projected increases in the frequency of large storm events due to climate change (Wisconsin's Changing Climate: Impacts and Adaption, 2011) are likely to add to the existing problems of erosion, sedimentation in coastal wetlands, flooding and flood-related infrastructure damage. Strategic wetland protection and restoration can help to regulate stream flows, reduce floods and flood damages, and remove sediments and pollutants from stormwater runoff.

In addition to these watershed runoff issues, Douglas County citizens had expressed concern regarding the lack of input into the siting of wetland mitigation in the county. Douglas County recently completed

their Comprehensive Land Use Plan (2010-2020) which describes future land use plans for each of the municipalities in the county. While the county has been a focus area for wetland mitigation projects there has been a lack of communication with local governments that is needed to maintain consistency with local land use plans. This watershed-based plan was developed to address both the environmental issues and community concerns described.

As this plan was developing over the past 2 years, the State of Wisconsin In-Lieu Fee (ILF) Program was initiated as a new option for mitigating impacts of wetland loss (WDNR 2014). As part of the state ILF Program Instrument, a Compensation Planning Framework (CPF) was developed for each major service area. The Douglas County portion of the Lake Superior Service Area contains two major watersheds, or HUC-8's: the St. Louis River and the Beartrap-Nemadji. Information compiled for the CPF identifies trends in permitted wetland loss from 2008-2012 in these watersheds and shows the intensity of wetland mitigation projects in this area. This document also identifies goals and objectives for the ILF program in these Service Areas and includes recommendations that include the restoration and enhancement of specific wetland types including floodplain forests, wooded swamps, shrub-carr and alder thicket swamps, sedge meadows, ephemeral wetlands, Great Lakes Ridge and Swale Wetlands, interdunal wetlands and open and coniferous bogs. This information further supports the need for the current watershed-approach to wetland planning in Douglas County that will provide a preservation and restoration strategy for future project planning.

Community engagement

Lake Superior Basin stakeholders participated in planning meetings over an 18-month period in order to identify watershed needs, discuss community issues regarding land use and develop a process for input into the siting of future wetland restoration and protection projects (Wilkens 2013). An engagement strategy called concept mapping was incorporated in the initial phase of this process and was developed from stakeholder interviews conducted prior to the first watershed planning meeting. The original situation map was edited by the stakeholders to assure that the final version represented their concerns regarding wetland mitigation in Douglas County (Fig.1).

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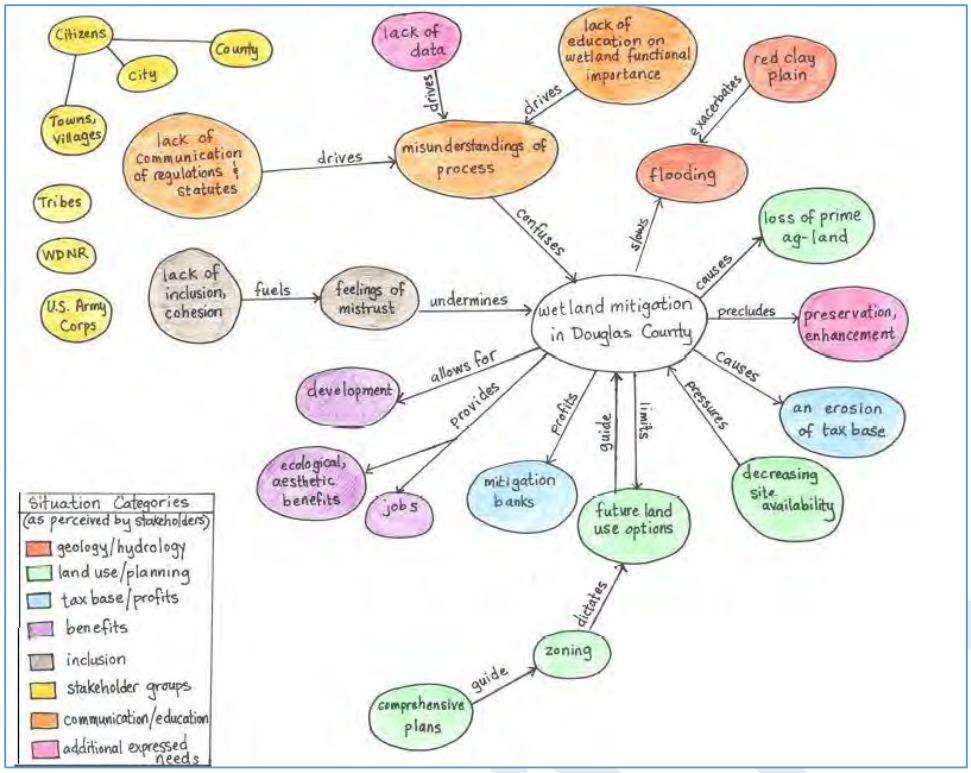

Figure 1. Situation map developed by Douglas County stakeholders.

This planning committee met eight times over an 18 month period to learn about watershed processes, wetland functions, wetland mitigation regulations and other land use issues. In addition, a technical advisory committee was convened that included wetland and soil scientists, landscape spatial analysts and natural resource regulators to provide input on the development of the wetland functional analysis for the Lake Superior basin. The final recommendations of this group are compiled in the landscape prioritization for watershed-based planning (Fig.2) that describe landscape characteristics and priorities for the location of future projects that meet watershed needs and are consistent with community land use goals.

The initial step was the ranking of major watersheds (HUC 12) based on historic wetland loss, or the loss of wetland acreage through conversion to other land uses. The watersheds with a higher amount of wetland acreage loss (relative to the other Lake Superior watersheds) received the highest ranking. The next step in the prioritization process included analysis of the landscape-level information at the sub-watershed (or HUC 14) scale. Subwatersheds showing land use changes resulting in a greater than 40% acreage of open land category were identified as a high priority. The open land category includes impervious surfaces, 0-15 yr. age class forest stands and agricultural land.

Figure 2. Landscape criteria and prioritization process developed by Douglas County Watershed Planning Committee

Within subwatersheds (HUC 14) current wetlands that had been assigned as having a moderate or high function for surface water detention were identified as high priority for wetland preservation. The surface water detention function was one of thirteen functions assessed through the geospatial analysis. The potentially restorable wetlands were prioritized as high for wetland restoration. Finally, agricultural land is rated as a low priority for wetland projects to reflect the community value of farmland preservation that is described in the town future land use plans. The exception for agricultural land includes transitional agricultural areas (areas marginal for production, not actively farmed and/or returning to native vegetation). Discussions with agricultural producers, who represent one of the largest private landowner groups in the county, has demonstrated an interest in working towards incorporating small wetland restoration projects on both transitional and working farmland in order to both restore lost wetland functions and provide land conservation practices to reduce soil erosion and protect water quality. Small wetland restoration projects developed across a specific area to form a wetland complex, restoring a more historically accurate condition has been identified as important by both resource manage and agricultural landowners.

The watershed-based approach developed through this project was piloted on one watershed in the Lake Superior Basin of Douglas County, the Middle River. The criteria and prioritization process developed for the Middle River watershed was recommended for submission to the Land Conservation committee where it was approved for application on the other Lake Superior Basin watersheds. This was the first step in the process of integrating the assessment results into local plans and policies. A digital map book was created using Adobe Pro software for the Middle River watershed and was the initial map book developed to depict the land cover and wetland functional assessment information for surface water detention.

Wetland functions and wetland restoration potential

A geospatial analysis of current wetland functions and identification of potentially restorable wetlands was completed by St. Mary's University of Minnesota (SMUMN) Geospatial Services (Stark and Robertson 2014). This included remotely-sensed information such as digital elevation models (DEMs), aerial photography, and other GIS datasets to predict the functions of current wetlands in the LSB. Locations of potential wetland restoration areas were developed through photointerpretation and geospatial data modeling. The full report of the methods and results of this analysis was submitted by SMUMN to Douglas County. This assessment also relied on best professional judgment of local and regional wetland and soils experts. While there was some limited field investigation to confirm broad-scale wetland mapping information, the data are not intended to provide site-level specificity. However, the data can be used to better understand the present-day distribution wetlands, which wetlands are predicted to be significant for performing certain ecological functions in the study area and provide an initial assessment of locations to be considered for the re-establishment of former wetlands.

The project utilized Wisconsin Wetland Inventory GIS, National Wetlands Inventory and enhanced the data by adding landscape and hydrologic wetland descriptors that are based on a classification system called Landscape Position, Landform, Water Flow Path and Water Body (LLWW) (Tiner 2011). With this enhanced wetland data, predicted wetland functions were applied based upon wetland characteristics contained within the geospatial database along with spatial relationships of the wetlands to each other and their surroundings. For a select group of ecological wetland functions, wetlands predicted to be significant for a given function were ranked as high or moderate. The criterion of wetland characteristics used for high and moderate levels for each ecological function was determined by the best professional judgment of several wetland experts. A final GIS wetland dataset contains coded wetland characteristics for each wetland area (polygon) along with a ranking for each of the ecological functions examined in the project.

In addition to the tabular format, the results are also presented in larger map form in a separate, supplemental map book form to provide detailed maps of the areas where wetlands are predicted to be significant for performing a set of ecological functions across the Lake Superior Basin of Douglas County. The assessment also identified wetland restoration, mitigation and preservation opportunities, specifically sites predicted to offer wetland reestablishment or wetland creation opportunities. This was accomplished using GIS models that incorporated existing wetland, soils, land use / land cover, and derived topographic data combined with a photo interpretive component.

The information in the next sections describing the Lake Superior Basin landscape, wetland functional assessment, potentially restorable wetlands including pour points, pour point catchments, ditches and drainage, synthetic flow network and potentially restorable stream reaches are primarily excerpted from the final report submitted to Douglas County, *A Watershed Framework for the Assessment of Wetland Services in Douglas County, Wisconsin* developed by Geospatial Services of St. Mary's University of Minnesota (Stark and Robertson 2014).

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Lake Superior Basin Description

Study Area

The study area for this project is the Lake Superior Basin portion of Douglas County (DC LSB) (Fig. 3). The Lake Superior Basin (LSB) of northern Douglas County contains geologically young red clay deposits left during the last glacial period that are highly erodible and prone to extensive mass wasting along stream banks, tributaries, and intermittent drainages (Verry and Kolka 2003). The study area covers 765.4 mi^2 of Douglas county, or just over half of the county's total area.

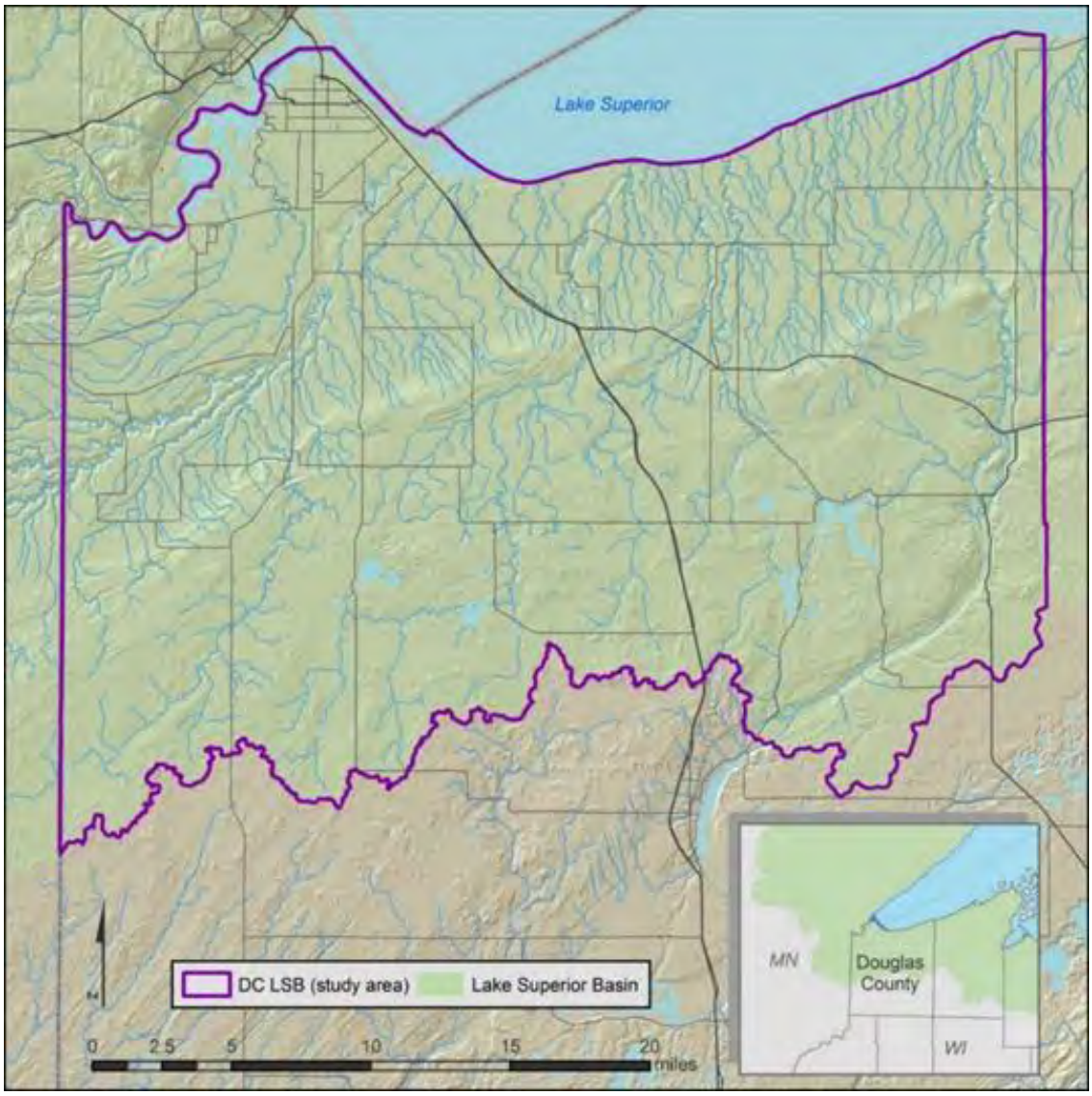

Figure 3. Study area defined as the Lake Superior Basin portion of Douglas County, Wisconsin, approximately the northern half of the county. The study area (CD LSB) is outlined in dark purple.

Ecological Landscapes & Land Type Associations

The study area is comprised of three ecological landscape units, the Superior Coastal Plain, the Northwest Sands and the Northwest Lowlands (Fig. 4).

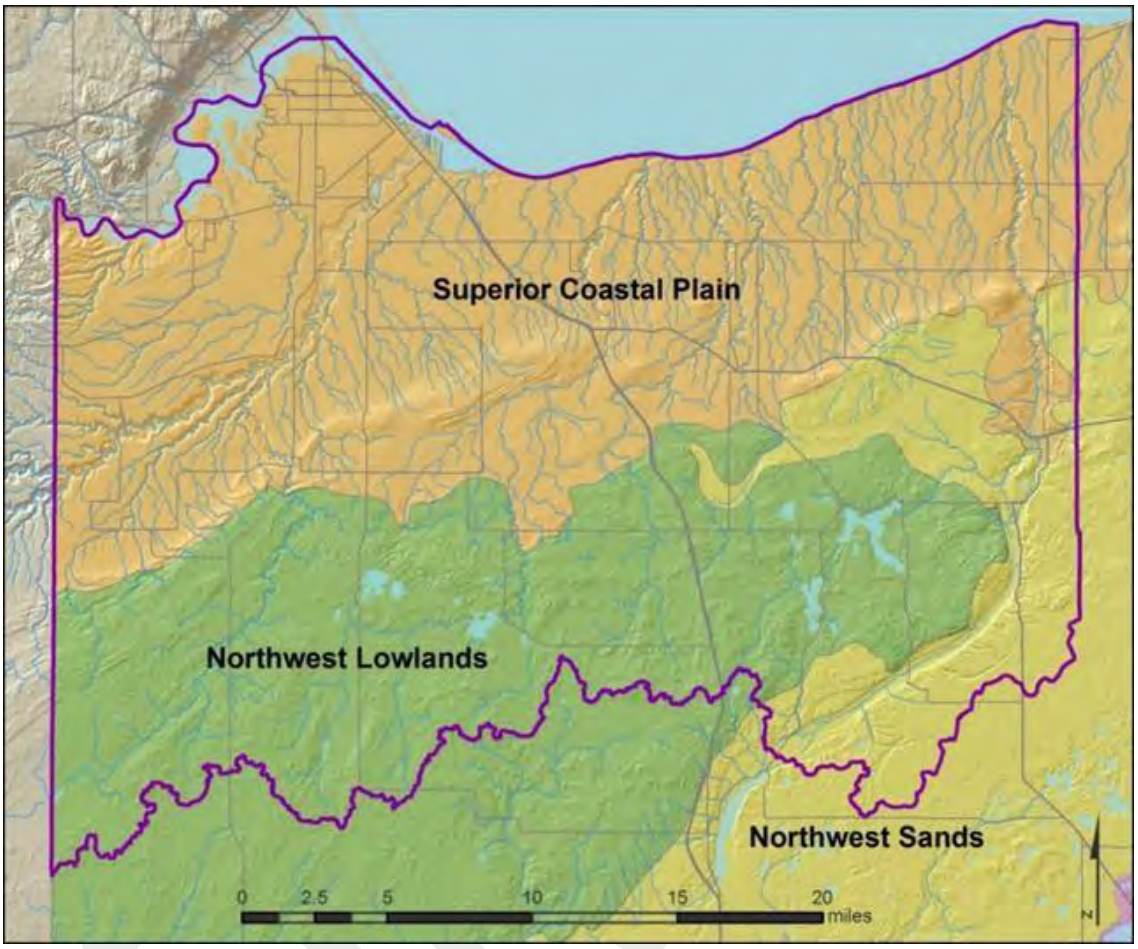

Figure 4. Ecological Landscape Units within the DC LSB.

Ecological Landscape Units are described by the Wisconsin DNR as regions within Wisconsin with similar ecology and management opportunities (WDNR 2013). Within each of these Ecological Landscape Units are several Wisconsin Land Type Associations (LTAs)(WDNR 1999) (Fig. 5). These LTAs provide a more detailed description of the land cover, geology and landforms for each unit. LTAs are recommended for forest, area-wide, or watershed-level planning and analysis scales (map scale ranges of 1:250,000 to 1:60,000). These ecological units contain similar patterns in their: 1) potential natural plant communities; 2) soils; 3) hydrologic function; 4) landform and topography; 5) lithology; 6) climate; and 7) natural processes (e.g., nutrient cycling, productivity, successional patterns, and natural disturbance regimes such as flooding, wind, or fire). LTAs within the DC LSB are depicted in Fig. 5. The following pages describe each of the Ecological Units and the LTAs within contained within them.

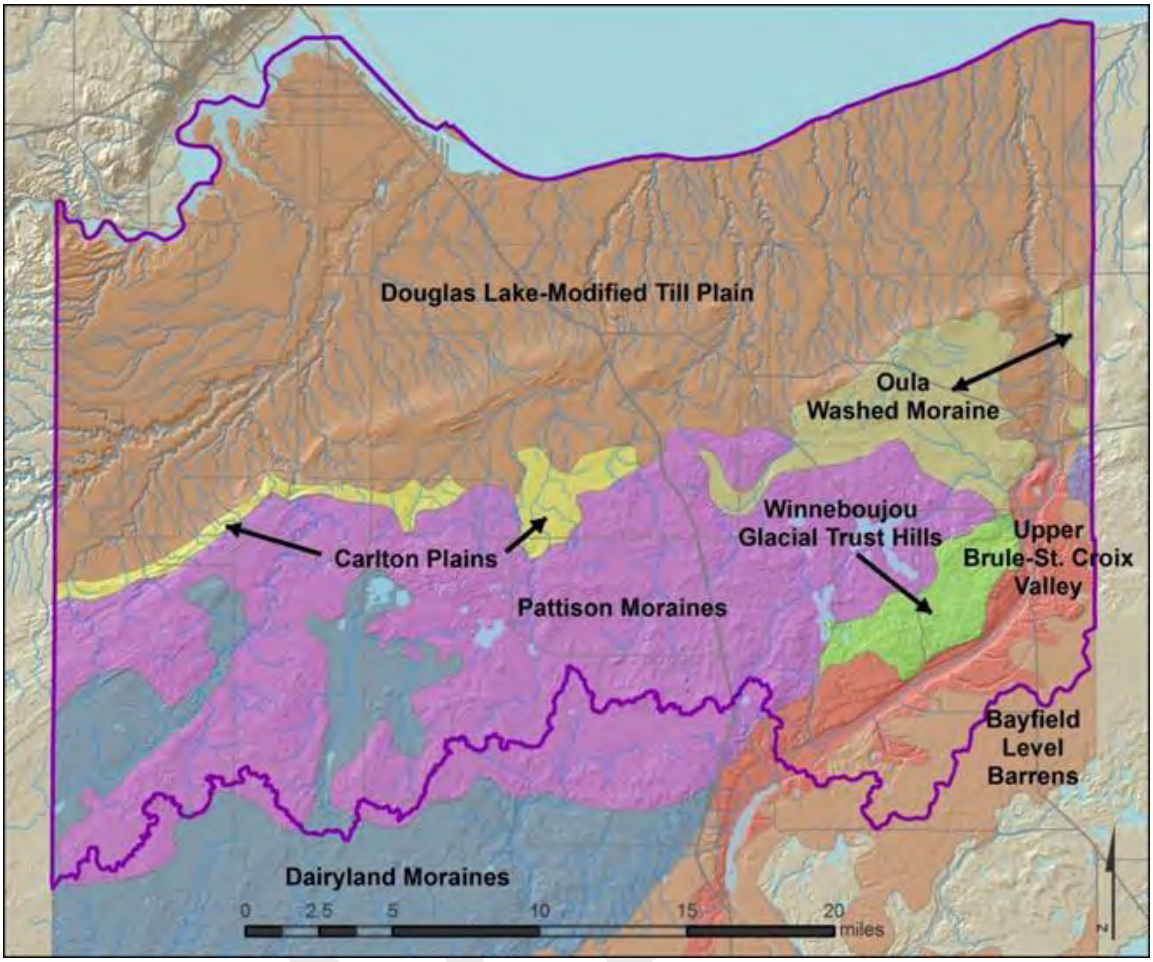

Figure 5. Land Type Associations (LTAs) within DC LSB.

Superior Coastal Plain

Approximately the northern half of the study area falls within the Superior Coastal Plain. This ecological landscape is generally rolling to flat topography with clay soils; primarily agriculture and mixed hardwood and spruce-fir forest with high gradient streams (Merryfield 2000). The following information on the Ecological Unit descriptions (climate, bedrock, geology & landforms, soils, hydrology, and current land cover) is taken directly from WI DNR (2014).

