Taking Action to Protect UW-Stout's Last Remaining Wetland

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Key words: Wetland delineation, wetland indicators, hydrophytic vegetation, hydric soils, wetland hydrology

Abstract

Wetlands provide many essential ecosystem functions, such as flood control, wildlife habitat, and groundwater recharge. Although wetlands in Wisconsin are protected, not all wetlands are recognized. According to the Wisconsin Public Land Survey records of 1849, a tamarack bog wetland once existed where the University of Wisconsin-Stout is currently located. A 1.01 acre remnant of that original wetland still exists, located within the outdoor classroom area on the south end of the UW-Stout campus, east of the UW-Stout baseball field and north of 18th Street. In order to protect and properly manage this wetland, the wetland boundaries were identified using the protocols established by the U.S. Army Corps of Engineers. Hydrophytic vegetation, hydric soils, and wetland hydrology were evaluated to determine the boundary of the UW-Stout wetland. Establishing the wetland boundary is a critical step in protecting and managing this unique remnant wetland. Now that the wetland area has been defined, UW-Stout Biology faculty will have the ability to pursue grant opportunities to continue the wetland restoration efforts.

Introduction

During the past 150 years, over 50% of the original wetlands in Wisconsin have been destroyed due to human settlement and development (Eggers & Reed, 1997). Wetlands are critical ecosystems; they store water to prevent flooding, protect water quality, and provide essential habitat for wildlife. According to the Wisconsin Public Land Survey records of 1849, a tamarack bog wetland once existed where the University of Wisconsin-Stout is currently located (Wisconsin Public Land Survey Records, n.d.). A 1.01 acre remnant of that original wetland still exists, located within the outdoor classroom area on the south end of the UW-Stout campus, east of the UW-Stout baseball field and north of 18th Street (Figure 1).

