

Indiana University Campus Wetland Survey
2010 Final Report
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INTRODUCTION

Following recommendations by the Indiana Department of Environmental Management, Indiana University inventoried jurisdictional wetlands and intermittent streams on its Bloomington campus. The goal of the wetland inventory was to develop a comprehensive map of jurisdictional wetlands on the campus. Under the Clean Water Act, jurisdictional wetlands are those wetlands of any size considered to have a significant connection to navigable waterways. Wetlands not meeting the above requirements are considered isolated wetlands, and are protected under Indiana's State Isolated Wetlands law (IDEM 2010). Damage or removal of these wetlands requires permitting and mitigation efforts to restore wetland area.

Wetlands provide floodwater storage, nutrient and sediment filtration, and valuable habitat for many rare and endangered species. The campus wetland map will assist IU in planning and developing campus green space to minimize wetland and stream impacts. Should the removal of any campus wetlands be necessary, this knowledge will facilitate future mitigation work required.

A secondary goal of the survey was to identify potential rain garden sites for stormwater management. Rain gardens are specifically situated to collect runoff from buildings, parking lots, and roads. Minimizing this overland flow will help prevent erosion problems. The gardens also provide treatment of stormwater by settling and filtering sediment before it reaches local waterways.

METHODS

During the summer of 2009, wetlands in the central portion of IUB's campus were delineated and mapped by an intern. I completed the inventory by surveying adjacent campus properties, including the IU Golf Course, Cross Country Course, and the IU Research and Teaching Preserve. Potential wetland sites were first identified by examining campus topographic maps. Wetlands were then delineated according to the U.S. Army Corps of Engineers 1987 *Wetland Delineation Manual* (U.S. ACE 2008), examining sites for hydric soil, hydrophytic vegetation, and hydrological characteristics. The site must meet all three criteria to be classified as a jurisdictional wetland. Sites meeting all three criteria were classified as wetland, and sites meeting two criteria were considered on an individual basis if they appeared disturbed. Boundaries were determined where characteristics shifted from wetland to upland.

Vegetation

Hydrophytic vegetation is characterized by a predominance of plant species where frequency and duration of flooding exert a controlling influence on the species present (U.S. A.C.E. 2008). Plant species were ranked by their wetland indicator status for Region 3, according to their prevalence and adaptations to life in saturated conditions (Table 1).

The most abundant species of three strata (trees, saplings/shrubs, and herbaceous) were identified. The 50% dominance test was used to determine which species comprised 50% of the absolute cover of each stratum. If more than 50% of the species were OBL, FACW, or FAC the vegetation met the criteria. The FAC neutral test was performed for sites where the 50%

dominance test was inconclusive. FAC species were dropped from the list and overall FACW/OBL dominance was recalculated.

Table 1. Description of wetland plant indicator statuses.

Wetland species type	Characteristic
Obligate wetland species (OBL)	Occurs almost always in wetlands (>99% probability)
Facultative wetland (FACW)	Usually, but not always, occurs in wetlands (67-99% probability)
Facultative (FAC)	Equally likely to occur in wetlands and non-wetlands (33-67% probability)
Facultative upland (FACU)	Usually occurs in non-wetlands, but occasionally found in wetlands (1-33% probability)
Obligate upland (OBL)	Almost always occurs in non-wetland in this region, but occasionally occurs in wetlands in other regions.

Soils

Hydric soils are those that are generally wet long enough to have low oxygen, reducing conditions in the top layers of the soil (USDA 2010). The Natural Resources Conservation Service maintains a complete list of hydric soils for each state. Soils not on the list may meet select criteria for hydric conditions, including gleying, redox depressions, and presence of organic histosols. The primary indicator used was a depleted matrix for soils with chromas of 2 or less and a depth of 15cm within the top 25 cm of soil. Soil samples were taken with a soil probe and the hue, value, and chroma of the sample was determined onsite using the Munsell Color Chart.

Hydrology

The hydrology criteria assess the extent, frequency, and duration of inundation or surface saturation within the rooting zone. The primary criteria indicating periodic inundation includes drift deposits, water stained leaves, visible inundation, presence of reduced iron, or a high water table. Two secondary indicators of hydrology (such as geomorphic position and crayfish burrows) may be used if a primary indicator is not present.

RESULTS

Site 1- Teaching Preserve floodplain: This site lies along the Indiana Creek floodplain in the Teaching Preserve, northeast of the University Lake drainage (Map 1). According to the Fish and Wildlife Service's National Wetlands Inventory (NWI), the area is classified as freshwater/forested shrub wetland. The area lies within a 2 year floodplain (Thomas 1977). Initial investigation revealed areas of soils with low chromas (3 or less) and primary and secondary indicators of hydrology including drift deposits, saturation, drainage patterns, and geomorphic position across the entire floodplain. Vegetation is characteristic of a bottomland floodplain and includes *Acer rubrum* (FAC), *Platanus occidentalis* (FACW), *Juglans nigra* (FACU), and the dominate invasive ground cover, *Microstegium vimineum* (FAC). Overall the floodplain vegetation was not hydrophytic. Soils did not meet the criteria across most of the

floodplain, so only two low-lying backwater channels were determined to be jurisdictional wetland. Total wetland area was approximately 690 m².