Climate: Typical of northern Wisconsin, though conditions are somewhat moderated by the proximity to Lake Superior; mean growing season of 122 days, mean annual temperature is 40.2 deg. F, mean annual precipitation is 32 inches, and mean annual snowfall is 87.4 inches. Cool summers, deep snows (including lake effect snows), high humidity, fog, mist, wave spray, currents, ice, and strong winds (e.g., along exposed coastlines, where blow-down events are frequent) affect parts of the Ecological Landscape, especially near Lake Superior. Some areas near Lake Superior support grass-based agriculture (18.5% of the Ecological Landscape). Areas away from Lake Superior have a shorter growing season and forests become more important than agriculture.

Bedrock: Late Precambrian sandstones are exposed and form cliffs and ledges along the northern edge of the Bayfield Peninsula and on the shores of the Apostle Islands. Igneous rocks (e.g., basalts) form the underpinnings of several waterfalls (e.g., Big Manitou Falls on the Black River in Douglas County).

Geology & Landforms: The Bayfield Peninsula is hilly, as are some of the Apostle Islands. Both are covered by glacial tills. The level plains on either side of the Bayfield Peninsula slope gently toward Lake Superior. They are dissected by many deeply incised streams and several large rivers that generally flow from south to north toward Lake Superior (e.g., Middle River). Sand spits, often enclosing lagoons and wetlands, are well-developed in the Apostle Islands archipelago and at river mouths; some of the larger spits are several miles long.

Soils: Important soils include deep, poorly-drained reddish lacustrine clays on either side of the Bayfield Peninsula. The clay deposits include lenses of sand or coarse-textured till; these areas are especially erosion-prone when they are cut by streams. The tills covering the Bayfield Peninsula and Apostle Islands are variable in composition, but include clays, silts, loams and sands. Organic soils are limited in extent, occurring mostly in association with the peatlands on the margins of the coastal lagoons and to a lesser extent in basins underlain by impermeable tills.

Hydrology: Lake Superior has had an enormous influence on the climate, landforms, soils, vegetation, and economy of the Superior Coastal Plain. Freshwater estuaries are present along the coast. Inland lakes are rare, but lagoons, some of them quite large, occur behind the coastal sandpits. Important rivers in this unit within DC LSB include the St. Louis, Nemadji, Amnicon, and the Bois Brule. Coldwater streams originate in the aquifers at the northern edge of the Northwest Sands in Bayfield County and flow north across the Superior Coastal Plain before emptying into Lake Superior. Many of the streams flowing across the clay plain suffered severe damage to their banks and beds during the era of heavy logging in the late 19th and early 20th centuries. Some of them have not yet recovered and their slumping banks continue to dump sediments into the main channels, and ultimately, into Lake Superior. Water (and soil) management can be challenging in this Ecological Landscape (WI DNR 2014).

Current Land Cover: Aspen-dominated boreal forests are abundant on the clay plains to the west and east of the Bayfield Peninsula. In some areas white spruce, balsam fir, and white pine (these were the dominant canopy trees prior to the Cutover) are now common understory species, or are even colonizing abandoned pastures. Older stands of boreal conifers still occur in a few places, such as the City of Superior Municipal Forest. Forest fragmentation is significant on the clay plain owing to the interspersion of forests with fields and pastures. Northern hardwood and hemlock-hardwood forests occur on the Apostle Islands and include old-growth remnants. Dry forests of pine and oak are scarce in this Ecological Landscape but they do occur on some of the sandspits associated with coastal estuaries. The largest coastal wetlands cover thousands of acres, and these are composed of complex vegetation mosaics that include coniferous and deciduous forests, shrublands, wet meadows and marsh. Large wetlands in the interior of the Superior Coastal Plain include the Bibon Swamp, a huge wetland of almost 10,000 acres along the White River on the southern edge of the Ecological Landscape, and Sultz Swamp, a peatland perched high on the northern Bayfield Peninsula. An extensive complex of wetlands of variable structure occurs on poorly drained red clays in and around the City of Superior.

Relevant LTAs: LTAs within the Superior Coastal Plain in the DC LSB are the Douglas Lake-Modified Till Plain and the Carlton Plains.

Significant Ecological Places

- Conservation Opportunity Areas (COAs): Pokegama-Nemadji Wetlands, Brule Boreal Forest, Bibon Swamp
- State Natural Areas (SNAs): Brule River Boreal Forest, Bibon Swamp, Nemadji River Floodplain Forest, Pokegama Carnegie Wetlands, Big Manitou Falls and Gorge, Dwight's Point and Pokegama Wetlands, and Bear Beach.
- Important Bird Areas (IBAs): Bibon Swamp, Wisconsin PointLand Legacy Places: Bois Brule River, Middle River Contact, Nemadji River and Wetlands, St. Lousi Estuary and Pokegama Wetlands, Wisconsin Point, Manitou-Black River Falls

Northwest Sands Ecological Landscape

A fairly small portion of the study area in the southeast corner falls within this ecological landscape unit. *The following information on the Ecological Unit descriptions (climate, bedrock, geology & landforms, soils, hydrology, and current land cover) is taken directly from WI DNR (2014).*

Climate: Mean annual temperature (41.30 F) is similar to other northern Ecological Landscapes. Annual precipitation averages 31.4 inches and annual snowfall about 61 inches, also similar to other northern Ecological Landscapes. The growing season is short and averages 121 days. Although there is adequate rainfall to support agricultural row crops such as corn, the sandy soil and short growing season limit row crop agriculture, especially in the northern part of the Ecological Landscape.

Bedrock: Underlying bedrock at the southern edge of the Northwest Sands is Cambrian quartzose and glauconitic sandstone and silt-stone. In the northern portion, the bedrock is Precambrian basalt, lithic conglomerate, shale, and feldspathic to quartzose sandstone. Bedrock is covered with 100 to 600 feet of glacial drift (sand, gravel, and silt), with the thickest deposits in the northern half. No terrestrial bedrock exposures are known from this Ecological Landscape.

Geology & Landforms: This Ecological Landscape is the most extensive and continuous xeric glacial outwash system in northern Wisconsin. It has two major geomorphic components. One is a large outwash plain pitted with depressions, or "kettle lakes." The other component is a former spillway of Glacial Lake Duluth (which preceded Lake Superior) and its associated terraces. The spillway is now a river valley occupied by the St. Croix and Bois Brule Rivers. The hills in the northeast are formed primarily of sand, deposited as ice-contact fans at the outlet of subglacial tunnels. Lacustrine deposits (especially fine materials of low permeability such as clays) from Glacial Lake Grantsburg underlie Crex Meadows and Fish Lake Wildlife Areas, and are responsible for impeding drainage, leading to the formation of the large wetlands there.

Soils: Upland soils are typically sands or loamy sands over deeper-lying strata of sand, or sand mixed with gravel. These soils drain rapidly, leading to xeric, droughty conditions within the Ecological Landscape. Wetlands in low-lying depressions have organic soils of peat or muck.

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Hydrology: This Ecological Landscape has significant concentrations of glacial kettle lakes, most of them seepage lakes, a well-developed pattern of drainage lakes, and several large wetland complexes. The lakes cover roughly 4.8% of the area of the Northwest Sands, the third highest percentage among ecological landscapes in Wisconsin. The headwaters of the St. Croix and Bois Brule rivers are here. Major rivers include the St. Croix, Namekagon, Yellow, and Totagatic. Springs and seepages are common along the Upper Bois Brule but local elsewhere.

Current Land cover: Land cover is a mix of dry forest, barrens, grassland, and agriculture, with wetlands occupying significant parts of the bed of extinct Glacial Lake Grantsburg, kettle depressions, and some river valleys. Within the forested portion, pine, aspen-birch, and oak are roughly equally dominant. The maple-basswood, spruce-fir, and bottomland hardwood forest types occupy small percentages of the Ecological Landscape's forests. The open lands include a large proportion of grassland and shrubland. Emergent/wet meadow and open water are significant in the southern part of the Northwest Sands. There is very little row-crop agriculture.

Relevant LTAs: LTAs within the Northwest Sands ecological unit in the DC LSB are the Bayfield Level Barrens, Bayfield Rolling Outwash Barrens, Oula Wahed Moraine, and the Upper Brule-St. Croix Valley.

Northwest Lowlands Ecological Landscape

Located in the southern portion of the study area, this ecological landscape unit covers nearly half of the study area. The following information on the Ecological Unit descriptions (climate, bedrock, geology & landforms, soils, hydrology, and current land cover) is taken directly from WI DNR (2014).

Climate: Typical of northern Wisconsin; the mean growing season is 122 days, mean annual temperature is 41.8 deg. F, mean annual precipitation is 30.6, and mean annual snowfall is 49 inches. The cool temperatures and short growing season are not adequate to support agricultural row crops; less than three percent of the land here is used for agricultural purposes and most of this is in the southern "hook" in Burnett County. The climate is favorable for forests, which cover almost 70% of the Ecological Landscape. The cool temperatures and short growing season, along with numerous and large acid peatlands, result in almost boreal-like conditions in parts of the Northwest Lowlands.

Bedrock: Bedrock outcroppings are rare except in association with the basalt ridge that follows the Douglas County fault line and forms part of the northern boundary of the Northwest Lowlands. Waterfalls, cliffs, bedrock glades, and rock-walled gorges are associated with this bedrock feature. Local, relatively small, exposures of sandstones and conglomerates occur in some of these gorges.

Geology & Landforms: The major landforms are ground and end moraines, with drumlins present in the southwestern portion. Topography is gently undulating. In the northern part of the Ecological Landscape many stream valleys run northeast-southwest in roughly parallel courses. This is caused by bedrock ridges that were created by harder strata of lava alternating with weaker sedimentary rocks; these were later tilted upward due to rifting and continental collision. This bedrock feature influences the surface topography of the Northwest Lowlands, especially where glacial deposits are thin.

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Soils: Soils are predominantly loams, with significant acreages of peat deposits in the poorly drained lowlands. Major river valleys have soils formed in sandy to loamy-skeletal alluvium or in non-acid muck. Alluvial soils range from well drained to very poorly drained, and have areas subject to periodic flooding.

Hydrology: This Ecological Landscape occupies a major drainage divide, and contains the headwaters of many streams that flow north toward Lake Superior or south toward the St. Croix River system. Important rivers include the St. Croix, Black, Tamarack, Spruce, and Amnicon. Lakes are uncommon except in the heavily agricultural southernmost part of the Ecological Landscape in Burnett County. Impoundments, all fairly small, have been created by constructing dams on the Tamarack and Black rivers, and several creeks. The St. Croix River is fed by springs, spring ponds, and seepages.

Current Land Cover: The present-day forests remain extensive and relatively unbroken, occupying about 68% of the landscape. Forests consist mainly of aspen, paper birch, sugar maple, basswood, spruce and fir. Minor amounts of white pine, red pine and red oak are also present. Older successional stages are currently rare, as almost all of this land is managed as "working forests". The large undisturbed peatland complexes consist of mosaics of black spruce-tamarack swamp, muskeg, open bog, poor fen, shrub swamp, and occasionally, white cedar swamp. The St. Croix River corridor includes forested bluffs and terraces, which support communities unlike those found in most other parts of the Ecological Landscape. These include mesic maple-basswood forest, dry-mesic forests of oak or oak mixed with pine, black ash-dominated hardwood swamps, and numerous forested seeps. Less extensive areas of marsh and sedge meadow also occur along the St. Croix. In most of this Ecological Landscape minor amounts of land are devoted to agricultural and residential uses, and most of these land uses are concentrated along State Highway 35. The major exception to this pattern is the area that wraps around the south end of the Northwest Sands which is a mix of agricultural lands and scattered oak or oak-pine woodlots.

Relevant LTAs: LTAs within the Northwest Lowlands ecological unit in the DC LSB are the Pattison Moraines, Dairlyand Moraines, and the Winneboujou Glacial Trust Hills.

- Significant Ecological Places (from Merryfield et al. 2000)
- Conservation Opportunity Areas (COAs): Northwest Lowlands Bogs
- State Natural Areas (SNAs): Belden Swamp, Erickson Creek Forest and Wetlands, Black Lake Bog
- Important Bird Areas (IBAs): none identified
- Land Legacy Places: Manitou-Black River Falls

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Watersheds & Rivers

Watersheds are defined by the USGS's National Hydrography Dataset (NHD) using a hierarchy of nested drainage areas defined. These drainage areas are represented by codes and referred to as Hydrologic Unit Codes or HUCs. The larger the number of digits in a HUC the smaller the area or more nested it is in the hierarchy of drainage areas. There are just two eight-digit HUCs that overlap the DC LSB, the St. Louis River 8-digit HUC which is the drainage area of the Pokegama and St. Louis Rivers near the city of Superior and the *Bear Trap-Nemadji Rivers 8 digit HUC.* This later HUC encompasses the remainder of the DC LSB. These HUCs are broken down further into 10-digit, 12-digit, down to16-digit HUCs**.** Figure 6 displays 10-digit and 12- digit HUC boundaries in the DC LSB along with the primary rivers, such as the Nemadji, Amnicon, Middle, and Bois Brule Rivers and some creeks such as Balsam, Bardon, Bluff, Dutchman, and Smith creeks.

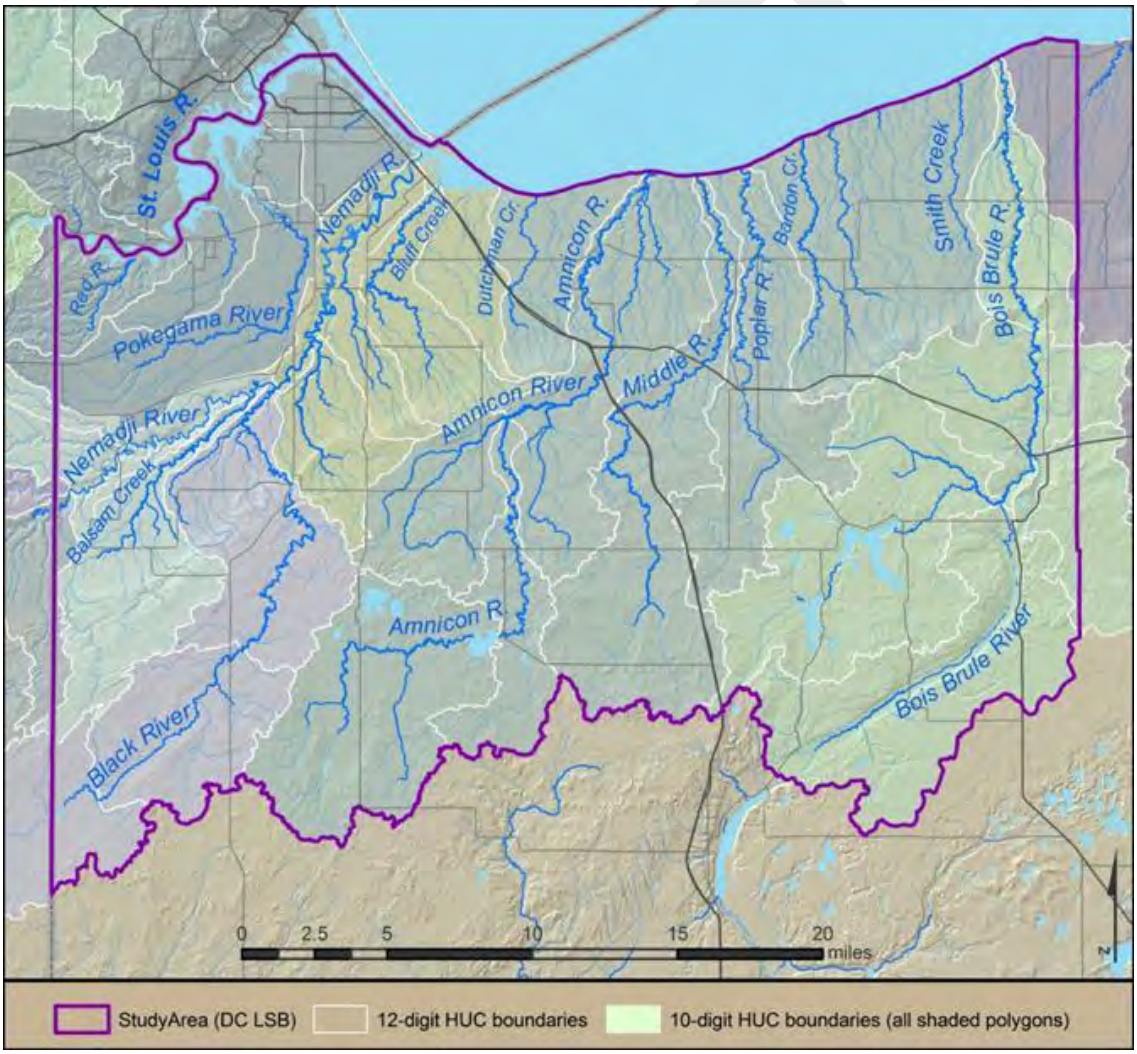

Figure 6. Hydrologic Units (i.e., watersheds & sub-watersheds) and major rivers and streams in the study area.

Red Clay Plain

An important feature in this study area and much of the Lake Superior Basin of Wisconsin is the lake clay plain (sometimes referred to as the red clay plain) where "red clay" soils that were glacial till and glacial lake deposits. For this study, the technical committee agreed to define the clay plain using an ecological classification in Wisconsin's Land Type Association GIS data. The Douglas Lake-Modified Till Plain land type association (LTA) is used to define the boundary of the clay pain, shown as a darker shaded area in the northern half of the study area (Figure 7). Red clay wetlands, those that are composed of a mixture of wet and dry red clay soils, are common here and this area is treated differently than the rest of the study area in terms of identifying potential wetland re-establishment sites and for determining some wetland functions because of the clay-dominant soils and the way they are treated in digital soils data (SURGO/NRCS).

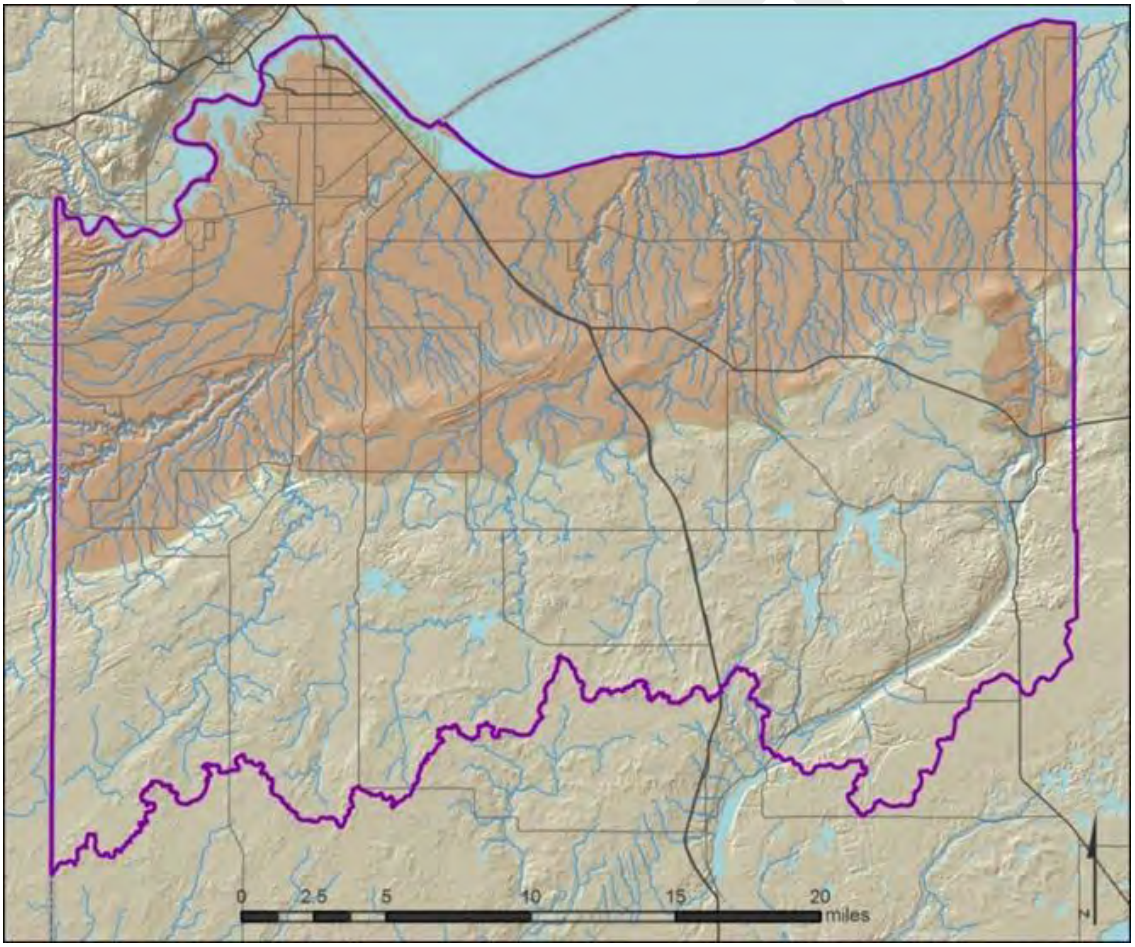

Figure 7. The red clay plain (orange shading) within the study area (outlined in purple). This is defined by the boundaries of the Douglas Lake-Modified Till Plain, a Wisconsin Land Type Association (LTA) (WI DNR 1999).

Land Cover / Land Use

Pre-settlement Land Cover

Forest vegetation dominated the landscape in the study area prior to European settlement. The exact extent of former wetlands is not known, however two datasets provide some general indication of former wetland extent: Finley's vegetation maps for each Ecological Landscape Unit in the study area (WDNR 2014) and the Wisconsin Economic Inventory (Bordner) Survey maps (Wisconsin Land Economic Inventory 1933).

Current Land Cover / Land Use

Multiple GIS data sources are available to define contemporary land cover/land use in Douglas County. Two of the highest resolution and most contemporary datasets include the Western Great Lakes Coastal Change Analysis Program (CCAP) (Fig. 8) data from 2010 and Community GIS Inc.'s Open/Impervious Land Analysis data (circa 2008-2010) (Fig. 9).