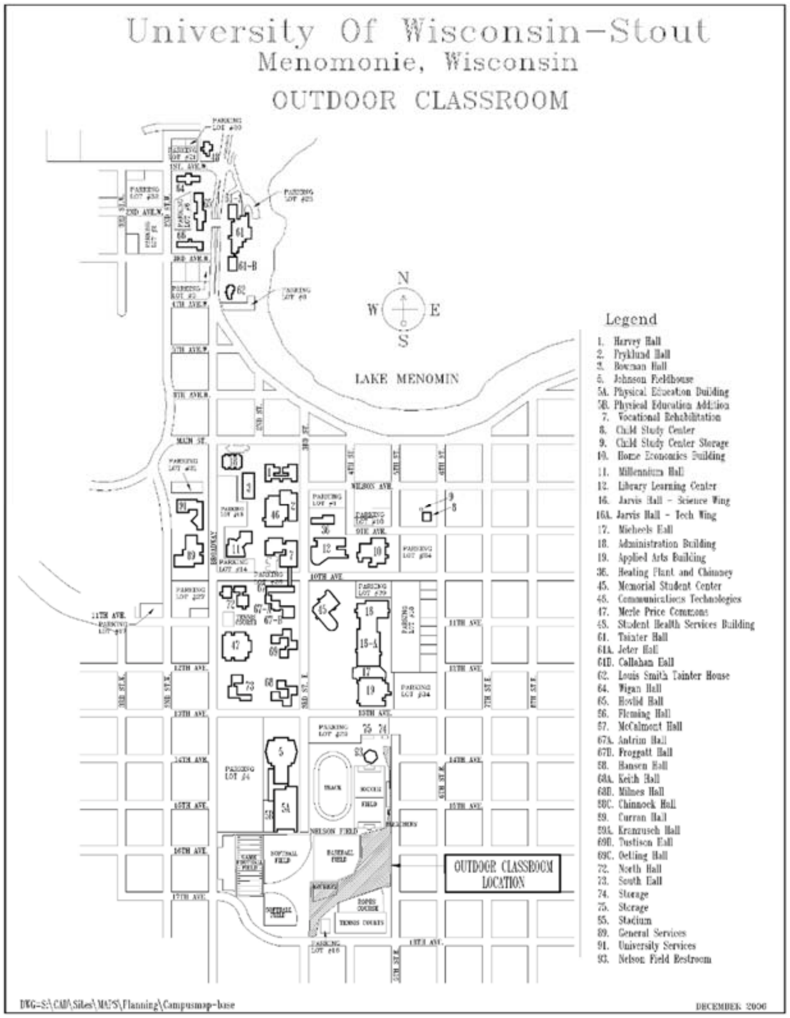

Figure 1. The location of the wetland on the UW-Stout campus (provided by the Physical Plant Department, UW-Stout, 2006).

According to the Dunn County Register of Deeds, the wetland area was purchased from private owners between 1968 and 1967 in order to expand the Nelson Athletic Field (Dunn Co, n.d.). The area was significantly impacted when a baseball diamond was developed in the early 1970s (Sparger, 1970):

> The improvements will include raising the field one and one half to two feet because of poor drainage and swampy land. Filler for this area is being taken from an area south of the field where some old homes have been torn down…..Softball and baseball diamonds and an archery range will be constructed south of the field. (p. 8)

UW-Stout Biology Department faculty and students are currently working with the UW-Stout Grounds Department on management plans to protect native species and control unwanted invasive plant species. A critical component of this wetland management plan is wetland delineation, a scientific process that defines the boundaries of a particular wetland for protection and management. During the spring 2006 semester, Maxine Pettis, an Applied Science student, received funding from the UW-Stout Student Research Fund to attend a wetland delineation training workshop. The actual wetland boundary determination was conducted from September to October, 2006.

Methods

The UW-Stout Wetland is located in the southeast part of Section 35, Township 28N, Range 13W; Dunn County, Wisconsin. The wetland was delineated using the procedure described in the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) and in the *Basic Guide to Wisconsin Wetlands and Their Boundaries* (Wisconsin Coastal Management Program, 1995). Resources used to initially identify wetland features included the *Natural Cooperative Web Soil Survey* (n.d.) and the *Hydric Soils List for Dunn County* (1995).

In order to make a precise determination of the wetland boundary, a 605 foot baseline was established parallel to the lowest end of the wetland (Figure 2); five different transect lines (200ft apart) were established perpendicular to the baseline. For each transect line, two sample points were used, one in the wetland area and one in the upland area; soil probing helped determine the approximate boundary. At each sample point, the presence or absence of hydrophytic vegetation, hydric soils, and wetland hydrology was determined using the protocol established by the U.S. Army Corps of Engineers (Environmental Laboratory, 1987). The wetland boundary was set where indicators for any one of the three parameters no longer existed. Transect two (T2) only had a wetland sample point because of the thick vegetation that blocked progress to the upland area (Figure 3). Transect three only had an upland sample point (T3 upland) because of the steep slope that occurs there; only one of the three wetland indicators was present (hydrophytic vegetation).