Site 2- Indiana Creek floodplain: Geographically, this small site is on the same floodplain as Site 1, but distinguished here because it is on the other side of Indiana Creek, just beyond the Teaching Preserve boundary. Again, only a small backwater channel was determined to be jurisdictional wetland.

Site 3- Teaching Preserve-Headley Road: This site lies just east of the Headley Road parking lot, along the Ravine Trail. Seepage from the hillside appears to be a main water source. The site also receives drainage from the golf course and is bounded by high, steep slopes. The drainage outlet has been blocked by a manmade pile of stones and rubble, probably contributing to the formation of the wetland area. The site meets soils criteria (chromas of 2 or less across the upper portion of the site, and gleyed soils), as well as hydrology. Saturation, high water table, oxidized rhizospheres, and sparsely vegetated concave surface were present. Vegetation included *Platanus occidentalis*, *Acer negundo* (FACW), and *Carpinus caroliniana* (FAC). Total wetland area was approximately 220m².

Site 4- Teaching Preserve-University Lake: The southern-most inlet of the three tributaries of University Lake appears to be developing into a small wetland. This site also met all three criteria. *Carex sp.*, *Juncus sp.*, and *Polygonum pensylvanicum* (FACW) were present at the site. As the site is situated along the banks of the lake, hydrological characteristics include surface water, high water table, and saturation. Soil chroma was 2 or less. While the southern inlet is the only one that satisfies all criteria, the other inlets have the potential to develop a hydric soil layer over coming years as sediment is deposited at the mouth of the inlets, which are currently just rocky substrate. Total wetland area is approximately 200m².

Site 5- Range Road remediation site: Three treatment wetlands existed below the coal spoil site at the end of Range Road approximately 10 years ago. While natural rain events and construction have reshaped the treatment ponds, to date a small wetland area exists near the outlet into Indiana Creek. This site appears to have been delineated by the construction company, and is marked. *Typha latifolia* (OBL), *Juncus spp.*, and *Platanus occidentalis* can be found at the site. The soils exhibit low chromas at some sites, but appear to be disturbed as well, most likely from flooding, the heavy construction, and sediment deposits from the construction site. Hydrology of the site seems to have been altered due to construction. The site is approximately 150m².

Site 6- Cross Country drainage: This site is on Range Road, across from the entrance to the Service Building. This site receives runoff from the cross country course as well as the road and parking lots from the Auxiliary Library. Drift deposits indicate hydrology. *Populus deltoides*, *Liriodendron tulipifera* (FACU), *Carex lupulina* (OBL), *Scripus fluviatilis* (OBL), *Soledago spp.*, and *Xanthium sp.* are present at the site. The soils appear disturbed, probably from gravel and sediment deposits from construction across the street and previous dumping of concrete blocks and gravel waste. This site did not meet all three criteria due to disturbance, but would be a good candidate for restoration work.

Site 7-Tamarack Trail: This small site is on the narrow floodplain beside E. Tamarack Trail Road, behind the Midwest Proton Radiotherapy Institute. The site has low soil chromas with a depleted matrix. Vegetation included *Acer saccharinum* (FACW), *Lonicera japonica* (invasive Japanese honeysuckle) (FACU) and *Vitis labrusca* (fox grape). Drift deposits and oxidized rhizospheres on roots indicated hydrology. Inundation may be a result of the road fill blocking the drainage. Total wetland area is approximately 95m².

Site 8-Bradford Woods, Martinsville, IN: With 2,500 acres of property, Bradford Woods was not actually delineated due to time constraints. However, according to the National Wetlands Inventory (NWI) map, there is an estimated 83 acres classified as freshwater forested/shrub wetland. We verified these sites on a visit to the property. *Equisetum hyemale* (FACW), *Typha latifolia* (OBL), and *Salix sp.* dominated in the winter. Soil chromas ranged from 2-4 depending on the location. Hydrology sources appeared to be overland flow from the stream and groundwater seepage from natural springs. **NWI map classifications often include areas that do not meet the full criteria of jurisdictional wetland, so these sites should be delineated at a future time if development is proposed** (Map 2).

Originally, I was going to document intermittent streams on campus and at these sites, but an existing, thorough intermittent stream survey in digital format was found in the Utilities Office. The rain garden sites were selected by the IU Department of Environmental Health and Safety and the IU Golf Course to maximize erosion control and reduce problematic wet areas on the golf course (see Map 1). Many sites are situated along the border between the Golf Course and the Teaching Preserve where steep ravines are experiencing severe erosion.