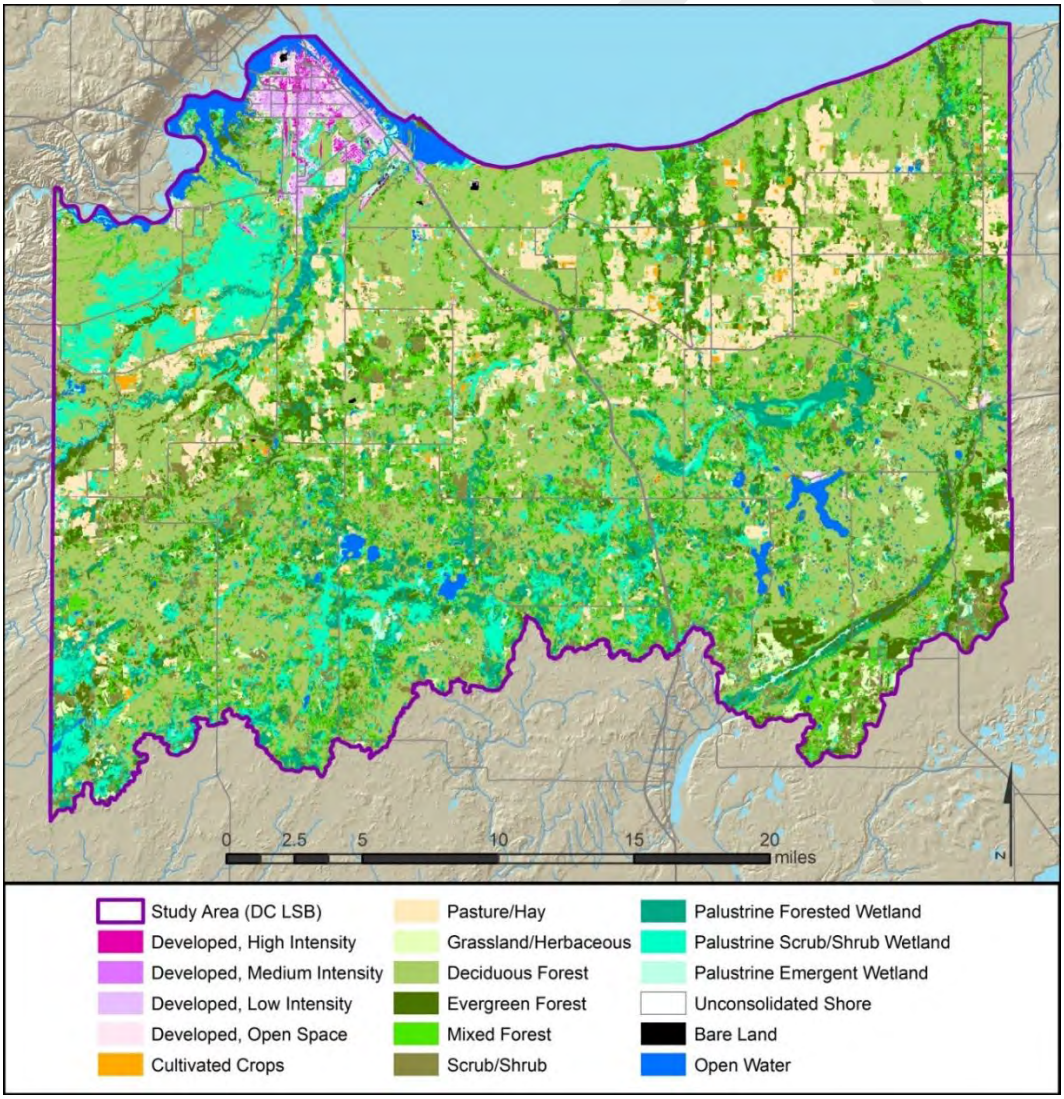

Figure 8. Land cover classes in the Douglas County Western Great Lakes Coastal Change Analysis Program (C-Cap) 2010 Land Cover

The Open/Impervious GIS dataset was one of several land cover datasets used to measure the proportion of open land and impervious surface within Douglas County. Open land describes land cover with limited or no forest cover and includes the following categories: 0-16 yr. age forest stands, agricultural areas, residential development, and impervious surfaces (Fig. 9) provides a brief description of each of the land cover/use categories. The transitional agriculture category was identified as areas where agricultural land is no longer being farmed and is 'transitioning' back to its former land cover.

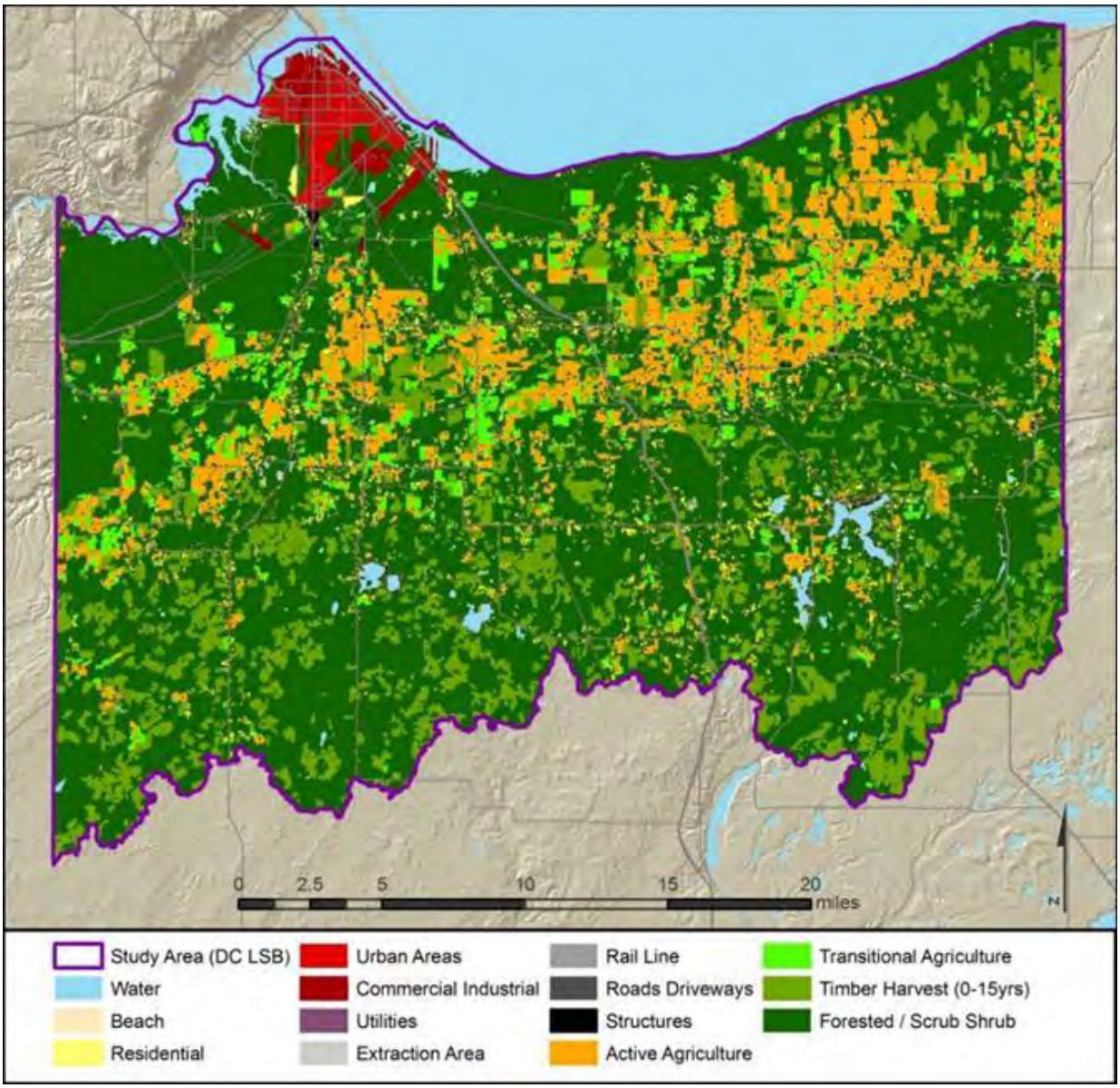

Figure 9. Land cover / land use in the Lake Superior Basin of Douglas County as of 2008-10. (Open / Impervious Lands analysis layer created by Community GIS Services Inc.).

Description of wetlands in the Lake Superior watersheds

Wetland functions

Wetlands perform a number of functions and are important in maintaining the overall health of the watersheds in which they are located. These functions can be categorized as physical and biological functions. An example of physical functions include providing areas for rainwater to pool during storm events (surface water detention) or areas where nutrients such as phosphorus can be removed by plants before entering streams and lakes (nutrient transformation). Examples of biological functions include amphibian, waterfowl and woodcock habitat. The analysis completed for the current wetlands in the Lake Superior Basin of Douglas County provides the best available information on wetlands that rank as medium or high for specific functions. Please note that since most wetlands perform more than one function, they have been identified for each of the functions having a medium or high score.

A description of wetland functions evaluated for the Lake Superior Basin of Douglas County with maps of showing the location of the significant (moderate or high) functioning wetlands for each function can be seen on the following pages (Figs. 11- 23). All current wetland functional data and potentially restorable wetland areas have been compiled on the Douglas County website and can be viewed at: www.douglascountywi.org. These maps are high resolution and provide detailed information for each wetland that are difficult to view on the following, large scale maps of the Lake Superior Basin in Douglas County. A Watershed Map Book was developed utilizing Adobe Acrobat software to enable viewing of all land cover/land use and wetland information compiled for this project without the need for GIS software. The Watershed Map Book contains several maps for each watershed (HUC 12) that includes the following information: aerial photo, land cover types, percentage of open land types, surface water detention wetlands, potentially restorable wetlands and historic wetland information from the 1933 Wisconsin Economic Land (Bordner) Survey (Fig. 10). This Map Book contains the high resolution information in a different viewing format and digital copies can be obtained by contacting the Douglas County Land Conservation Department.

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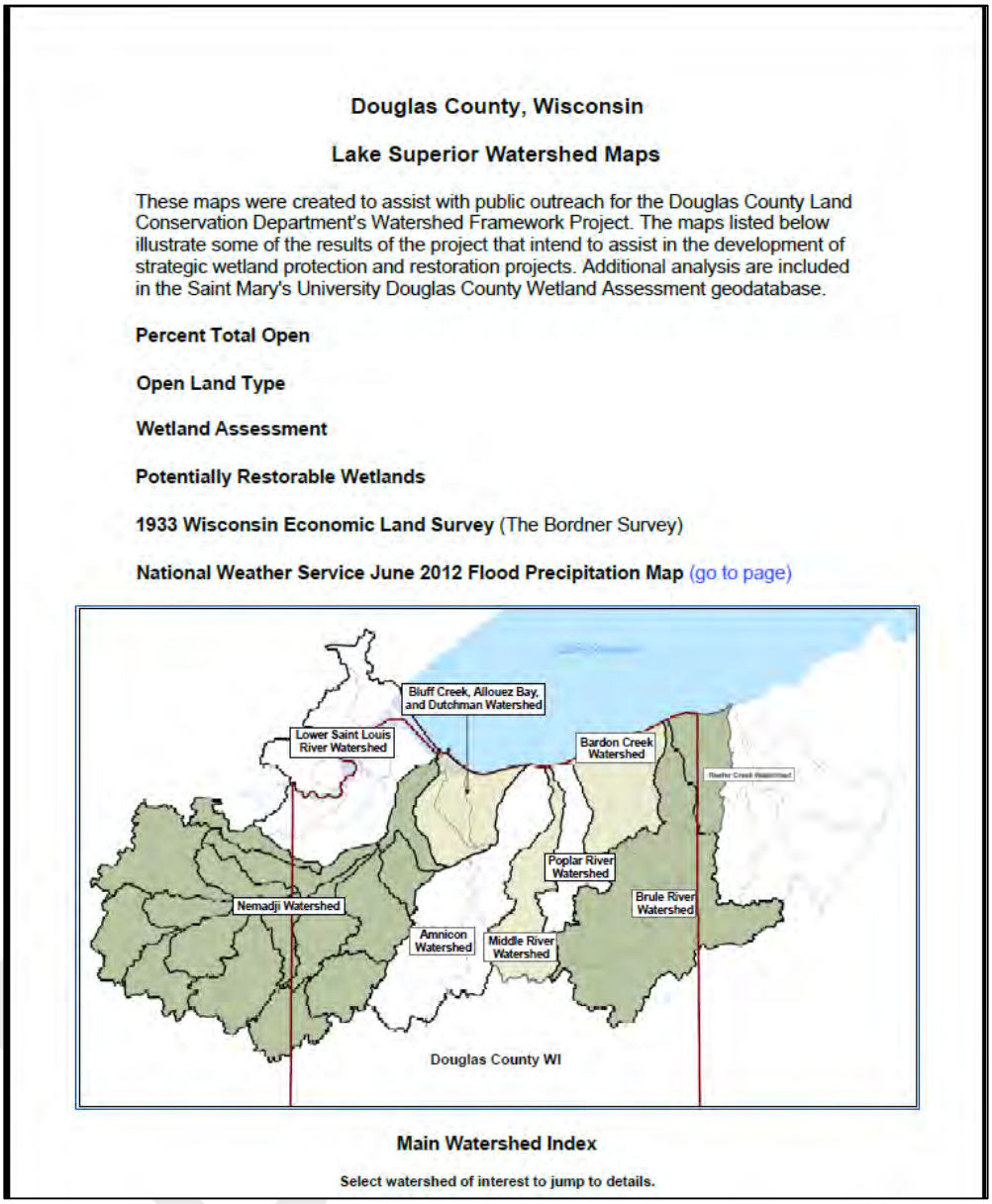

Douglas County, Wisconsin

Lake Superior Watershed Maps

These maps were created to assist with public outreach for the Douglas County Land Conservation Department's Watershed Framework Project. The maps listed below illustrate some of the results of the project that intend to assist in the development of strategic wetland protection and restoration projects. Additional analysis are included in the Saint Mary's University Douglas County Wetland Assessment geodatabase.

Percent Total Open

Open Land Type

Wetland Assessment

Potentially Restorable Wetlands

1933 Wisconsin Economic Land Survey (The Bordner Survey)

National Weather Service June 2012 Flood Precipitation Map (go to page)

Main Watershed Index

Select watershed of interest to jump to details.

Figure 10. Cover page of the Lake Superior Basin, Douglas County, WI. Map Book

Physical/Chemical Functions

Surface Water Detention (SWD): Wetlands trap and store surface water. Surface water can take the form of precipitation or in colder climates spring snow melt. The wetlands then release the water slowly over time through surface or underground hydrologic networks. From the human perspective, this process equates to lower peak flood levels. In fact, wetlands in a watershed can diminish and even desynchronize peaks flows. Generally, depressional wetlands that capture and store precipitation and runoff are significant for performing the function of surface water detention. They provide ground water recharge points and include wetlands found along stream and river floodplains, in lake basins, fringes, and islands.

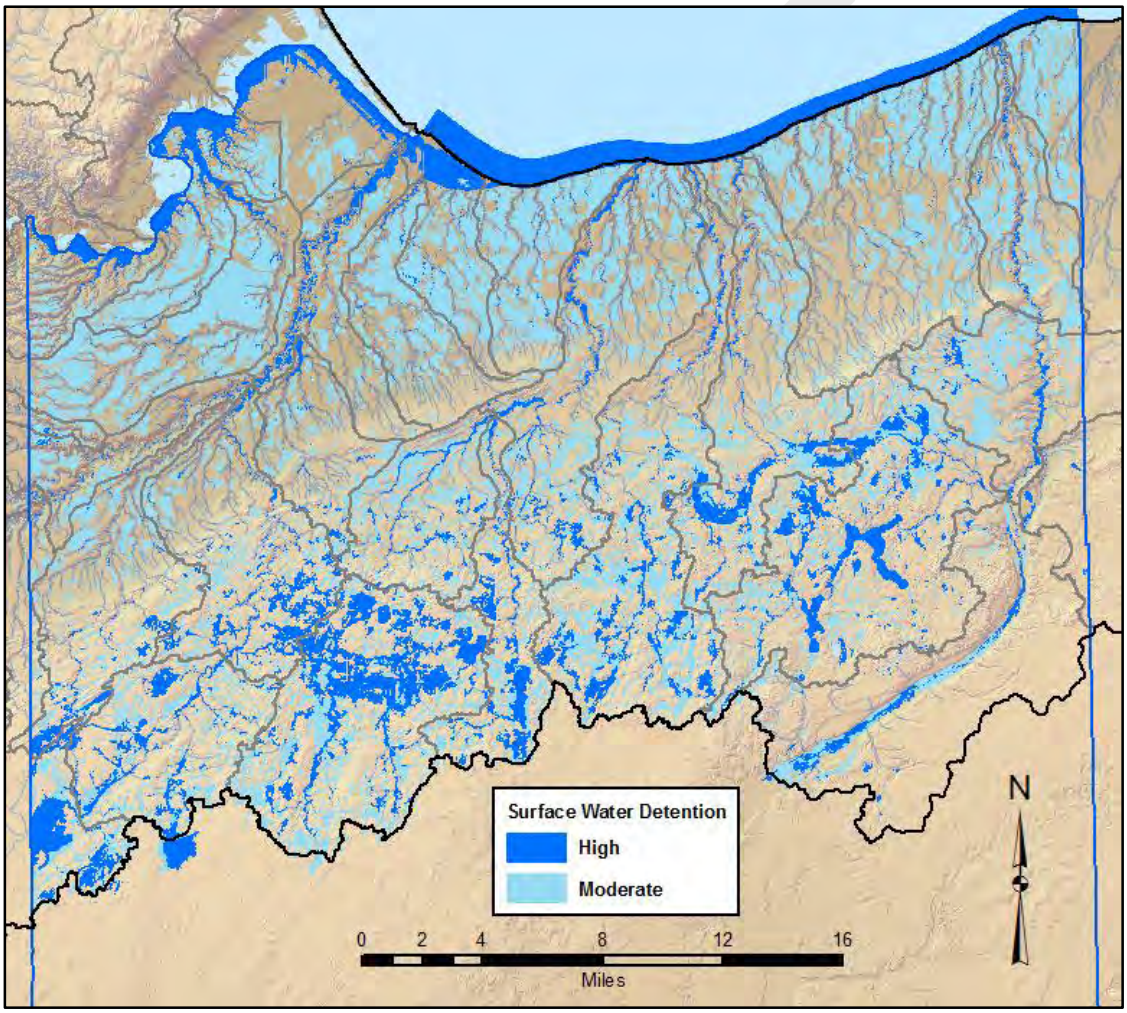

Figure 11. Wetlands with moderate or high function for surface water detention.

The primary function of interest for reducing water runoff is ***surface water detention*** (SWD)**.** Note that wetlands that demonstrate medium to high function for surface water detention are primarily found in the headwater and floodplain areas of many Lake Superior basin watersheds**.** These wetlands represent the highest priority for preservation in order to maintain the function and services currently provided in Lake Superior Basin watersheds.

Stream-flow Maintenance (SM): Surface water maintenance is the ability of a watershed to keep water traveling through the drainage system. Wetlands that help maintain stream flow are those that contribute water to the interconnected conduits within a watershed. Wetlands providing highest surface water maintenance are headwater wetlands. Most other wetland types that provide surface water maintenance are through flow and outflow types, although in some cases isolated and inflow wetlands also provide this function to a moderate degree.

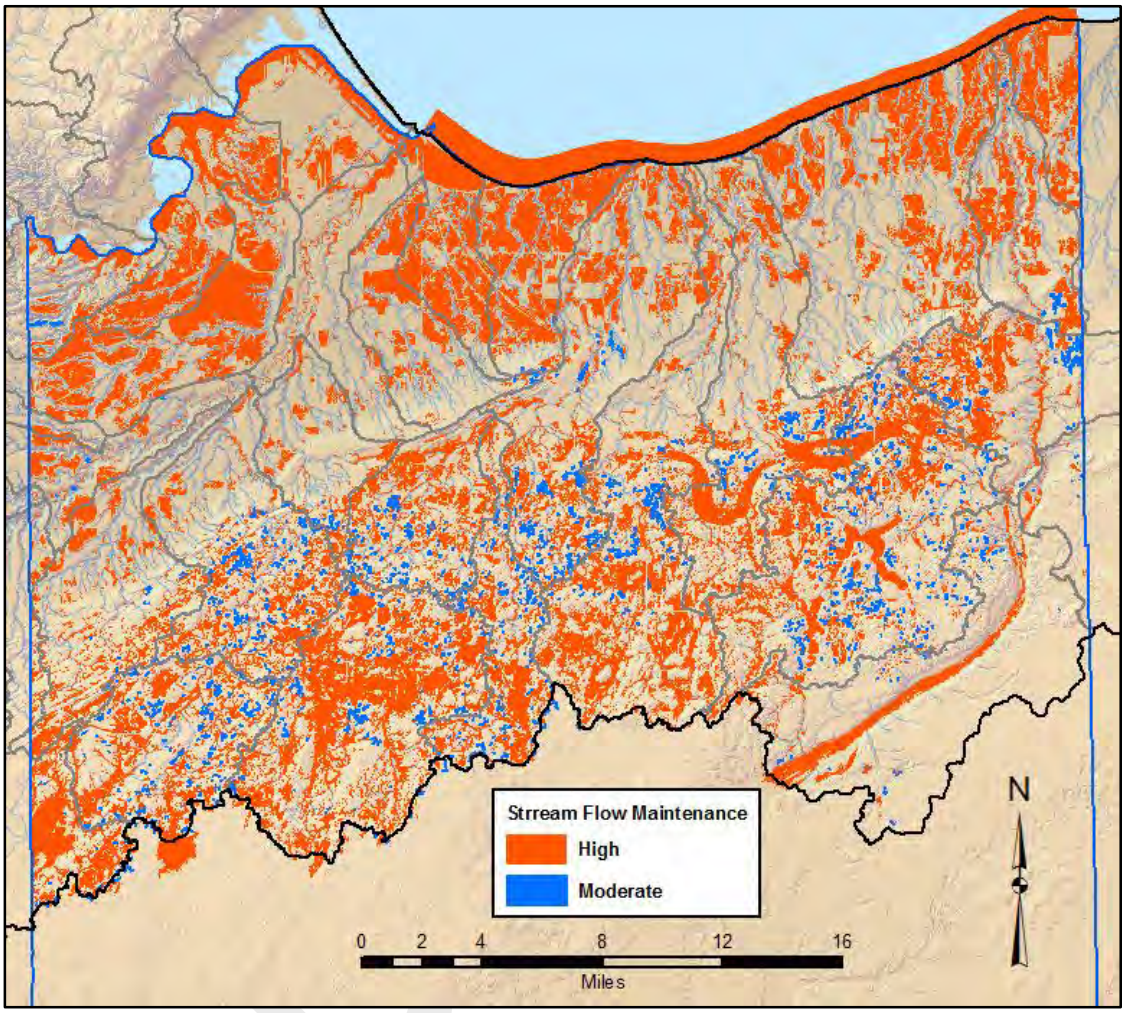

Figure 12. Wetlands with moderate or high function for stream-flow maintenance (SM)

Shoreline Stabilization (SS): Natural shoreline stabilization structures and vegetation prevent erosion or remediate erosion that has already occurred by binding soils. Vegetation and mixed vegetation along lake, river, stream, and pond shorelines prevent soil from being washed or blown away.