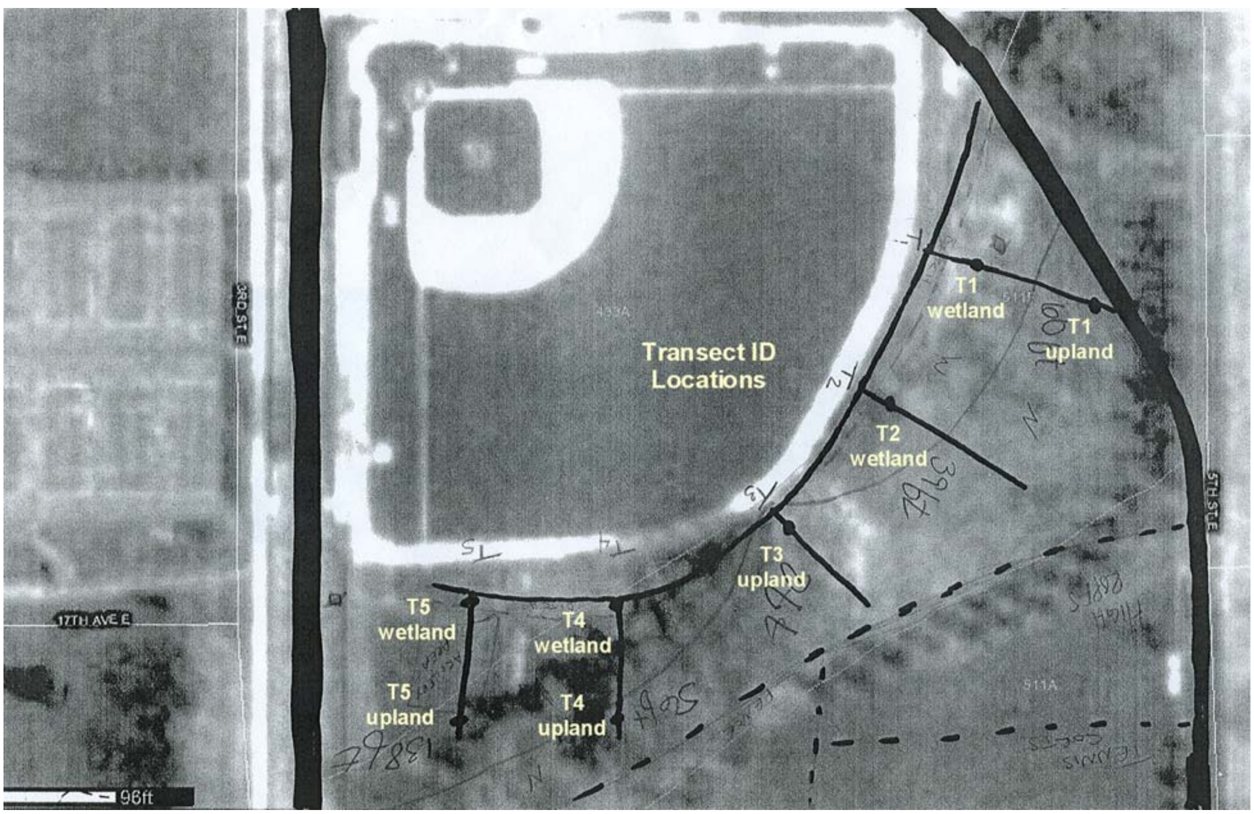

Figure 2. Transect ID locations within the UW-Stout wetland area (The Natural Cooperative Web Soil Survey, n.d.).

Vegetation

Vegetation sampling resulted in the assignment of an indicator status for the dominant plants in each strata of the flora. The flora strata included: herb- anything less than 3 feet tall; shrub- woody vegetation less than 20 feet tall; sapling- woody vegetation taller than 20 feet and less than 5 inches in diameter at breast height (DBH); tree- woody vegetation taller than 20 feet and greater than 5 inches DBH; and wood vine- woody climbing plants less than 3 feet tall (Environmental Laboratory, 1987).

At each sample point within each transect, the percent cover for each plant species in the plot area was visually estimated and recorded; a 1.0-m by 1.0-m square quadrant was used to determine the percent cover for herbs; and a 9-m (30ft) radius was used to determine percent cover for shrubs, saplings, trees and woody vines. After estimating the percent aerial cover for each species, the 50/20 rule was applied to determine dominance. Under the 50/20 rule, any plant species that equals or exceeds 20% of the total percent coverage of the plot is a dominant plant. In addition, the cumulative total of all dominant plants must be equal to or greater than 50% of the coverage of the plot.