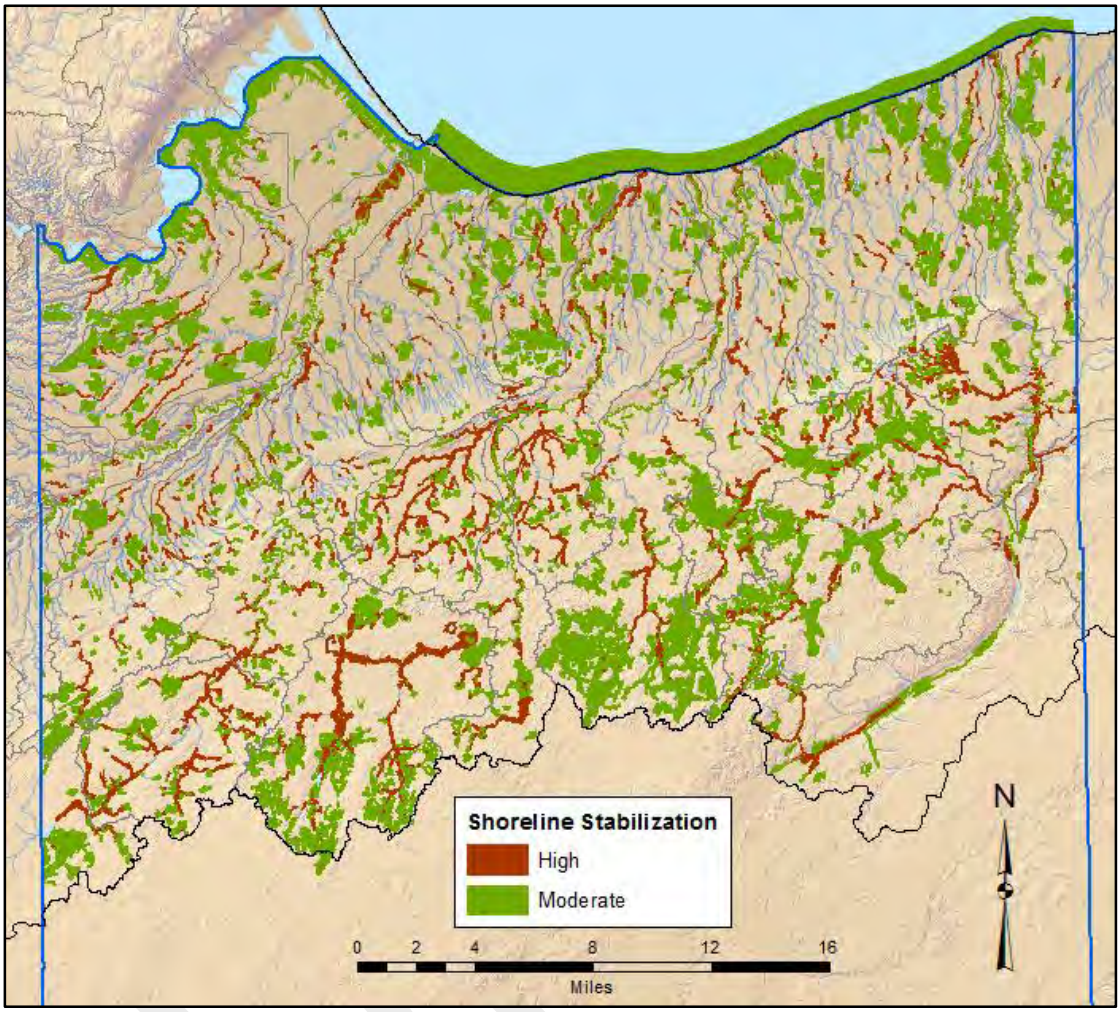

Figure 13. Wetlands with moderate or high function for shoreline stabilization.

Sediment & Other Particulate Retention (SR): Wetlands that physically trap particles that affect water quality have sediment retention properties. In contrast to nutrient transformation which involves chemical processes, SR is a physical process where the suspended particles are filtered by the soil and plant roots. The removal of suspended particles helps to improve water clarity and help maintain cooler temperatures on cold water streams. Due to the physical nature of sediment retention LLWW is the primary system used to make SR determinations with the NWI vegetation classes and water regime also factoring into the process.

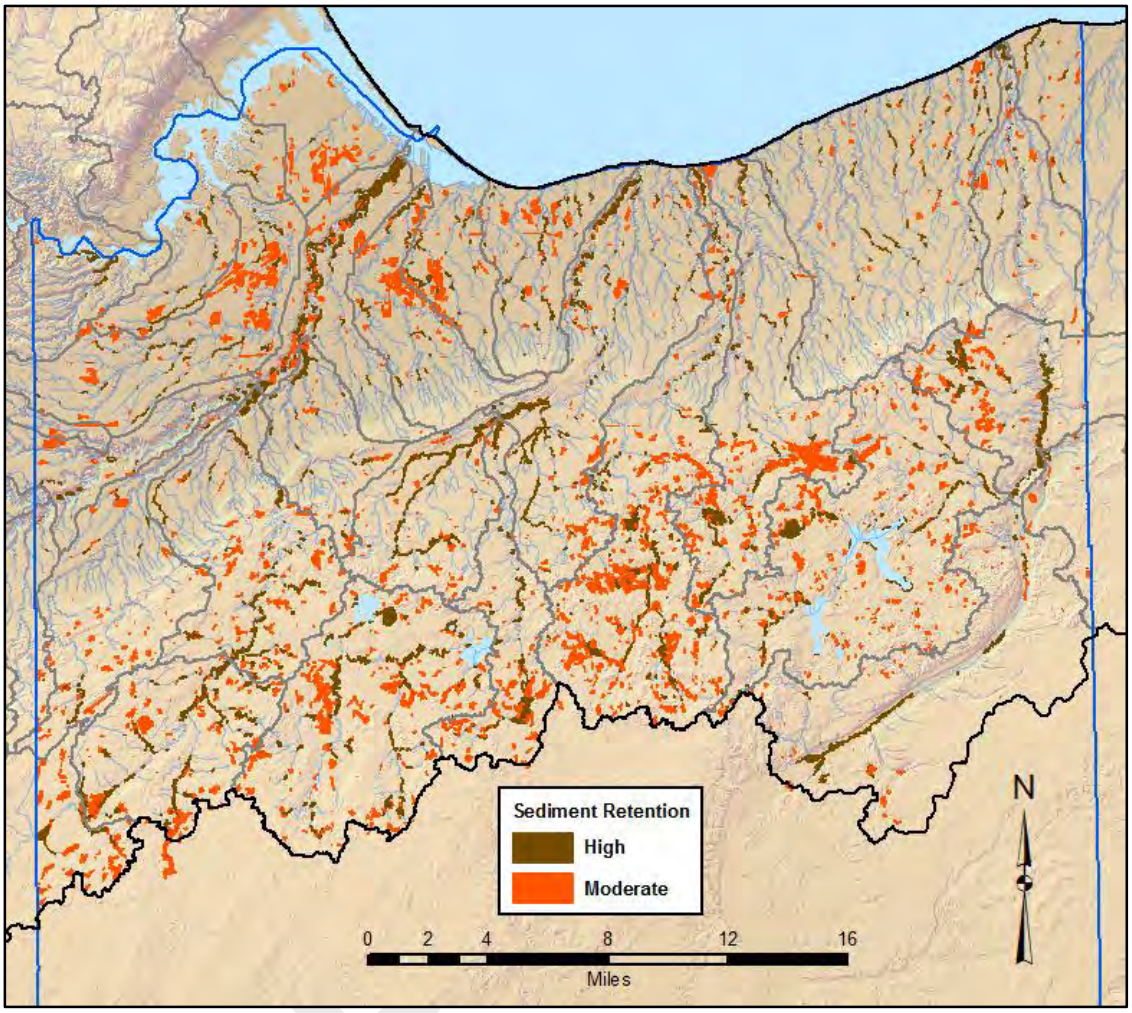

Figure 14. Wetlands with moderate or high function for sediment retention.

Nutrient Transformation (NT): Nutrient transformation refers to the natural chemical processes that remove or recycle compounds in the environment. In the case of wetlands, nitrates and phosphorous from agricultural runoff are the primary nutrients of concern. Wetlands performing this function are sinks for excess nutrients. The nutrients are prevented from moving further through the watershed through either storage or by wetland vegetation using the nutrients for their own life cycle.

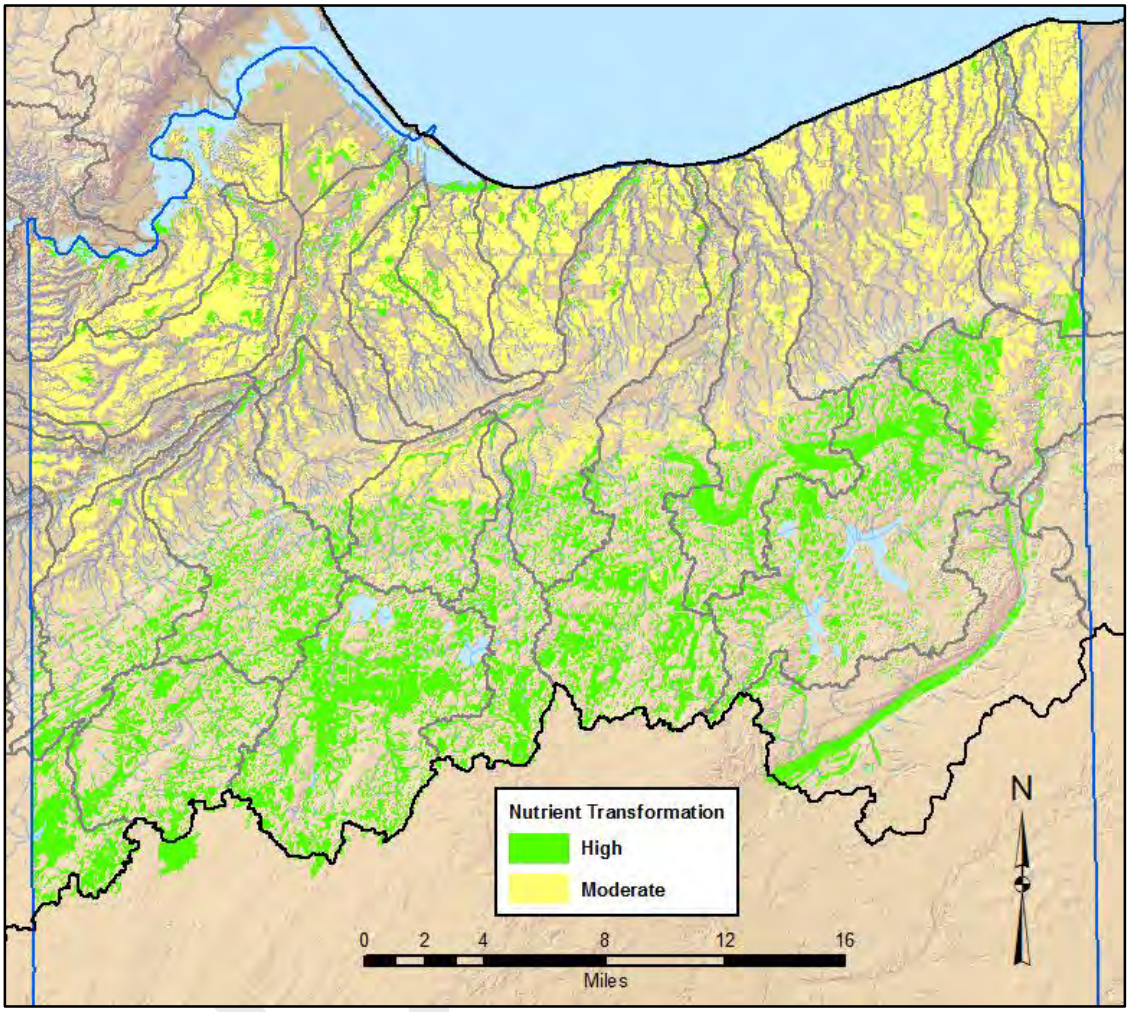

Figure 15. Wetlands with moderate or high function in nutrient transformation.

Carbon Sequestration (CAR): Carbon sequestration occurs when wetlands act as carbon sinks through chemical and biological processes such as photosynthesis. Typically, wetlands performing carbon sequestration are vegetated to some degree. Therefore, NWI classifications become the major source of information in making determinations regarding carbon sequestration. Soil and water regime information are also important in determining whether a wetland functions at a high or moderate level for this function.

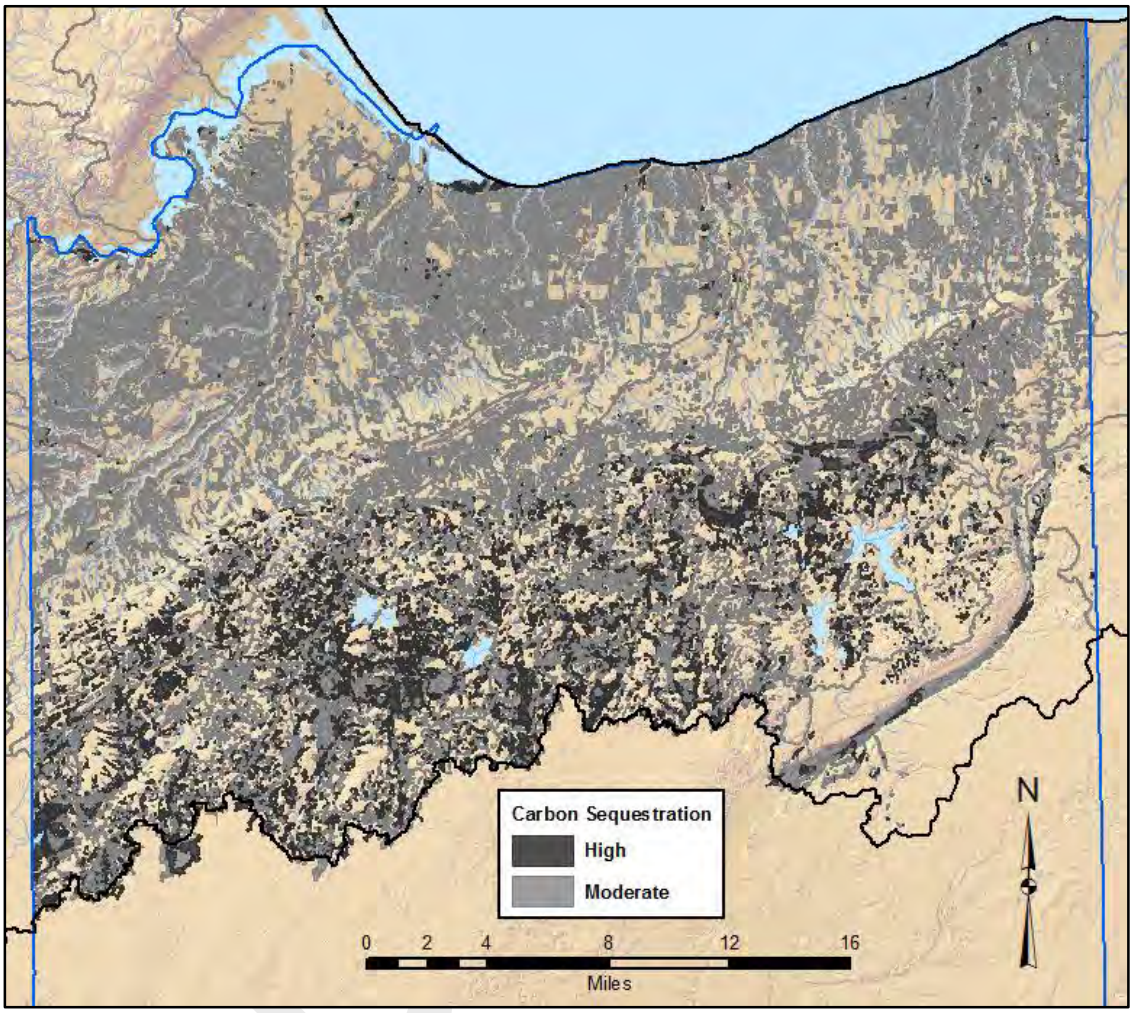

Figure 16. Wetlands with moderate or high function for carbon sequestration

Habitat Functions

Amphibian Habitat (AMH): Amphibians such as frogs, toads, and salamanders are commonly found in floating vegetation and wild rice. Some amphibian species require a variety of habitats for their life cycle, while others tend to stay in much wetter areas throughout their lives. Typically seasonally flooded to permanently flooded wetlands provide amphibian habitat. Shallower water habitats tend to be best for amphibians.

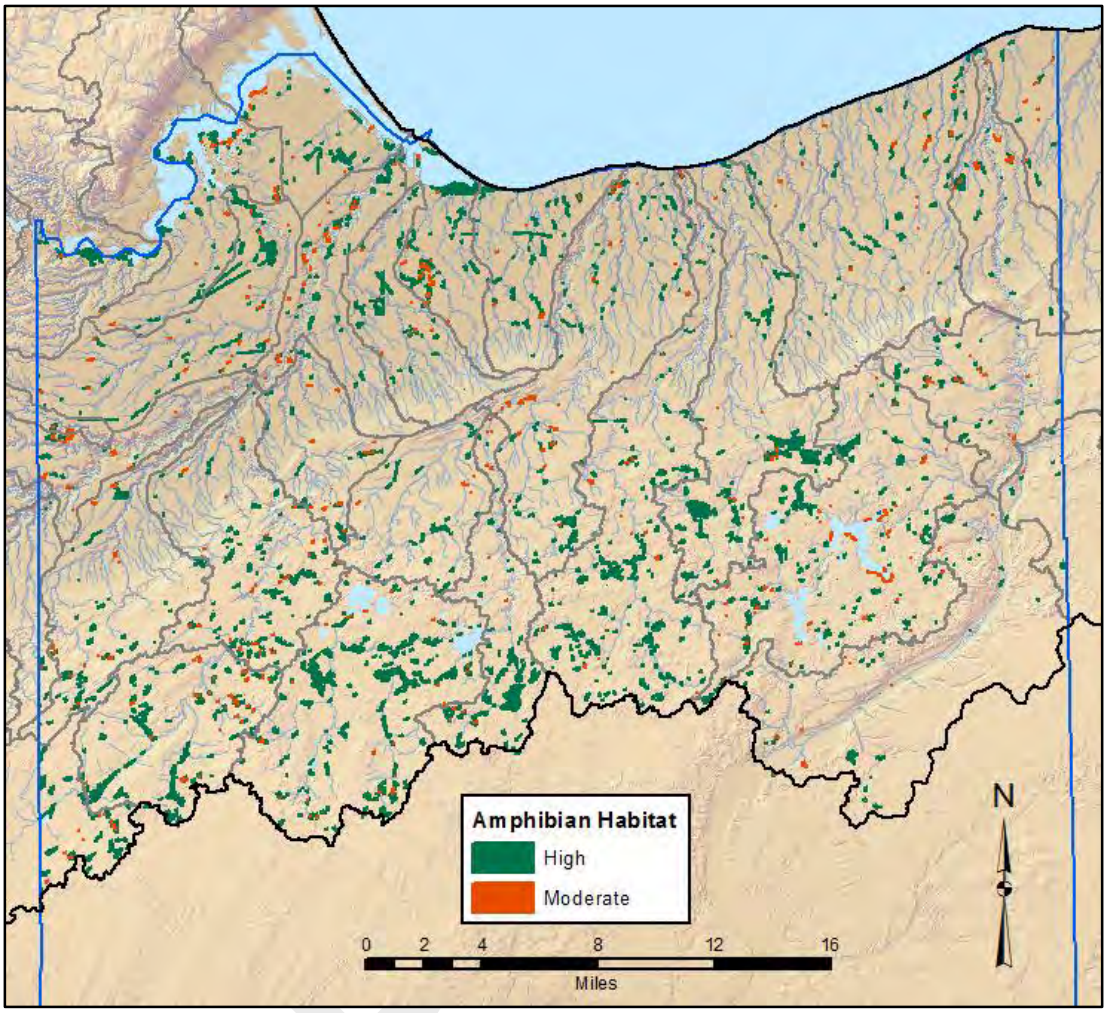

Figure 17. Wetlands with moderate or high function for amphibian habitat

Fish (FIS): Wetlands performing the function of fish habitat provide areas vital for various parts of their life cycle. Many organisms on which fish feed need wetlands to survive. Wetlands also provide spawning and nursery areas. Wetland plants provide cover essential to small and young fish avoiding predators. The shade provided by wetland trees and shrubs helps to maintain cooler water temperatures for cold water species.

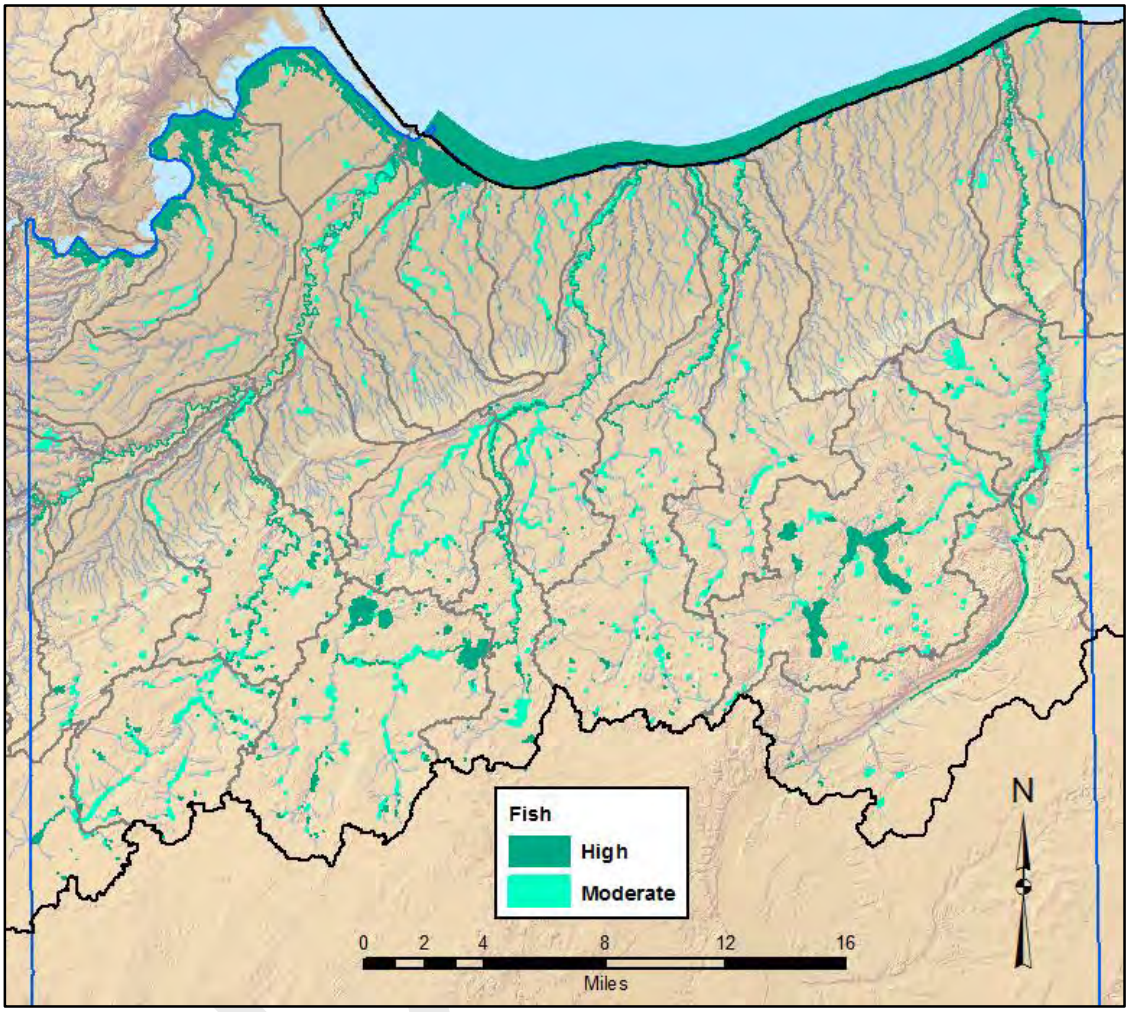

Figure 18. Wetlands with moderate or high function for fish habitat.

Other Wildlife (OWH): General wildlife in this case includes mammals, reptiles, and songbirds. All vegetated wetlands, and only vegetated wetlands, perform this function to some degree. The size and whether there are multiple vegetation types in a complex determine the level at which a wetland complex is functioning for GHW. It needs to be emphasized that this function is dependent on wetland complexes that may be made up of many different interconnected wetlands types. In other words it is the size of the entire wetland complex that determines its level of function and not the size of the individual wetlands making up the complex.

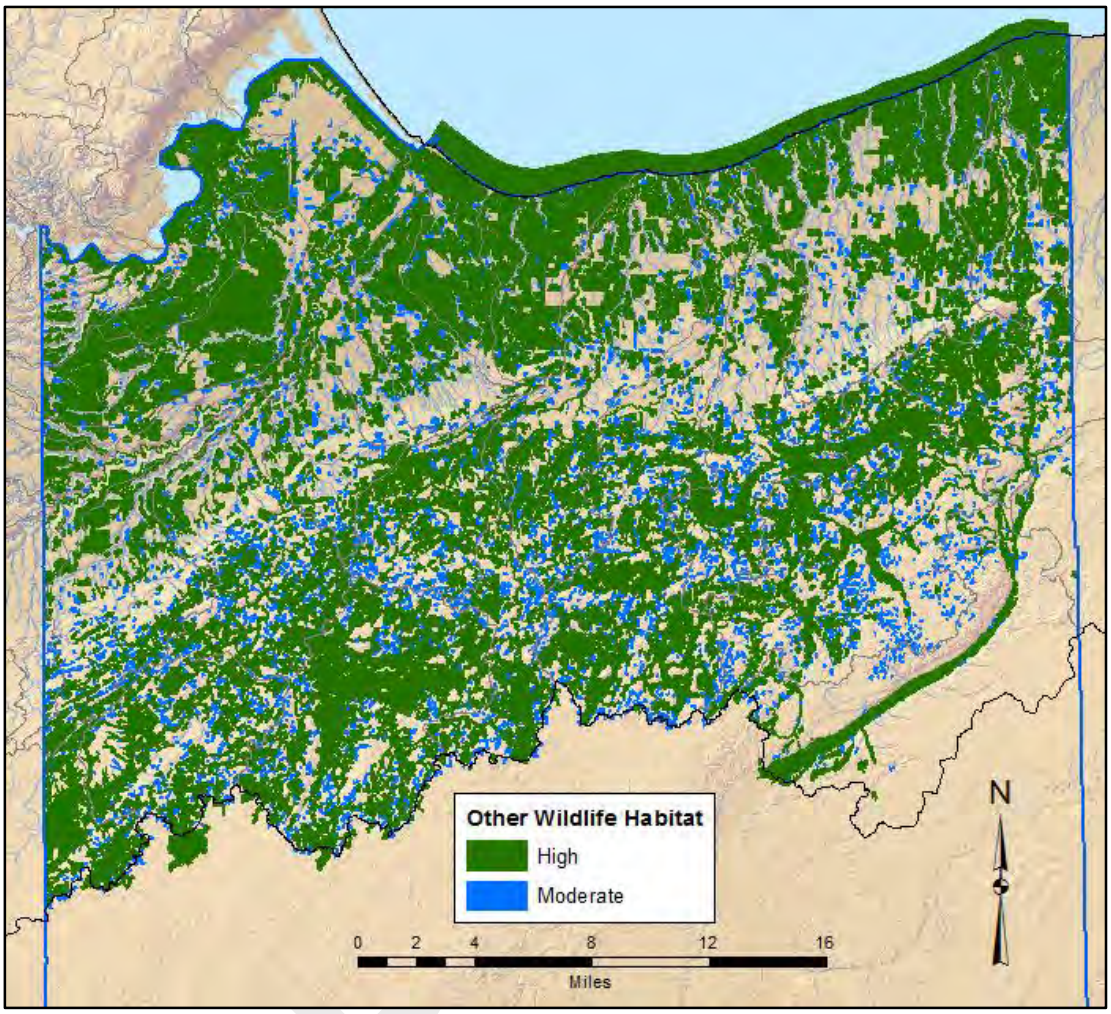

Figure 19. Wetlands with moderate or high function for other wildlife habitat.

Shorebird Habitat (SHB): Birds including: herons, cranes, egrets, and sandpipers are shorebirds, and are commonly referred to as wading birds. They require shallow open water areas of lakes or ponds, sometimes mixed with emergent vegetation for feeding on invertebrates, fish, and amphibians. Nesting occurs on sandy beaches and bars and mudflats.

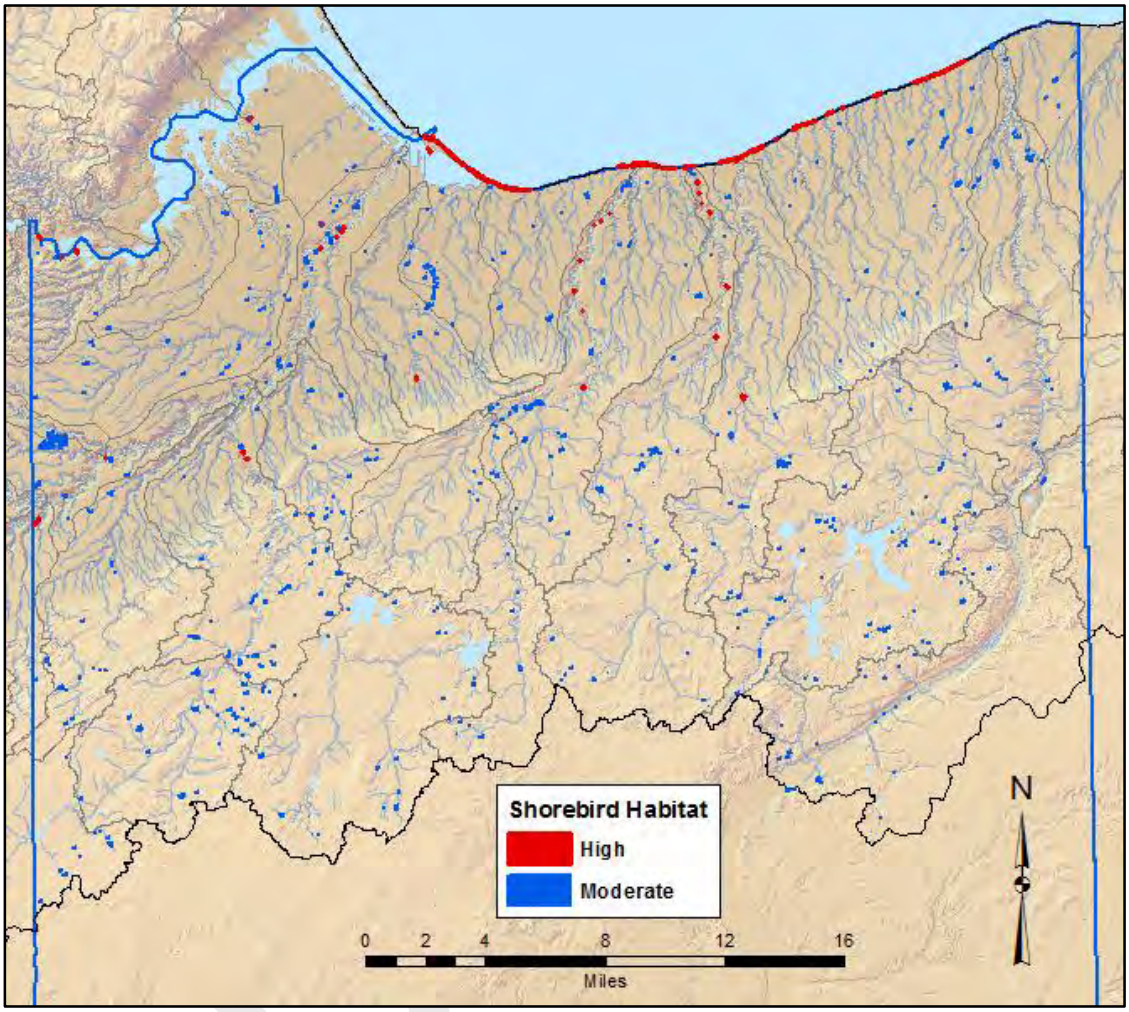

Figure 20. Wetlands with moderate or high function for shorebird habitat.

Migratory Bird Habitat (MBIRD)

This function is intended to identify wetlands that are predicted to act as significant stop-over locations for migratory birds during migration. Migratory birds are considered non-game birds that fly between summer breeding grounds and non-breeding wintering areas. During their migration, they must stop to feed and rest. Some areas are considered especially important as stop-over locations based on the availability of food, water, and shelter they provide to various migratory birds.

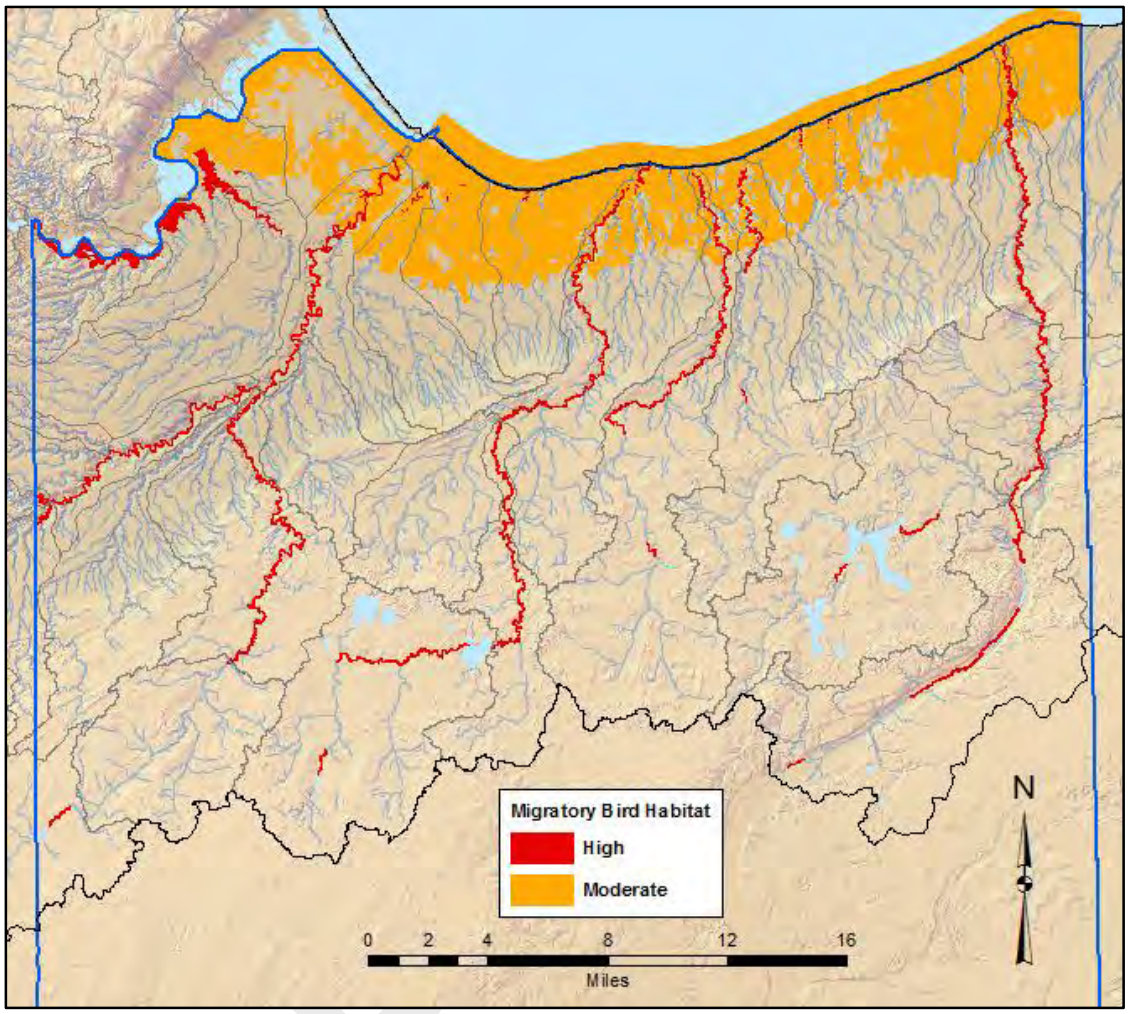

Figure 21. Wetlands with moderate or high function for migratory bird habitat.

Waterfowl & Waterbird Habitat (WBIRD)

Ducks, geese and swans are most commonly thought of as waterfowl, but a number of other types of birds, such as loons, coots and grebes also rely on similar habitats for survival. Their highly functioning habitat is typically associated in some way with open water. Depending on the species, habitats can range from large open littoral areas, to forested ponds and streams.

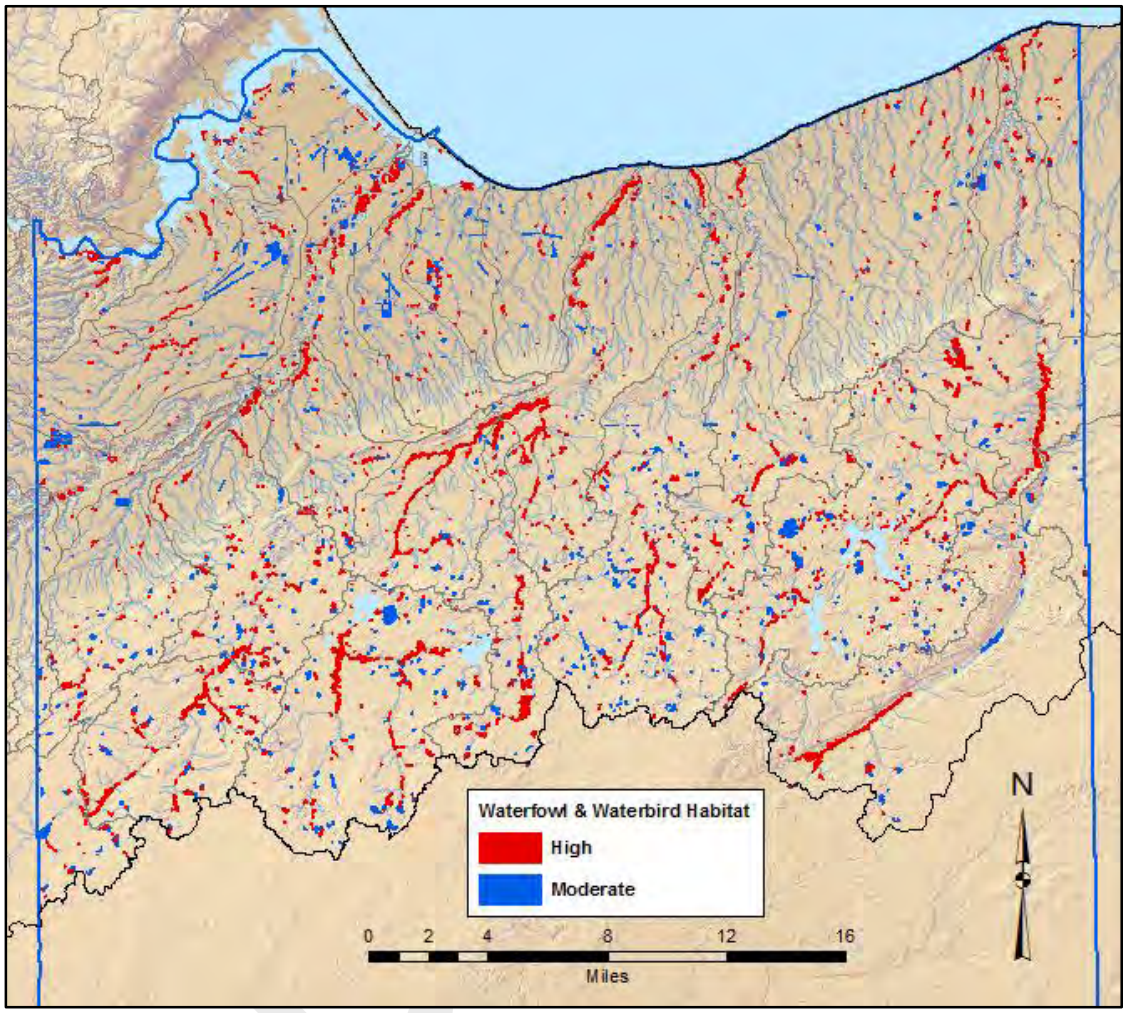

Figure 22. Wetlands with moderate or high function for waterfowl and water bird habitat.

Woodcock Habitat (WCK): Woodcock prefer a variety of habitats depending on time of day, activity, and season, but generally prefer younger forested areas for nesting and brood rearing and scrub shrub with saturated soils for feeding.

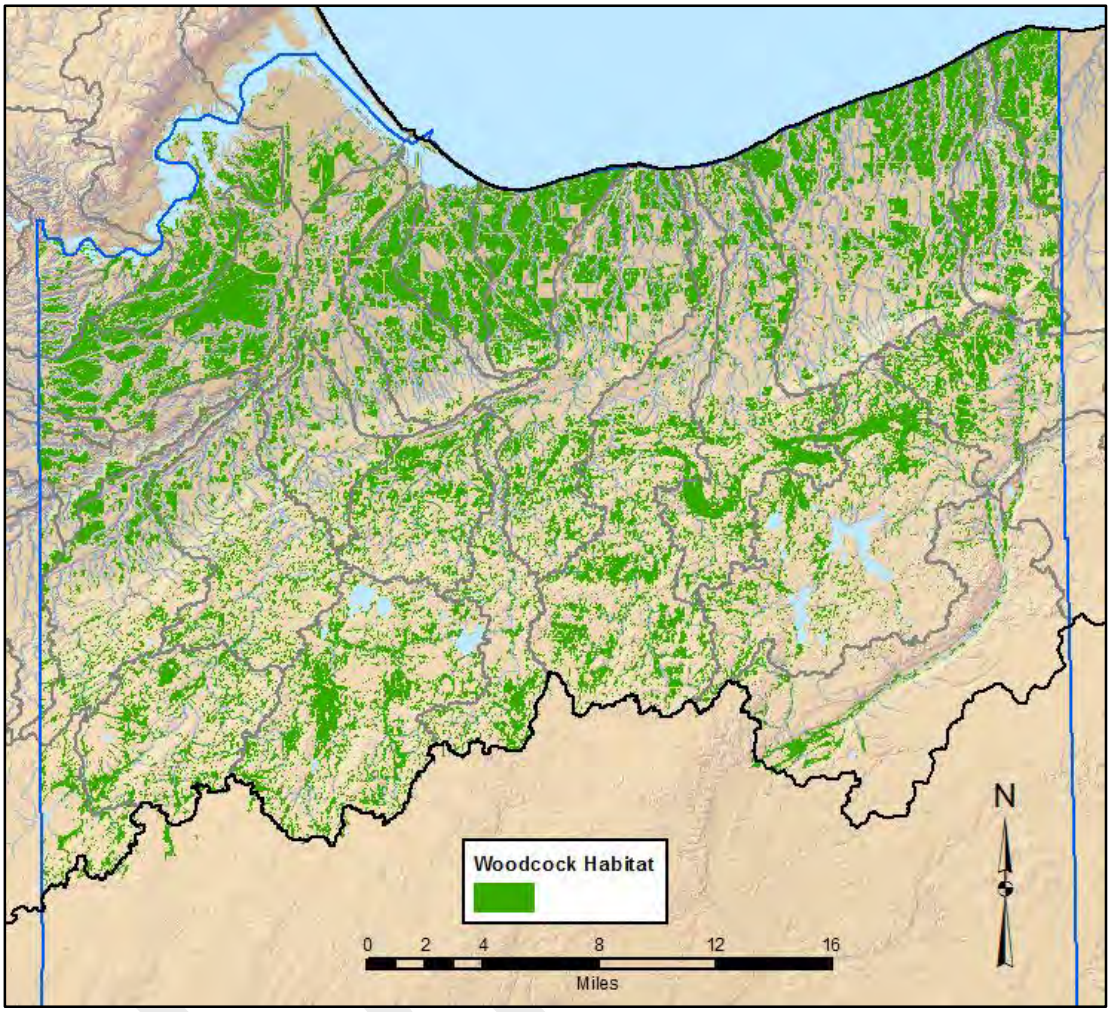

Figure 23. Wetlands that function as woodcock habitat.

Potentially Restorable Wetlands (PRWs)

The best opportunities for restoring wetlands in the LSB have been identified in the potentially restorable wetland information for Douglas County. The GIS analysts compiled the relevant datasets and interpreted this information using their best professional judgement and technical advisory committee input to determine PRW locations and extent. PRWs are areas where a preponderance of evidence exists indicating the area was once a wetland or at minimum contained more wetland area, but may have since experienced vegetative and/or hydrologic modification. These areas are considered to have a likelihood of supporting wetland development given some hydrologic or land management changes.