The *National List of Plant Species that Occur in Wetlands* (Reed, 1988) was used to determine the indicator status of each plant. The indicator categories are as follows:

Obligate Wetland (OBL) - Occur in wetlands >99%
Facultative Wetland (FACW) - Occur in wetlands 67% - 99%
Facultative (FAC) - Occur in wetlands 34% - 66%
Facultative Upland (FACU) - Occur in wetlands 1% - 33%
Obligate Upland (UPL) - Occur in Wetlands <1%

Plants that are OBL, FACW or FAC are positive wetland indicators. If greater than 50% of the dominant plants in all vegetation strata are OBL, FACW and/or FAC, then the hydrophytic vegetation criteria for a wetland is satisfied.

Soils

Hydric soils were identified in the wetland area by digging a pit 1 foot in diameter and 18 inches deep and removing a slice of the intact soil profile from the side of the hole. The profile was then examined for evidence of long-term saturation. Soils that are waterlogged for long periods become depleted in oxygen. The lack of oxygen restricts normal breakdown of dead plant debris, causing partly decomposed organic matter to accumulate on the soil surface; it also causes chemical changes in the soil, which can affect soil color and odor (Environmental Laboratory, 1987). At each sample location, soil matrix color, soil texture, presence of mottling or gleying, and presence of odor were recorded. Soil hue, value and chroma were determined using a Munsell® Soil Color chart.

Hydrology

Wetland hydrology refers to the presence of surface water or waterlogged soils for a sufficient period of time so that it influences the kinds of plants and soils that occur in an area (Wisconsin Coastal Management Program, 1995). Wetland delineators use primary and secondary hydrologic indicators that can be observed during a field inspection. Primary indicators are surface features resulting from flooding, ponding, and direct observation of groundwater tables. Secondary indicators are characters that result from prolonged subsurface saturation.

Test pits were established at the different sample points in order to determine the presence or absence of wetland hydrology. Primary indicators used to determine whether wetland hydrology existed were visual observation of inundation or saturation, watermarks, drift lines, sediment deposits, and drainage patterns. Secondary indicators for hydrology that were used included oxidized root channels, water stained leaves, and the FAC Neutral test. For the FAC Neutral test, the number of dominant plant species that were FACW and OBL (wet) were compared with the number of dominants that were FACU and APL (dry). The FAC plants (neutral) were excluded. If there were more wet dominants than dry dominants, then the plant community reflected the presence of wetland hydrology (Environmental Laboratory, 1987).

Results

The wetland is located at the base of a hill where it receives considerable surface runoff and groundwater flow (Figure 3). According to Lynn Peterson, UW-Stout Grounds Supervisor, at one time a small pond existed in the southeast section of this wetland. This pond was most likely filled in when the property was purchased and developed by UW-Stout in the early 1970s. There are currently no streams or other waterbodies that adjoin this wetland area. Under natural conditions, water pools at the surface when the water table is high (i.e. spring melt). However, when the new baseball diamond was established in 1971, five storm drains were installed in the wetland area (Figure 3) in order drain off excess water from the adjacent athletic fields. These drains have greatly affected the hydrology of this wetland area. Instead of remaining within the wetland, pooled water enters the drains, flows through two underground storm pipe systems (one to the south and one to the west of the baseball field), and continues flowing through the City of Menomonie storm drain system until it finally discharges into Galloway Creek, a nearby urban stream.

Vegetation

The average annual total precipitation for this area is about 30.55 inches (National Water and Climate Center, n.d.). Of this, about 65% (19.89 inches) usually falls from May through September. The growing season for most plants falls within this period. The wetland delineation was conducted at the end of September and beginning of October; therefore, the field investigator may have missed some of the plants that grow earlier in the season.

Eight sample points were evaluated at the UW-Stout wetland (Figure 3). The T2 wetland site and T3 upland sites rated 86% and 80%, respectively, and the T1, T4, and T5 wetland sample points each rated 66% dominant facultative or wetter plant species. Wetland vegetation consisted of goldenrod (*Solidago* spp.*)*, boneset (*Eupatorium perfoliatum*), silver banner grass (*Miscanthus sacchariflorus*) and cattail (Typha x glauca). Wetland trees included silver maple (*Acer saccharinum*), river birch (*Betula nigra* L.), American elm (*Ulmus americana*), black willows (*Salix nigra*) and box elder (*Acer negundo*). Upland vegetation consisted of American red raspberry (*Rubus strigosus*), black locust (*Robinia pseudoacacia*), and common buckthorn (*Rhamnus cathartica*). Upland trees included bur oak (*Quercus macroparpa*) and some white pine (*Pinus strobus*) (Pettis & James, 2006).

Many years ago, purple loosestrife (*Lythrum salicaria*) and silver banner grass (*Miscanthus sacchariflorus*) were intentionally planted in this wetland under the misguided belief that they would beautify the area. Lynn Peterson, UW-Stout grounds supervisor, and Krista James, Biology Dept faculty, have been working with the Wisconsin DNR to raise and release the purple loosestrife biological control (Galerucella beetles) to this and other wetlands in Dunn

County. Other restoration efforts include buckthorn (*Rhamnus cathartica*) eradication and the planting of native tamarack (*Larix laricina*) seedlings.

Soils

Two major soil series are found within the UW-Stout wetland, Newson and Markey; both are listed as hydric soils for Dunn County (Natural Resource Conservation Service, n.d.). The Newson series consists of very deep and very poorly drained soils formed in sandy outwash, sandy alluvium, or sandy lacustrine deposits on outwash plains, lake terraces, stream terraces, and valley trains. The Markey series consists of very deep, very poorly drained organic soils formed in herbaceous organic material 16 to 51 inches thick overlying sandy deposits in depressions on outwash plains, lake plains, flood plains, river terraces valley trains and moraines. Of the eight sample points evaluated at the UW-Stout wetland (Figure 2), hydric soils were determined to be present at 6 of the locations (T1 wetland, T2 wetland, T4 wetland, T4 upland, T5 wetland, and T5 upland).

Hydrology

The current hydrologic circumstances at the wetland are the result of the area's geomorphology, climate, and human-induced changes that have occurred over many decades. These changes include baseball field and sidewalk development, vegetation management, ditch construction, and the installation of storm drains.

During the summer of 2006, the City of Menomonie experienced an extended drought. Total accumulated rainfall from May through September was only 15.56 inches, with 43% (6.73 inches) occurring in August (National Water and Climate Center, n.d.). Since the wetland delineation field work was conducted in late September and early October, indicators such as inundation, water stained leaves, and water marks on trees were absent. Of the eight sample points evaluated at the UW-Stout wetland (Figure 2), wetland hydrology was determined to be present at four of the locations (T1, T2, T4, and T5 wetland), with the depth of standing water in the pit ranging from 7.5 to 15 inches. Indicators of wetland hydrology observed included soil saturation in the upper 12 inches (primary indicator), and oxidized root channels in the upper 12 inches and positive FAC- neutral tests (secondary indicators) (Pettis & James, 2006).

Discussion and Conclusion

The Wisconsin Statute Section 23.32 (1) states that "wetland means an area where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which has soils indicative of wet conditions" (Wisconsin State Legislature, 2006). Three parameters were used to delineate the UW-Stout wetland boundary. These parameters were vegetation, soils, and hydrology. For a sample location to be classified as wetland, it has to have at least one positive indicator for each of hyrophytic vegetation, hydric soils, and wetland hydrology. The wetland boundary was set where indicators for any one of the three parameters no longer existed (Figure 3). In the near future, the wetland area in the northern section of the outdoor classroom (northern side of the sidewalk) will also be delineated. A different Applied Science student will be recruited to complete this task.

A map outlining the wetland boundary was a critical step in restoring and managing this unique remnant wetland on the UW-Stout campus. Now that the area has been defined, UW-Stout Biology faculty will pursue grant opportunities to continue the wetland restoration efforts. Students participating in biology courses for many years to come will have the opportunity to be involved in all management aspects, including the eradication of invasive species, planting and seeding of native species, and basic maintenance. As Stout alumni, they will return to the University and, seeing improvements in the health of this wetland, will know that their efforts contributed to this progress.