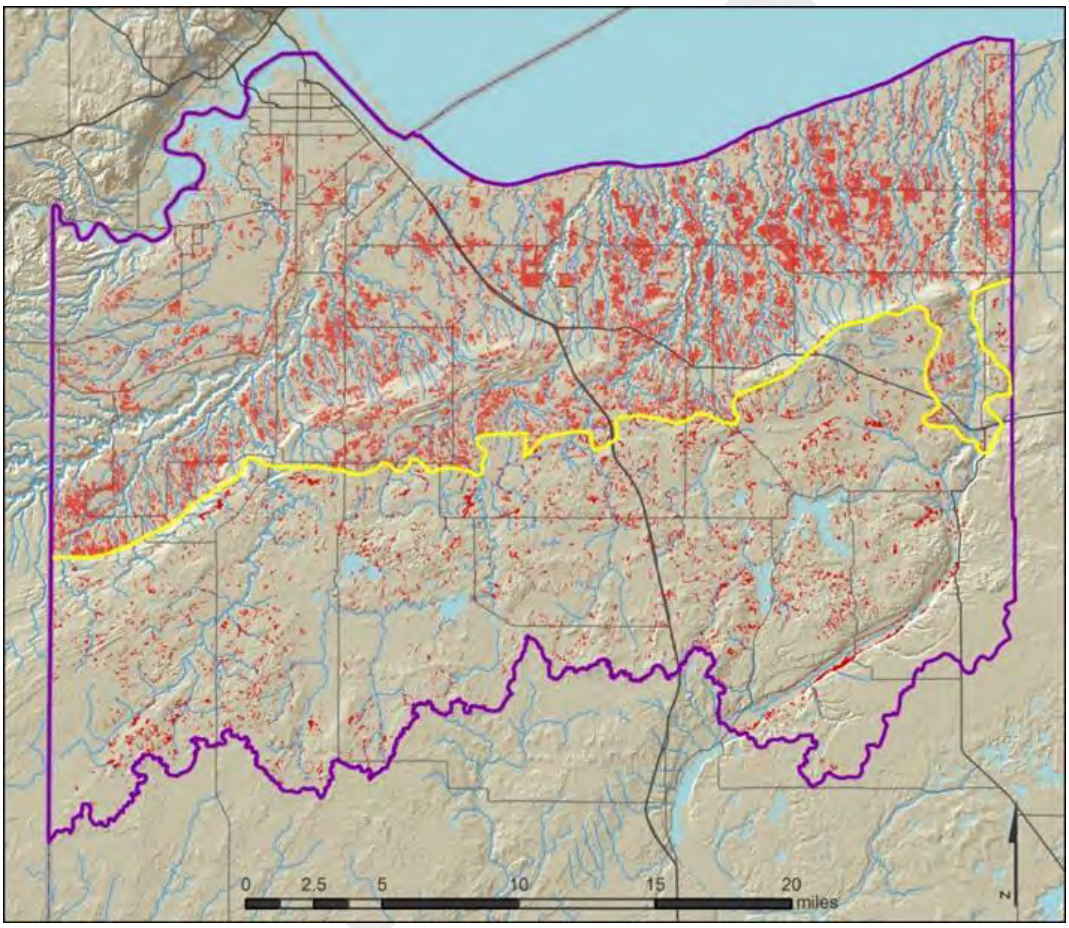

Figure 24. General distribution of PRWs (i.e., potential reestablishment sites) (red polygons) in the DC LSB. The yellow line indicates the clay plain boundary for the purposes of this assessment; the clay plain is to the north of this line. Different methods were employed to define PRWs in the clay plain vs outside of the clay plain.

Interpreted Pour Points

Pour Points (interpreted) are the locations where the PRWs are most likely to drain into the flow network (synthetic flow network) developed for this project. They were developed through the examination of the top 300 largest PRW areas (polygons) in the study area. Only areas that showed evidence of ditching or other wetland draining practices (hydrologic alteration) are shown in the map. In many cases multiple pour points were digitized (interpreted) for a PRW as the PRW often appeared to likely drain in multiple directions. Generally, they were found to be most prevalent in agricultural areas, especially in the eastern portion of the clay plain within the DC LSB. This is to be expected because this area has a higher concentration of agriculture and ditching.

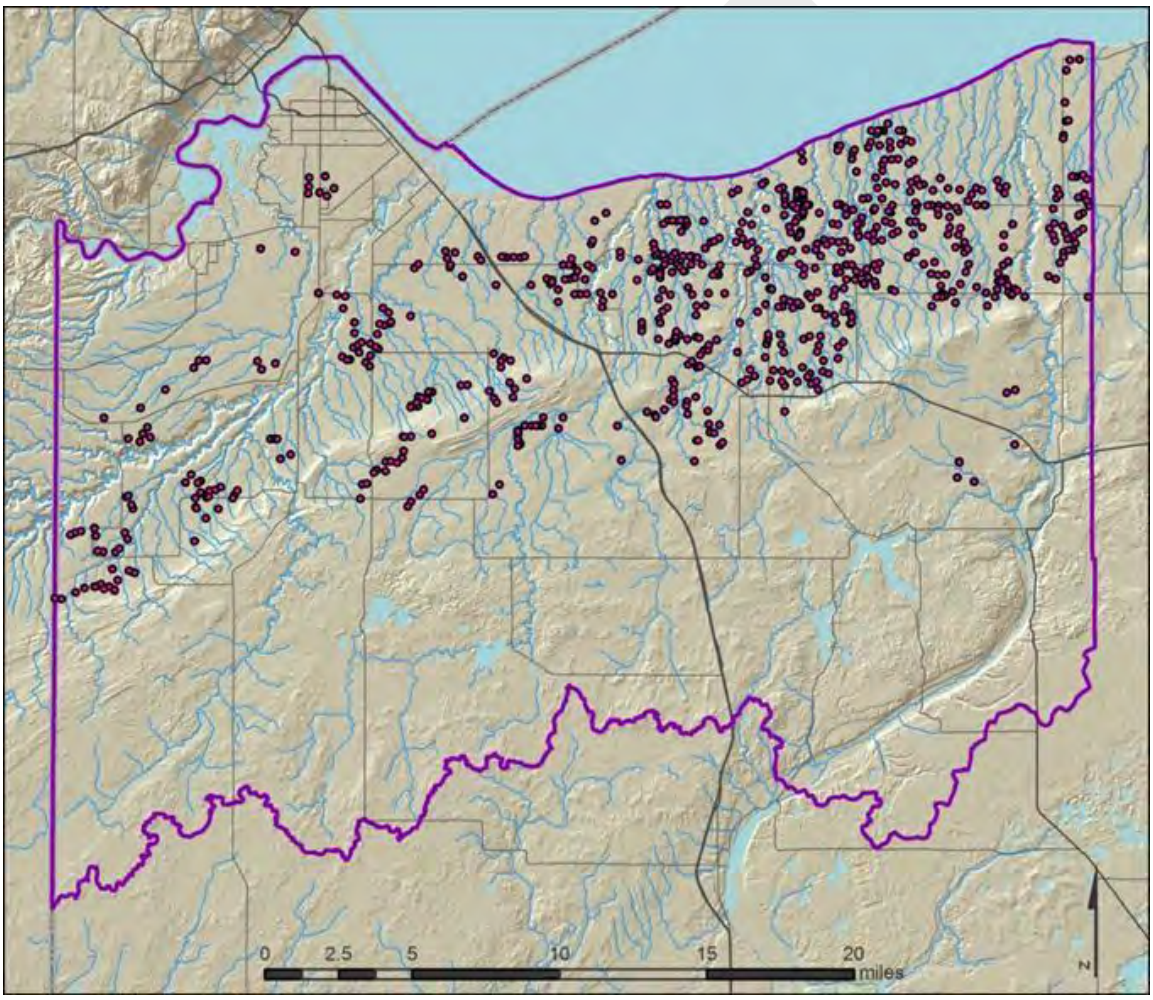

Figure 25. Interpreted PRW pour points (red) in the LSB of Douglas County.

PRW Catchments

Catchments were created from the pour points described above. ESRI's Spatial Analyst (Watershed Tool) was run to create the catchments for each of the pour points. The catchments are only as accurate as the DEM from which they are based, but provide a starting point for narrowing down areas for wetland restoration opportunities, these might be fed as an input to a future prioritization model that would incorporate other, additional criteria that would provide some guidance on which PRWs (the polygons, the pour points, and the resultant catchments) might be of the highest priority in a watershed planning context.

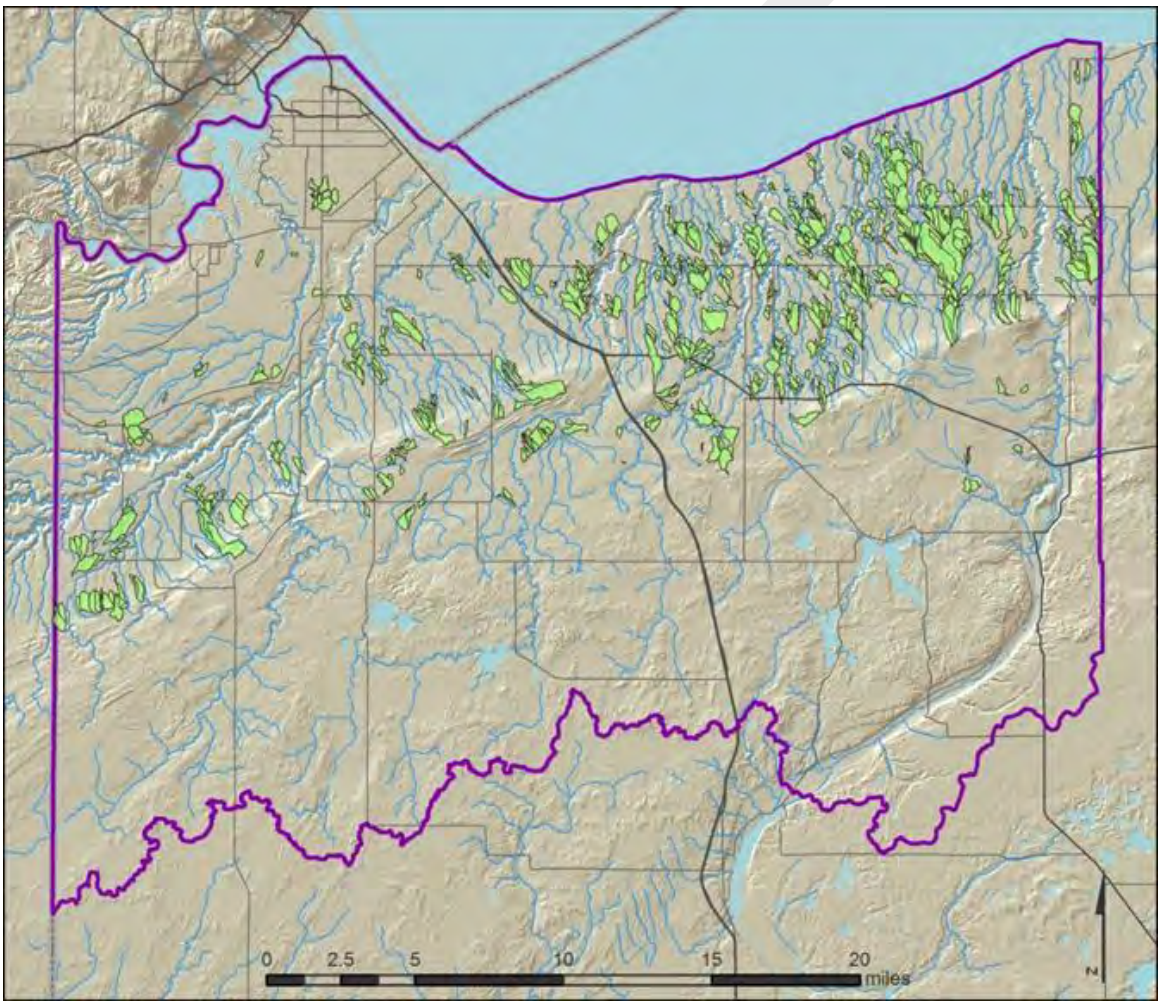

Figure 26. PRW representative catchments (green areas) created to represent catchments of viable or possibly viable PRW polygons in the clay plain portion of the DC LSB. These were created from a 10-meter Digital Elevation Model (DEM).

Ditches & Drainage Paths

The ditches and drainage paths were found to be most concentrated in the eastern portion of the clay plain portion of the study area. They often drain agricultural fields to the nearest roadside ditch or stream. An attempt was made to characterize these ditches & drainage paths in order to differentiate between channelized ditches and natural or semi-natural drainage paths. In some cases it was found that drainages might even be intermittent streams not captured in the WI DNR 24K hydro flow line data.

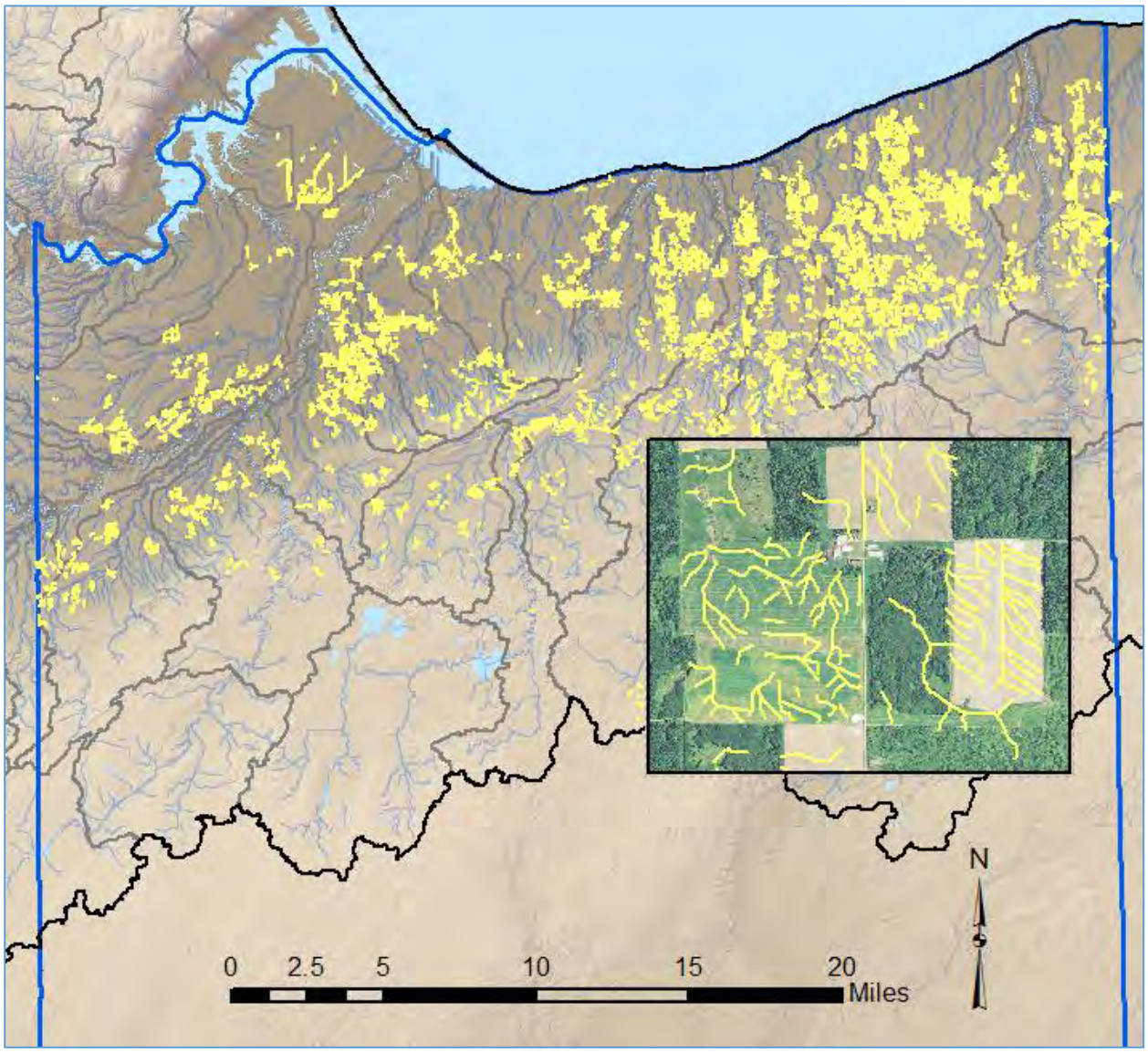

Figure 27. General distribution of ditches (yellow lines) in the DC LSB. Note: some of these "ditches" are likely relatively shallow and include some semi-natural drainage paths that have been enhanced in order to reduce surface ponding.

Some examples of ditching can be seen in the photos in Figures 28 and 29.

Figure 28. Ground view of shallow, parallel agricultural ditches (indicated by white arrows) draining to nearby roadside ditch.

Figure 29. Ground view of roadside ditch conveying water during spring snow melt in April 2014. The shallow agricultural ditches (shown in Figure 28) are seen in the upper left of this photo; they drain into this roadside ditch.

Potentially Restorable Stream Reaches (PRSRs)

Potentially restorable stream reaches (PRSRs) were generally found to be more common in the agricultural areas of the clay plain in the study area and especially more common on first order streams. The general distribution of these stream reaches are indicated in Figure 30. Additional information regarding the composition of different riparian vegetation along these segments, evidence of grazing, and other information can be queried by data users. It is important to note that this dataset identifies an initial indication of riparian health based only on aerial photo interpretation (i.e., what can be detected in the aerial photo). This is primarily woody riparian vegetation density, land use, evidence of channelization, grazing in the riparian zone, etc. This layer does not identify channel incision or other river or stream morphological characteristics important in understanding erosion susceptibility.

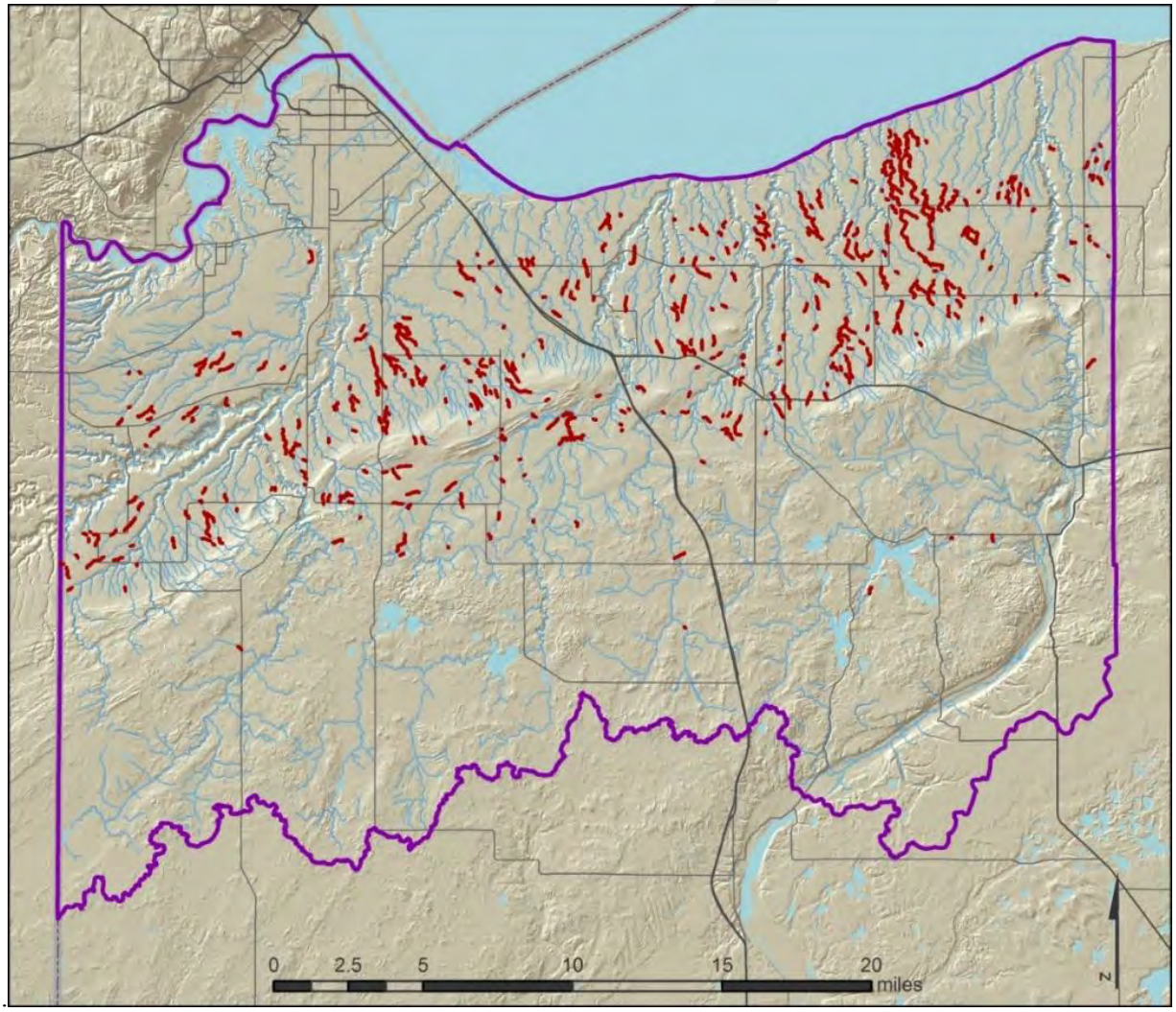

Figure 30. General distribution of potential restorable stream reaches (PRSRs) (dark red) identified in the Douglas County, Lake Superior Basin.

An example of a perennial stream reach in the study area which has evidence of livestock grazing in the riparian zone is provided in a ground view in Figure 31 and an aerial view in Figure 32. In the PRSR data this stream reach's riparian area was considered to have "no woody riparian vegetation" and the riparian zone was affected by active livestock grazing.

Figure 31. Ground–level view of a grazed riparian zone along an intermittent stream. Notice some hummocks created by livestock hooves (process referred to as "pugging"). Shown here during spring snow melt (April 2014).

Figure 32. Aerial view of the same grazed riparian area of an unnamed perennial stream identified as a PRSR (maroon line) in April 2013. The above photo was taken from the road facing the south (upstream in this north flowing stream). Notice the drainage ways (yellow lines) coming into the stream from the left side of the photo.

Another example of a grazed stream bank and riparian zone in a woodland area is shown as a ground-level view in Figure 33 and an aerial view in Figure 34.

Figure 33. Ground-level view of a grazed stream riparian zone. Notice the small stream banks affected by livestock. Photo taken in July, 2014.

Figure 34. Aerial view of a grazed stream riparian zone during April, 2013. This segment was identified as a PRSR (maroon line). In this case, the stream is identified as an unnamed perennial stream in the WI NDR Hydro data. The photo in Fig.33 was taken from the road facing north (towards the top of this figure).

Historic wetlands, wetland loss and open land cover changes

Historic wetlands and wetland loss

Estimates of wetland loss in Lake Superior watersheds were calculated utilizing the best available information that included the 2012 Wisconsin Wetland Inventory (WDNR) for current wetlands and the PRW estimates developed for Douglas County's Lake Superior Basin through the Science Collaborative Project (O'Halloran 2014). Potentially restorable wetlands (PRWs) outside the clay plain have been defined by the Wisconsin DNR and the Science Collaborative Project. Historic wetlands are defined as the current wetlands plus the PRWs and were calculated following WDNR protocols (WDNR 2014). Figure 35 shows the percentage of wetland loss in each watershed (HUC 12) and Table 1 shows the calculations used to estimate the wetland acreage and percentage of wetland loss for these watersheds.

- The estimated *historic wetland* acreage was calculated by adding the current wetland acreage to the potentially restorable wetlands. Historic wetlands = current + sum of PRWs (C6 = C2 + C5)
- The estimated percent *historic* wetland acreage was estimated by dividing the acreage of historic wetlands by total watershed acreage [C1=C6/C7*100)].
- The estimated percent wetland loss by watershed was estimated as the PRW acreage for the watershed divided by the total watershed acreage: [C8 =(C5/C6)*100)]

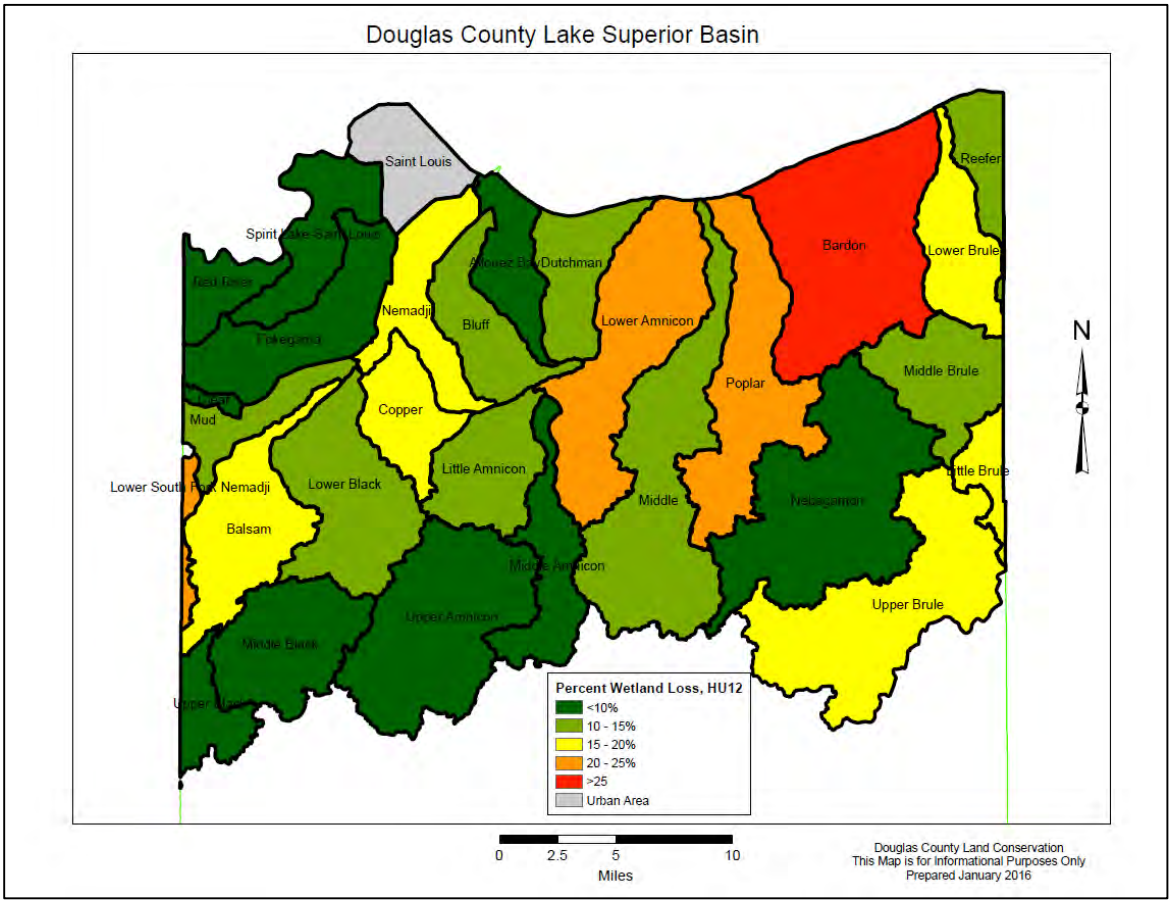

Figure 35. Map of the percent wetland loss in watersheds (HUC 12) in the Lake Superior Basin of Douglas County, WI.

Table 1. Calculation of wetland loss for HU 12 watersheds, Lake Superior Basin, Douglas County WI.

	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
	HU12 Area [a]	Current Wetland [b]	DNR PRWs [c]	Clay Plain PRWs [d]	Sum PRWs	Historic Wetlands	Percent Historic Wetlands	Watershed Percent Wetland Loss
HU 12 Watershed	Acres	Acres	Acres	Acres	Acres	Current Wetlands + Sum PRWs	Hist. WL Area / Wtrshd Area	PRWs / Hist. WL
Bardon Frontal L. Superior	38598.4	14013.7	85.6	4968.3	5053.9	19067.6	49.4	26.5
Lower South Fork Nemadji	2111.3	485.2	32.6	119.9	152.4	637.6	30.2	23.9
Poplar -Frontal L. Sup.	26402.3	9477.4	886.5	1653.7	2540.1	12017.5	45.5	21.1
Lower Amnicon	29860.6	10498.9	422.0	2334.3	2756.3	13255.2	44.4	20.8
Copper Creek	10751.5	2898.5	105.9	550.0	655.9	3554.3	33.1	18.5
Upper Brule	35071.8	3675.1	830.9		830.9	4506.0	12.8	18.4
Little Brule	4705.6	317.9	46.8	18.0	64.8	382.6	8.1	16.9
Nemadji	13167.3	4244.5	101.2	747.8	849.0	5093.5	38.7	16.7
Balsam Creek	19685.4	5129.5	179.4	757.0	936.3	6065.8	30.8	15.4
Lower Brule	12794.6	5010.0	67.7	842.7	910.5	5920.4	46.3	15.4
Little Amnicon	13926.2	5271.1	433.7	462.0	895.8	6166.9	44.3	14.5
Middle R	35024.2	5461.7	1081.6	872.2	1953.8	15125.9	43.2	12.9
Middle Brule	14721.4	5669.8	508.9	271.1	780.0	6449.8	43.8	12.1
Dutchman Frontal L. Sup	12312.9	7933.5	17.0	1057.0	1074.0	9007.5	73.2	11.9
Bluff Creek	12486.2	5000.2	11.0	650.1	661.1	5661.3	45.3	11.7
Lower Black	23142.1	7535.3	345.0	574.1	919.2	8454.5	36.5	10.9
Mud Creek	7771.2	1875.1	36.2	189.6	225.8	2100.9	27.0	10.7
Nebagamon Creek	36339.9	10489.5	1139.0		1139.0	11628.5	32.0	9.8
Allouez Bay-Frontal L. Sup	8280.0	4888.6	6.7	448.4	455.0	5343.6	64.5	8.5
Middle Black	18385.5	7186.1	549.1		549.1	7735.1	42.1	7.1
Middle Amnicon	12487.7	5461.7	226.9	115.9	342.8	5804.5	46.5	5.9
Pokegama River	19077.1	11172.8	10.8	662.1	672.9	11845.6	62.1	5.7
St. Louis River (Urban)	8668.7	1962.0	4.4	98.1	102.5	2064.5	23.8	5.0
Spirit Lake-St. Louis	10544.6	6349.2	14.4	255.1	269.5	6618.7	62.8	4.1
Upper Amnicon	30239.6	14974.0	549.5		549.5	15523.5	51.3	3.5
Clear Creek	1112.2	459.3	0.4	15.1	15.4	474.7	42.7	3.3
Red River-St. Louis	6136.7	1607.6	20.1	28.1	48.1	1655.8	27.0	2.9
Upper Black	6959.2	4594.6	91.1		91.1	4685.7	67.3	1.9

a: HUC 12 Area: Watershed layer from the National Hydrograghy Dataset, areas were recalculated to remove waterbodies. For example, Aloueze Bay was included as part of the area of its watershed

b: Current Wetlands: Wisconsin DNR 2012 Wetland Inventory

c: DNR PRWs: Potentially Restorable Wetland 2012 version 2: The DNR defines a PRW as polygon that is the result of a hydric soil map unit (85% or higher for hydric percent) higher, minus areas already mapped as wetlands and areas mapped as incompatible land uses.

d: Clay Plain PRWs: These PRWs were determined by the 2014 Science Collaborative study by St. Mary's University in the clay plain area of the Lake Superior Basin of Douglas County. Areas considered to represent a potential opportunity for wetland reestablishment meet a set of soil criteria (wetland indications) and topgraphic criteria (CTI values) and are within compatible land use. The process for identifying these polygons is specific to the clay plain area of the DC LSB.

Watershed open land cover

Estimates of the percentage of open land cover in Lake Superior watersheds (2009) can be seen in Figure 36. The percentage of open land is depicted as 0-10% (dark green), 10-20% (light green), 20-30% (yellow) 30-40% (orange) and over 40% (red). The map shown in Figure 36 represents the land cover information seen in Figure 9 as a percentage of the total subwatershed acreage. For example, the subwatersheds shown as yellow have 30-40% of their land cover as open land. The open land is identified as agricultural, young forest (0-16 yrs. old) and impervious surfaces. This data is utilized at the subwatershed (HUC 14) scale to prioritize areas for wetland restoration and preservation projects within the watersheds that have experienced the greatest amount of wetland loss

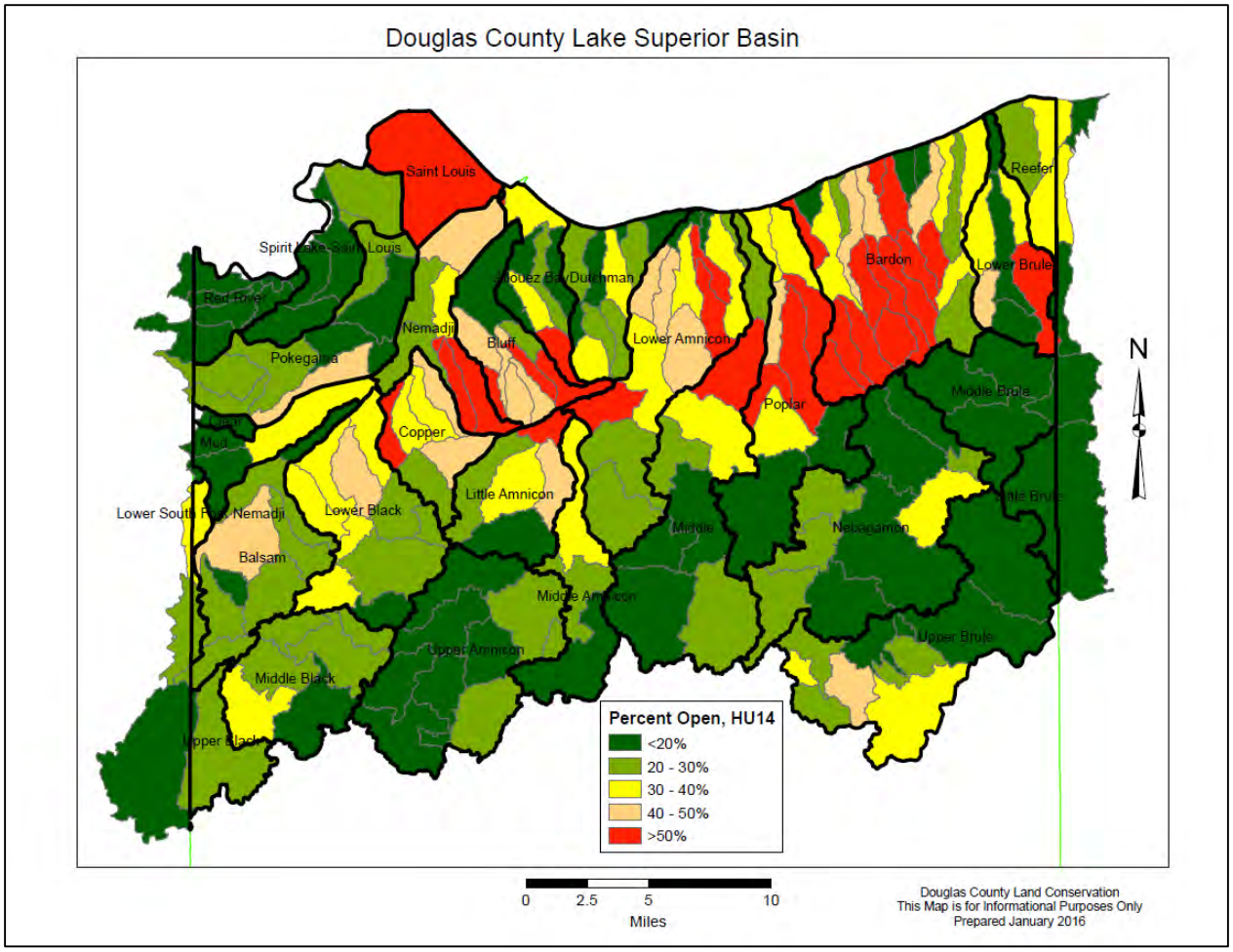

Figure 36. Open land cover (percentage) in each subwatershed (HUC 14) in Lake Superior watersheds, Douglas County, WI.

Restoration and preservation priorities

A primary goal of this watershed-based plan is to enable Douglas County stakeholders to provide input into the location of future wetland mitigation sites that will improve watershed health within the Lake Superior basin. The process developed by the Douglas County Watershed Planning Committee, results of the wetland functional assessment and current data on landscape surface water hydrology provide the best available information for prioritizing locations for future wetland preservation and restoration projects in the Lake Superior Basin of Douglas County. Following is a summary of the key information utilized to identify and prioritize watersheds based on the landscape prioritization criteria developed through this project (Fig. 2).

Within the HUC 12 watersheds in the Lake Superior Basin, the subwatersheds (HUC 14) listed as Tier 1 and Tier 2 represent the areas with the highest need for restoration and preservation of wetland functions (Fig. 34). Wetland preservation and restoration criteria includes the following:

- Watersheds (HUC 12) estimated to have **15%** or more wetland loss (Fig. 35)
- Tier 1 priority subwatersheds (HUC 14) with **40%** or greater open land cover (Fig. 36)
- Tier 2 priority subwatersheds (HUC 14) with **30%** or greater open land cover (Fig. 36)

Watershed (HUC 12)	Wetland Loss (%)	Tier 1 Number sub watersheds (HUC 14) > 40% open land	Tier 2 Number sub watersheds (HUC 14) 30-40% open land	Total number of subwatersheds
Bardon-Pearson Creeks	**26.5**	**15**	**4**	**25**
Poplar River	**21.1**	**4**	**3**	**9**
Lower Amnicon River	**20.8**	**6**	**3**	**14**
Copper Creek	18.5	3	2	6
Upper Brule River	18.4	1	2	10
Lower Nemadji River	16.7	3	1	6
Balsam Creek	15.4	1	0	8
Lower Brule River	15.4	2	2	7

Table 2. List of Lake Superior Basin HUC 12 watersheds with greater than 15% wetland loss, number of subwatersheds with more than 30% open land and total number of subwatersheds within each watershed.

Based on the information developed through the wetland assessment, there are *three watersheds* that have experienced 20% or more wetland loss and have at least one subwatershed with more than 40% open land cover: Bardon-Pearson Creeks, Poplar River and the Lower Amnicon River. Within the Bardon-Pearson

Creek watershed there are 15 subwatersheds that are at least 40% open land and are listed under Tier 1 (Table 2). The land cover maps (Fig. 8) shows that agricultural land represents a large component of the open lands, with forest harvest the next most prevalent. Similar patterns can be seen in the Poplar and Lower Amnicon River watersheds. Balsam Creek, Copper Creek, the Lower Nemadji River, the Lower and Upper Brule watersheds are estimated to have lost 15-20% of their former wetland area and at least one subwatershed with greater than 40% open land cover. While the Little Brule River watershed was estimated to have greater than 15% wetland loss it did not have any subwatersheds with more than 30% open land cover. The Tier 2 watersheds are estimated to have greater than 15% wetland loss and 30-40% open land cover (Table 2, Fig. 36)

Balsam Creek, Copper Creek and the Lower Nemadji and the Lower South Fork Nemadji River are watersheds (HUC 12) within the Nemadji River Sub-basin. The Lower South Fork of the Nemadji River was not included in this prioritization since only a small portion of the watershed is located in Wisconsin. Watershed-wide planning efforts are currently being coordinated between the two states in order to strategically address the issue of surface water runoff from the headwaters to Superior Bay, where excess sediment is dredged annually from shipping channels. A Nemadji River Basin Project completed by NRCS in1998 developed a sediment budget that estimated the annual sediment contribution from this watershed to be 127,000 tons of sediment per year (NRCS, U.S. Forest Service, 1998). Updated models are being currently developed and will be utilized in future planning efforts.

Recommendations for implementing a watershed approach to wetland management

The subwatersheds listed in Table 2 represent the greatest need for wetland restoration, preservation and enhancement based on the prioritization criteria identified. However, the HUC 12 watersheds that they are located in should also be considered a high priority for wetland restoration and preservation. Since wetland restoration and preservation are dependent on the availability of public land and/or willing landowners the inclusion of the larger watershed area would provide additional opportunities for locating wetland projects that would provide the greatest benefits within these watersheds. In addition, the historic information on wetland loss suggests that all Lake Superior Basin watersheds would benefit from the preservation and restoration of surface water detention wetlands to improve watershed health.

Farmland preservation has community and economic significance for Douglas County and conservation of existing farmland is an important consideration when evaluating potential wetland restoration sites. Wetland restoration projects in the region have demonstrated that transitional agricultural areas have a high restoration potential when surface water drainage patterns are re-established. In addition, historic information shows a pattern of smaller wetlands on the landscape that provided surface water runoff retention at multiple locations in the drainage network. This information will provide assistance in the identification of smaller wetland restoration sites that could potentially be located adjacent to current agricultural areas. This should be an alternative approach to the current practice of creating or restoring large wetland banks on farmland that results in the removal of these larger parcels from production.

Public and private land parcels that meet the criteria for either restoration or preservation, as described by the subwatershed criteria, will be compiled and utilized to develop a request for landowner participation. A listing of landowners who are willing to participate will be developed, additional site-level criteria will

be used to evaluate parcel suitability and recommendations will be finalized and approved by the appropriate entities. Sites meeting the criteria will be eligible for wetland restoration and protection projects as funding becomes available. Project site location criteria will include, at a minimum, an evaluation of the following landscape/land use characteristics:

Wetland *restoration* criteria includes all identified potentially restorable wetland areas that:

- are located on or adjacent to transitional agricultural land
  have identified pour points and catchments that intersect highways and roads
- have a direct hydrologic connection to streams and rivers
- are located in proximity to current wetlands with significant surface water detention function
- are located in proximity to public land currently managed for conservation and/or preservation of unique habitats

Wetland *preservation* criteria includes:

- current wetlands with moderate to high function for storm water detention (SWD), especially in the headwaters and floodplain areas in all Lake Superior Basin watersheds of Douglas County.
- current wetlands located in proximity to public land currently managed for conservation and/or preservation of unique habitats

Through this prioritization process subwatersheds at the highest risk of increased runoff have been identified and would be the focus of future funding for wetland mitigation projects including restoration, preservation, enhancement, riparian buffers and land conservation management activities. While the data on potentially restorable wetlands that is now available for the Lake Superior Basin clay plain region provided additional information for estimating wetland acreage loss., more detailed hydrologic information is needed for site-level determination of the best locations for future wetland restoration and enhancement projects. This plan presents an opportunity to work with landowners, both public and private, to implement land management practices that will maintain a strong agricultural community, improve watershed health, reduce the risks associated with flooding and other large precipitation events, and improve the overall resiliency of Douglas County communities to climate change.

Several key land conservation and management strategies have been identified that should be implemented to address the watershed goal of reduction in surface water runoff. In addition to identification of the wetland areas that provide the best opportunities for restoration and protection, the results of the landscape analysis that includes the drainage paths, flow networks and potentially restorable stream reaches provides valuable information when identifying the best management practices that would result in the most efficient use of available resources. They include:

- managing timber harvests to maintain a minimum of 40% forest cover in watersheds (HUC 14)
- Implementation of wetland preservation and restoration projects in priority subwatersheds and the watersheds within which they are located.
- Implementation of stream and riparian/floodplain restoration and protection projects in priority locations identified as potentially restorable stream reaches.

In order to address the watershed issue of increased surface water runoff it is recommended that the management strategies described in this watershed-based plan be approved by the Land and Water Conservation Committee as an addendum to the 2010-2020 Land and Water Resource Management Plan. In addition, recommendations from this plan should be coordinated with the Douglas County Comprehensive Land Use Plan, Hazard Mitigation Plan, Farmland Preservation Plan and Forestry Plan. These strategies should be based on the currently available land cover/land use data and should be updated every 5 years.

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In-Lieu Fee Wetland Mitigation Program for Douglas County, WI

Lake Superior Basin

Douglas County Land and Water Conservation Department

Feasibility Analysis

Stakeholder Group Review

February 25, 2016

DRAFT

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Mike Gardner – Northflow LLC

Sue O' Halloran – Watershed Planner

Mary Munn – GIS Analyst

Background

The subject of wetland mitigation has been discussed and contested by Towns as to how it fits into their comprehensive land-use plans, how mitigation sites affect property taxes, and how mitigation sites typically convert abandoned farmland to wetland limiting future opportunities for agriculture and changing the rural character. Towns have demanded a way to provide more input into mitigation siting decisions. In response to requests from the Towns, the Zoning Committee hosted working sessions to discuss ways to regulate wetland mitigation sites through the conditional land-use permitting process in order to have more local control over wetland mitigation siting decisions. Concurrently, the Land Conservation Committee approved forming a workgroup to discuss wetland management and local input issues. The workgroup met in 2011; members were Andy Lisak, Doug Finn, Mark Liebaert, Dan Corbin, Jane Anklam, Charlene Johnson (past City of Superior SAMP Coordinator), Steve Rannenberg, Steve LaValley (WDNR wetland regulator), Jason Berkner (past USACE wetland regulator). The workgroup reviewed information, discussed options, and recommended creating a federally approved watershed-based plan for the Lake Superior Basin in Douglas County; a relatively new option allowed by a change in the federal wetland regulations in 2008. During the next two years these actions were taken in order to move the watershed-based plan forwards:

- The Douglas County Unit of the Wisconsin Towns Association elevated the issues over the lack of local input and consideration of town land-use plans in decisions about siting wetland mitigation projects state-wide; support was given to the Douglas County effort by the state Wisconsin Towns Association
- Christine Ostern collaborated with the newly designated Lake Superior National Estuarine Research Reserve to apply for grant funding from the National Oceanic Atmospheric Administration to begin watershed-based assessments and planning; the grant funding was not awarded
- Douglas County's wetland management issue was brought forth and accepted as a Superior Days issue; members from the Douglas County delegation presented and sought support from the WDNR during Superior Days in Madison
- Christine Ostern worked with Sue O'Halloran, the Lake Superior National Estuarine Research Reserve Coastal Training Program Coordinator a second time to apply for grant funding from the National Oceanic Atmospheric Administration to begin watershed-based assessments and

planning; the grant was awarded and work started on the one-year "Lake Superior Watershed Framework for Assessment of Wetland Services" project

LAKE SUPERIOR WATERSHED FRAMEWORK FOR ASSESSMENT OF WETLAND SERVICES

This project was the initial grant-funded effort to begin assessment and planning to address issues brought forth by Douglas County. The project was funded for one year to support four major efforts simultaneously:

1) Complete a scientific assessment and create a GIS-based database of wetland services (including current, historic, and potentially restorable);

2) Form a Technical Committee of professional resource managers to guide wetland assessment, identify opportunities for using the GIS-based database, and help to answer technical questions for the project;

3) Form a Watershed Planning Committee of diverse stakeholders to learn together and from each other about all aspects of wetland management and approve a prioritization criteria for siting wetlands and other conservation practices in Douglas County; and

4) Identify strategies for enhancing the quality of water resources, including fish and wildlife habitat, in Douglas County by identifying land management practices that reduce water runoff and flooding.