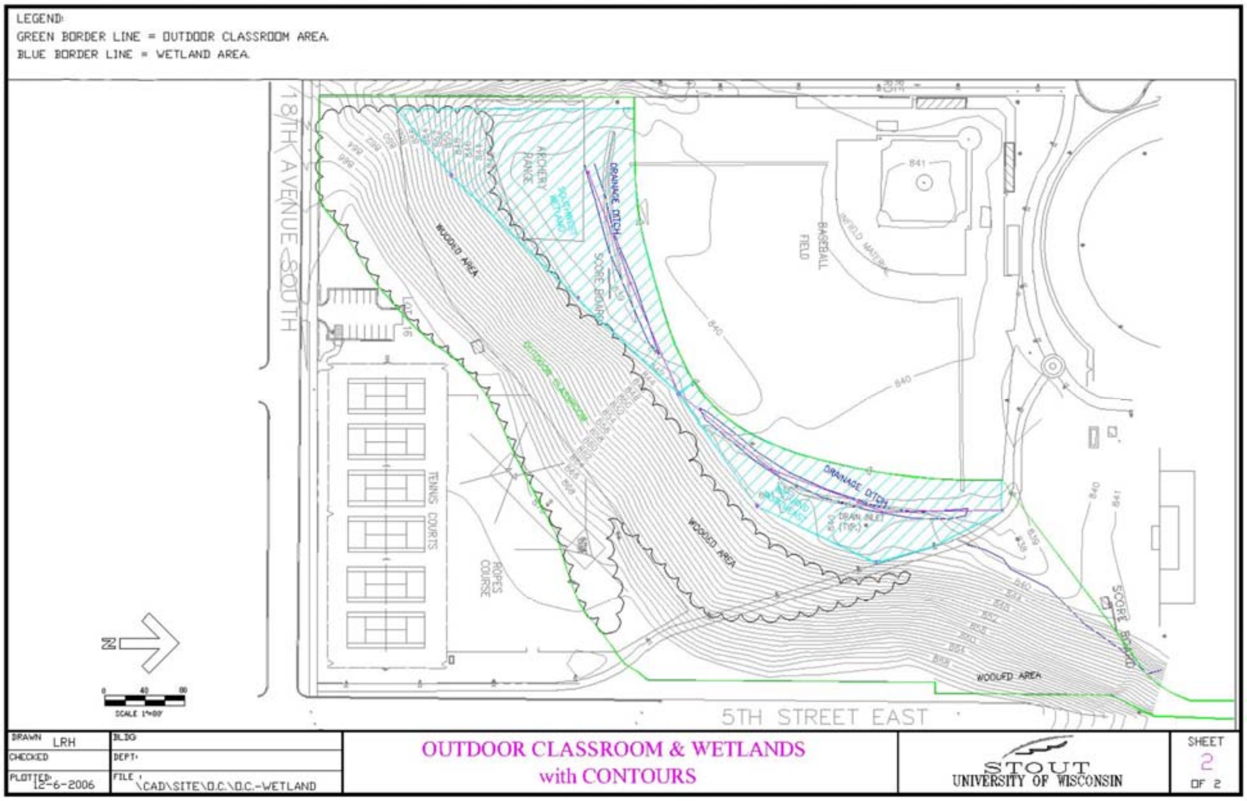

Figure 3. Final wetland delineation map for the UW-Stout wetland (provided by the Physical Plant Department, UW-Stout, 2006).

Acknowledgements

The author would like to acknowledge the following individuals: Lynn Peterson, UW-Stout grounds supervisor, Judith Hayducskco (Wisconsin DNR), and Deb Konkel (Wisconsin DNR) for providing assistance in identifying plant species; and Tim Meyer, USDA Soil Scientist for assisting in the classification of soils within the UW-Stout wetland.

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