Many partners and stakeholders were brought together during this part of the project including regular participation from six Douglas County Board Supervisors, Douglas County Administrator, two representatives of the Douglas County Unit of the Wisconsin Towns Association, private wetland banker, state and federal regulators, state resource managers, industry partners, City of Superior SAMP Coordinator, Douglas County Fish & Game League representative, Douglas County staff, Northwest Regional Planning Commission, private citizens, non-profit conservation groups, and others.

CONTINUING DEVELOPMENT OF THE WATERSHED-BASED PLAN

Funding was sought to continue developing a watershed-based plan using the outputs of the initial framework and assessment project. Funding was provided by Enbridge Energy, Douglas County Capital Fund and the Douglas County Unit of the Wisconsin Towns Association. The prioritization criteria is currently being applied across the Lake Superior basin and the GIS-based wetland assessment information has been added to the Douglas County GIS database and web-mapping site for public

distribution. Selection criteria will continue to be refined, field validation of wetland sites will be initiated and data will continue to be updated in the county's database and on the county's web-mapping site. Communication with state and federal wetland regulators will continue to provide direction as the County determines the best methods for addressing watershed needs through wetland restoration and preservation projects. These partnerships will assist the County as they work towards the development of an approvable plan.

Findings of Fact

- Wetlands perform a number of functions and are important in maintain the overall health of watersheds within the Lake Superior basin. They provide ecological services such as surface water detention, stream-flow maintenance, shoreline stabilization, sediment retention, nutrient transformation, carbon sequestration and diverse wildlife habitat.
- The current options for wetland mitigation within the Lake Superior Basin include wetland banks (limited), Wisconsin Wetland Conservation Trust (WDNR In-Lieu Fee Program) and permittee-responsible (on site) concurrent mitigation.
    - Wetland mitigation banking is a system for providing compensatory mitigation in advance of authorized wetland impacts. Wetland mitigation banks contain "credits" which are generated through advance restoration, creation, enhancement, or in exceptional circumstances the preservation (purchase) of extremely high quality wetlands. A wetland bank is a site where this wetland construction is undertaken. The credits can be used or sold to another party to provide replacement wetland area and function when unavoidable impacts occur to wetlands elsewhere, but within the service area of the wetland bank.
    - In-Lieu Fees is a program where funds are collected in-lieu of a landowner / developer providing concurrent mitigation of their own accord. Within three years, collected funds would need to be expended on a wetland creation, rehabilitation, or enhancement project, according to Federal rule.

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    - Advance wetland mitigation is an alternative available to both public and private sectors. Advance wetland mitigation is when wetlands are created, rehabilitated, or enhanced as compensation for, and in advance of, *known* wetland impacts.
- The Federal Rule for Compensatory Mitigation for Losses of Aquatic Resources (33 CFR, Part 332) specifies the steps necessary to develop programs for Concurrent Mitigation as well as Mitigation banking and In-Lieu Fees.
- The Lake Superior Framework for Assessment of Wetland Services (2014) has combined science, participatory process and public outreach to conduct a wetland assessment to identify and prioritize future wetland restoration sites in Douglas County Lake Superior Basin.
- The Watershed-Based Plan for the Lake Superior Basin of Douglas County, WI (2016) has utilized a watershed-based planning approach for the further identification of priority wetland preservation, restoration, and enhancement opportunities that restore and maintain ecosystem functions and improve watershed health.

Market Analysis / Scenario

Douglas County has been a target for compensatory wetland mitigation in the Lake Superior Basin for decades. Wisconsin Department of Transportation, City of Superior, Enbridge Energy and private bankers have all utilized the lands availability and capability to meet the increasing demand. Mitigation banking is the designated preferred option in all instances but the demand for credits continually exceeds availability. The newly established state sponsored in-lieu fee program sold 6.75 acres of Lake Superior basin advance credits in its first year (2015).

A scenario to consider is the increasing need for local road improvements. "Douglas County has over 337 miles of county highways. Many of Douglas County's highways and bridges are in need of significant repair and/or reconstruction." (Superior Days 2016) The recent and current project to improve CTH D generated the need for more than an estimated 12 acres of mitigation credits. The current rate for purchase through the WDNR In-Lieu Fee Program is $58,000 per credit. Without locally driven and cost effective options many future projects could be cost prohibitive due to regulatory compliance.

Advantages to a Douglas County In-Lieu Fee Program

- **Supports Mission of Douglas County Land and Water Conservation Department**
  The Land Conservation Department's mission is to administer the Douglas County Land and Water Conservation Program to meet local priorities, conditions, and the needs of Douglas County land users through utilizing the Douglas County Land and Water Resource Management Plan as guidance and the State-funded, cost-share program for implementing conservation practices. One of the means by which they accomplish this is by restoring and preserving floodplain and wetland habitat to maintain the natural flow of surface waters within the County. Many of the projects that LWCD would promote as In-Lieu Fee projects may be projects that they desire to undertake anyhow, as part of accomplishing the mission. The sale of in-lieu fee credits provides a means of generating revenue to design and construct these types of projects.

- **Supports Existing Land and Water Resource Management Plan**
  The Douglas County Land and Water Resource Management Plan (2010-2020) was developed to meet requirements in Chapter 92 of the Wisconsin Statutes. The intent of the plan is to foster local water quality planning and increase public participation in natural resource management. <u>One of the three main goals are:</u> **Protect and enhance surface waters and wetlands to preserve and restore their water quality, ecological functions, recreational and scenic values.** The implementation of the plan is intended to provide the basis for the future of land and water conservation in Douglas County.

- **Locally Determined Compensation Planning Framework**
  The compensation planning framework is a detailed and extensive section of any in-lieu prospectus and instrument that is "used to select, secure and implement aquatic resource restoration, establishment, enhancement, and / or preservation activities" (Compensatory Mitigation Rule 2008). The Watershed-Based Plan for the Lake Superior Basin of Douglas County, WI meets many of the required elements.

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- **Locally Determined Mitigation Siting**

  The local determination, siting and construction of mitigation sites in advance of wetland impacts affords the luxury of planning ahead and positioning consolidated mitigation sites where they make the most sense within a watershed and where their position helps to achieve local land use goals or to contribute to watershed function and health. This allows the maximum potential to utilize existing public lands and willing conservation landowner database.

- **Achieve No Net Loss of Wetland Function**

  A Douglas County In-Lieu Fee program would help achieve a No Net Loss of valuable wetland functions and watershed health. Wetland creation, rehabilitation, and enhancement would be undertaken at sites that are strategically positioned within a watershed to meet the watershed's limiting hydrologic and habitat needs, and designed, constructed, and monitored by local LWCD staff that has experience and a vested interest in seeing these sites meet locally determined needs and are successful.

- **Supports Economic Development**

  Mitigation banks are the preferred compensation option by Federal Rule. The availability of bank credits in the Lake Superior basin is not consistent or totally predictable. A County sponsored ILF fills the gaps in support of cost effective development and timely permitting processes. The program would coordinate with the City of Superior SAMP and private banking operations completing a suite of local compensation options for economic growth.

Disadvantages of a Douglas County –Sponsored In-Lieu Fee Program

- **Existing In-Lieu Mitigation Program Available**

  The Wisconsin Wetland Conservation Trust (WWCT) administered by the Department of Natural Resources was approved by the Army Corps of Engineers in November 2014. The WWCT has established a Lake Superior Basin Service Area and has a Lake Superior Compensatory Planning Framework. They currently market advance credits at $58,000 each.

  A Douglas County sponsored program could be perceived as redundant or in direct competition within the service area.

- **County Code Amendments Required**

  There currently is no implementing language for In-Lieu Fee programs in the Douglas County Code. This would need to be fleshed out in order for the County to ensure the use of In-Lieu Fee sites sufficiently compensates for wetland impacts.

- **Legal Responsibility for Private Wetland Mitigation**

  In-Lieu fee program would allow developers to legally transfer their mitigation, monitoring and reporting obligations to the ILF program sponsor (County). By selling mitigation credits to private individuals the County would be assuming their mitigation obligations.

- **Financial Assurance (Endowment) and Third party Oversight**

  The District Engineer (of the U.S. Army Corps of Engineers) typically requires the posting of bonds, or other secured funding mechanisms (such as endowment) to ensure that resources are available for successful long-term performance of In-Lieu Fee sites. This requires long term financial obligation by the County.

  (Many of the perceived long term maintenance and monitoring requirements in the instance of County lands the County already assumes as part of LWCD operations. Township lands would be part of their existing duties.)

- **Land Use and Zoning Conflicts**

  In-Lieu Fee sites are required to be placed in a permanent protective status. A review of zoning ordinances and local land use plans would be necessary to determine any potential rezoning needs or exclusions to the zoning requirements that expressly allows the development of In-Lieu site within some categories would be needed to the program to be successful.

- **Capitalization Costs**

  There will be a need to capitalize direct and indirect costs incurred during the period of Corps Final Approval and the sale of advance credits. The need can be better quantified as the final instrument is developed with administrative and maintenance cost determinations.

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- **Not a Revenue Generating Program**
  All funds generated from the sale of credits are required to be kept in a program account that establishes and maintains an annual report ledger and individual project ledgers. Douglas County would be able to capture appropriate administrative fees (5% -20%)
- **Approval Time**
  There is a required Federal Review timeline of approximately 225 days. This does not include the Douglas County time as the Sponsor to reply to agency and public comments. The WDNR ILF approval time was 614 days or 1.68 years.

Process

In-Lieu Fee Programs have a specific review and approval process by the Corps under the federal mitigation rule (33 CFR Parts 325 and 332, 40 CFR Part 230). ILF projects go through the following certification steps:

- **The review process starts when Douglas County (sponsor) submits a prospectus to the Corps.** Once the Corps determines that the prospectus is complete, notice is issued seeking public input regarding the proposed project.
- **The Interagency Review Team (IRT) is convened.** The IRT reviews and provides technical input on the sponsor's project design, service area, performance standards, and the number of advance credits available. Public comments are considered during the technical review stage.
- **Sponsor submits a draft ILF Instrument for IRT review and comments.** The sponsor incorporates these comments and submits a Final Instrument to the IRT.
- **Sponsor arranges for signing after necessary comments are incorporated and approved by IRT.** Lake Superior Basin Interagency Review Team currently includes the Army Corps of Engineers (USACE), US Environmental Protection Agency (EPA) and the Wisconsin Department of Natural Resources (WDNR).

Compensatory Mitigation Rule Timeline for Bank or ILF Approval (attached)

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2011	2012	2013	2014	2015	2016	2017	2018
•Town Concerns •County Work Group •Superior Days •Meetings	•Superior Days •Partnerships •Fundraising •meetings	•Superior Days •NOAA grant •Assessment •Stakeholders •Meetings	•Assessment •Maps •Framework •Meetings	•Capital Fund •Grant Funds •Planning •Meetings	•Watershed Based Plan •PRW analysis •Assess sites •Demonstration •ILF Prospectus	• • • ILF Draft Instrument Site Selections ILF Final Instrument	• • Approval Advance Credits

Douglas County
Watershed Approach to Wetland Mitigation

Compensatory Mitigation Rule
Timeline for Bank or ILF Instrument Approval*

		Event	# of Days**		
Phase I		Optional Preliminary Review of Draft Prospectus	30		DE provides copies of draft prospectus to IRT and will provide comments back to the sponsor within 30 days.
		Sponsor Prepares and Submits Prospectus ~DE must notify sponsor of completeness w/in 30 days of submission~			
Phase II	Day 1**	Complete Prospectus Received by DE			
	Day 30	Public notice must be provided within 30 days of receipt of a complete prospectus	30		
	Day 60	30-Day Public Comment Period	30		
	Day 90	DE must provide the sponsor with an initial evaluation letter within 30 days of the end of the public comment period.	30	15	DE distributes comments to IRT members and sponsor within 15 days of the close of the public comment period
		Sponsor Considers Comments, Prepares and Submits Draft Instrument ~DE must notify sponsor of completeness w/in 30 days of submission~			
Phase III	Day 1	Complete Draft Instrument Received by IRT Members			
		30-day IRT comment period begins 5 days after DE distributes draft instrument to IRT members	30	90	Within 90 days of the receipt of a complete draft instrument by IRT members, the DE must notify the sponsor of the status of the IRT review.
	Day 90	DE discusses comments with IRT and seeks to resolve issues ~ # of days variable~	60		
		Sponsor Prepares Final Instrument ~Sponsor provides copies to DE and all IRT members~			
Phase IV	Day 1	Final Instrument Received by DE & IRT			
	Day 30	DE must notify IRT members of intent to approve/not approve instrument within 30 days of receipt.	30	45	IRT members have 45 days from submission of final instrument to object to approval of the instrument and initiate the dispute resolution process.
		Remainder of time for initiation of dispute resolution process by IRT members	15		
	Day 45	INSTRUMENT APPROVED/NOT APPROVED, or DISPUTE RESOLUTION PROCESS INITIATED			

EPA/Corps draft 4/02/08

Total Required Federal Review (Phases II-IV): ≤225 Days

*Timeline also applies to amendments

**The timeline in this column uses the maximum number of days allowed for each phase.

Minnesota Pollution Control Agency

520 Lafayette Road North | St. Paul, Minnesota 55155-4194 | 651-296-6300

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JANUARY

7

December 28, 2015

TO: INTERESTED PARTIES

RE: 21st Avenue West Aquatic Habitat Restoration Project

The Minnesota Pollution Control Agency (MPCA) has approved the Findings of Fact, Conclusions of Law, and Order for a Negative Declaration on the need for an Environmental Impact Statement on the proposed 21st Avenue West Aquatic Habitat Restoration Project, St. Louis County. The Findings of Fact, Conclusions of Law, and Order document concludes that this project does not have the potential for significant environmental effects. The decision for a Negative Declaration completes the state environmental review process under the revised Environmental Quality Board rules, Minn. R. ch. 4410. Final governmental decisions on the granting of permits or approvals for the project may now be made.

These documents can be reviewed at the following locations: the MPCA offices in St. Paul and Duluth; the Minneapolis Public Library at 300 Nicollet Mall, Minneapolis; and the Duluth Public Library. The document can be viewed on our MPCA website at http://www.pca.state.mn.us/news/eaw/index.html. Requests for copies of these documents may be made by contacting the St. Paul office at 651-757-2100.

We want to express our appreciation for comments submitted on the Environmental Assessment Worksheet. Comments and responses to them have been incorporated into the Findings of Fact, Conclusions of Law, and Order and have been considered by MPCA staff during the permit process for the proposed project.

Sincerely,

Dan R. Card, P.E.
Supervisor, Environmental Review Unit
St. Paul Office
Resource Management and Assistance Division

DRC:bt

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January 27, 2016

TO: INTERESTED PARTIES

RE: First Amendment to December 28, 2015 Findings of Fact Conclusions of Law and Order
21st Avenue West Aquatic Habitat Restoration Project

In accordance with Minn. R. ch. 4410, on December 28, 2015, the Minnesota Pollution Control Agency (MPCA) approved the Findings of Fact, Conclusions of Law, and Order ("FOF") for the proposed 21st Avenue West Aquatic Habitat Restoration Project, St. Louis County. This FOF concluded the Project does not have the potential for significant environmental effects and ordered a Negative Declaration on the need for an Environmental Impact Statement.

Subsequently, the MPCA determined that specific Findings for this Project could be misinterpreted or result in confusion. The MPCA hereby amends its December 28, 2015, FOF with the attached First Amendment to the FOF.

The FOF and First Amendment for this Project can be reviewed at the following locations: the MPCA offices in St. Paul and Duluth; the Minneapolis Public Library at 300 Nicollet Mall, Minneapolis; the Duluth Public Library; and at the MPCA website at http://www.pca.state.mn.us/news/eaw/index.html. Please contact the St. Paul MPCA office at 651-757-2100 to request hardcopies of these documents.

Sincerely,

Dan R. Card, P.E.
Supervisor, Environmental Review Unit
St. Paul Office
Resource Management and Assistance Division

DRC:bt

STATE OF MINNESOTA
MINNESOTA POLLUTION CONTROL AGENCY

IN THE MATTER OF THE DECISION ON THE NEED FOR AN ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED 21ST AVENUE WEST AQUATIC HABITAT RESTORATION PROJECT, DULUTH, ST. LOUIS COUNTY, MINNESOTA	**FIRST AMENDMENT TO DECEMBER 28, 2015 FINDINGS OF FACT CONCLUSIONS OF LAW AND ORDER**

Pursuant to Minn. ch. 4410, the Minnesota Pollution Control Agency ("MPCA") staff prepared and distributed an Environmental Assessment Worksheet ("EAW") for the proposed 21st Avenue West Aquatic Habitat Restoration project ("Project") in Duluth, Minnesota. The MPCA posted its December 28, 2015, Findings of Fact, Conclusions of Law, and Order ("FOF") on its website. Subsequently, the MPCA staff determined that specific Findings could be misinterpreted or result in confusion. The MPCA hereby amends its December Findings as follows:

1. Finding 45.a. is amended as shown:

   45. The Proposer and the Corps have assessed the likely impacts of sediment and turbidity from the Project by conducting a sediment investigation using contaminant sampling and analysis within the Project site.

      a. The Proposer identified areas of sediment quality consideration within the Project site where contaminant concentrations exceeded recommended Level II Sediment Quality Targets ("Targets"). These Targets are MPCA screening tools for predicting the probability of potential risk to benthic macroinvertebrates based on contaminant concentrations. ~~and~~ ~~r~~Results of further testing and analysis in ~~suggest~~ the areas exceeding SQT Level II Targets are at a depth greater than or equal to 50 centimeters which indicates that, ~~and~~ if left in place or further sequestered with restoration material, the contaminants present pose no risk to ~~human health or~~ the environment.

2. Finding 45 is amended by adding a new item e. as follows:

   45. The Proposer and the Corps have assessed the likely impacts of sediment and turbidity from the Project by conducting a sediment investigation using contaminant sampling and analysis within the Project site.

      e. The Proposer evaluated the risk to human health from the contaminated sediments on site. Based on a 2013 Limno Tech report, the contaminants are present at levels that do not create a risk to human health. In addition, the potential risk to humans from exposure to contaminants left in place in the sediments is negligible based on the location of the contaminants. They are located at or more than 50 centimeters below the sediment surface in more than 8 feet of water.

3. Finding 46 is amended as shown:

   46. The MPCA finds that based on the Proposer's analysis and recommendations, areas at this site that were identified as exceeding the Level II Sediment Quality Targets do not present a risk to human health or the environment.

3. Finding 47 is amended as shown:

   47. The MPCA finds that based on the Proposer's analysis and recommendations, the ~~Target exceedances~~ sediments do not present a risk to human health or the environment.

IT IS SO ORDERED

John Linc Stine, Commissioner
Minnesota Pollution Control Agency

2/2/2016
Date

DC LWCD Staff Report for 3-15-16 LCC meeting
Prepared by: Christine Ostern

WETLAND WATERSHED PLANNING: A presentation and update will be provided at the meeting.

IMPLEMENTATION PROJECTS:
There are several shoreline restoration projects underway in the St. Croix watershed area; one site on Lake Nebagamon; one on Lake Minnesuing; one trail/stream crossing on a tributary to Lake Nebagamon; and one bank stabilization project in Brule on the Brule River. Topographical surveying for our 2016 projects has been completed; planning for these projects will continue through the season. There continues to be more demand for our assistance with projects than we have resources to fill. Demand is especially high for shoreline erosion projects and for stormwater runoff control in more highly developed areas along our lakes. Shoreline erosion continues to increase due to higher wakes from specialty wave-making boats, changing water levels, and increased frequency and intensities of storm events. We are also continuing to help the Zoning Department with non-metallic mine reclamation plan review/approvals/inspections/compliance. We also assist the Zoning Department with shoreline mitigation plan reviews/approvals/inspections/compliance.

NORTHWEST WISCONSIN LAND & WATER CONSERVATION ASSOCIATION (NWLWCA): The next NWLWCA meeting will be June 10th in Hayward. The area speaking and poster contest in February was well-attended and went smoothly. The association approved another MOU for Douglas County's services in coordinating the association and providing treasurer duties. Christine attended the WI Land+Water annual conference at Elkhart Lake in early March and co-presented a break-out session with NRCS and Jackson County about the EWP program. There will be LCC training at the June meeting by WI Land+Water Association staff. All LCC members are welcome; please let Christine know if you would like to attend.

ST. CROIX – EAU CLAIRE WATERSHED PROJECT: The grant extension was not given by WDNR and so this project ended December 31st, 2015. Final payment requests and reports are due in June.

AQUATIC INVASIVE SPECIES PROGRAM: We applied for AIS program funding from WDNR in December and were notified approximately one month ago that we did not receive the grant. There are two WDNR staff that cover Douglas County, AIS needs should be directed to those individuals who are: Jeremy Bates (Superior office) and Pamela Toshner (Spooner office).

ALLOUEZ BAY RESTORATION PROJECT: This project is to restore wild rice, control invasive species, and provide education/outreach in Allouez Bay. The project is funded through two grants; one from the National Fish and Wildlife Foundation and the other from the U.S. Fish and Wildlife Service. We are contracting with the Lake Superior Research Institute to accomplish the work and also working closely with the WDNR and Great Lakes Indian Fish and Wildlife Commission. Initial site surveys were completed this summer and wild rice seeding was begun this fall. The project team is also working with Ducks Unlimited to create interpretive signage to be installed along the road on Wisconsin Point.

FARMLAND PRESERVATION PLAN REVISION: An update will be provided at the meeting.