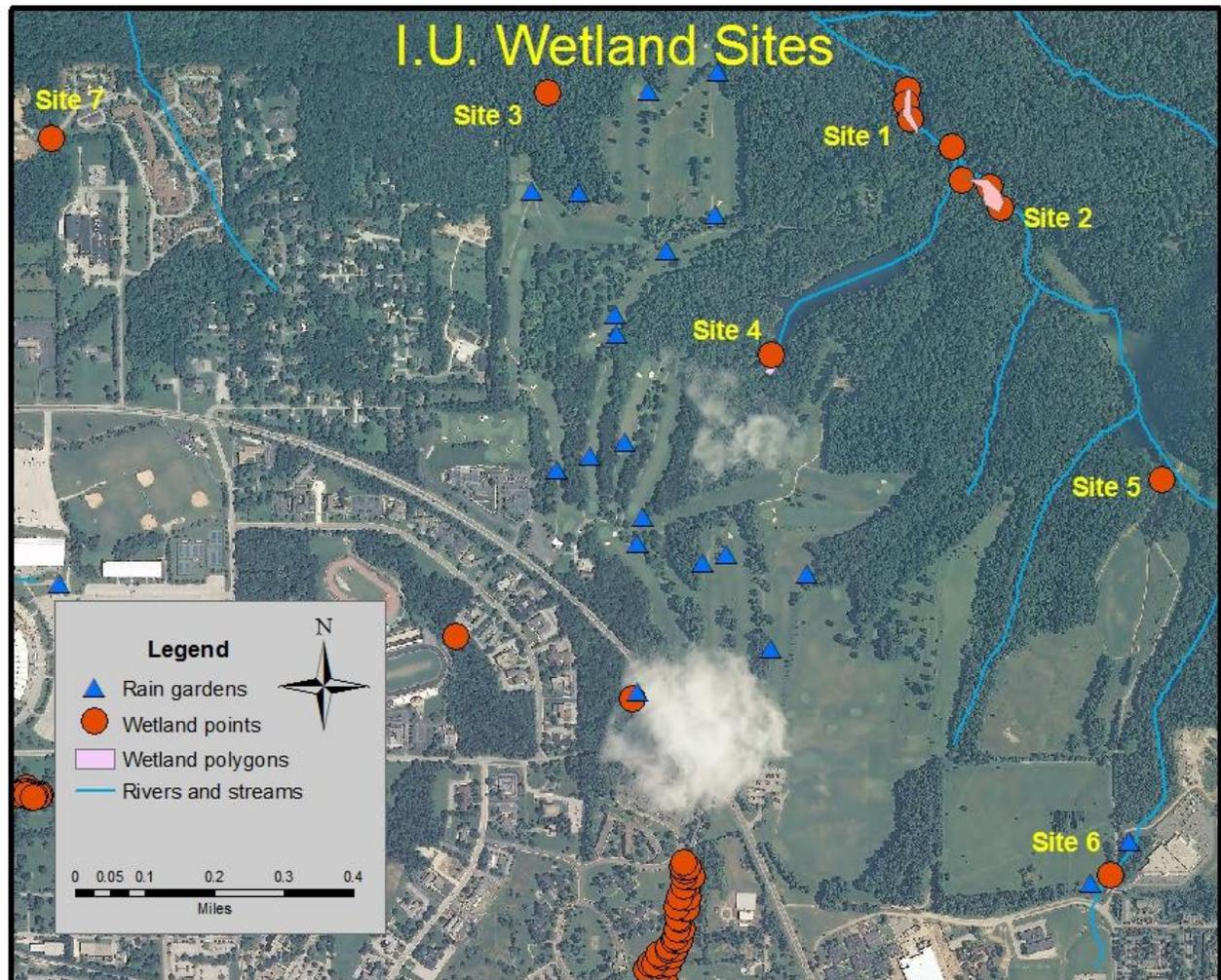
RECOMMENDATIONS

- Provide campus wetlands GIS layer to Utilities office, the Department of Environmental Health and Safety, and other campus departments for use in planning and education.
- Disturbed wetlands such as site 6 should be the focus of future restoration efforts.
- With wetland sites within a substantial floodplain, site 1 in the Teaching Preserve should remain undeveloped.
- Encourage placement of rain gardens on campus and on the Golf Course and IU Teaching Preserve, to mitigate runoff and prevent erosion problems. Partnership with the Bean Blossom Watershed Management Project could provide additional funding for the rain gardens.
- Signage at both wetland and rain garden sites could help promote water quality awareness on campus and in the Teaching Preserve.
- Observation of wetland development at the University Lake sites and observation of impacts on University Lake by management practices within each tributary's watershed.

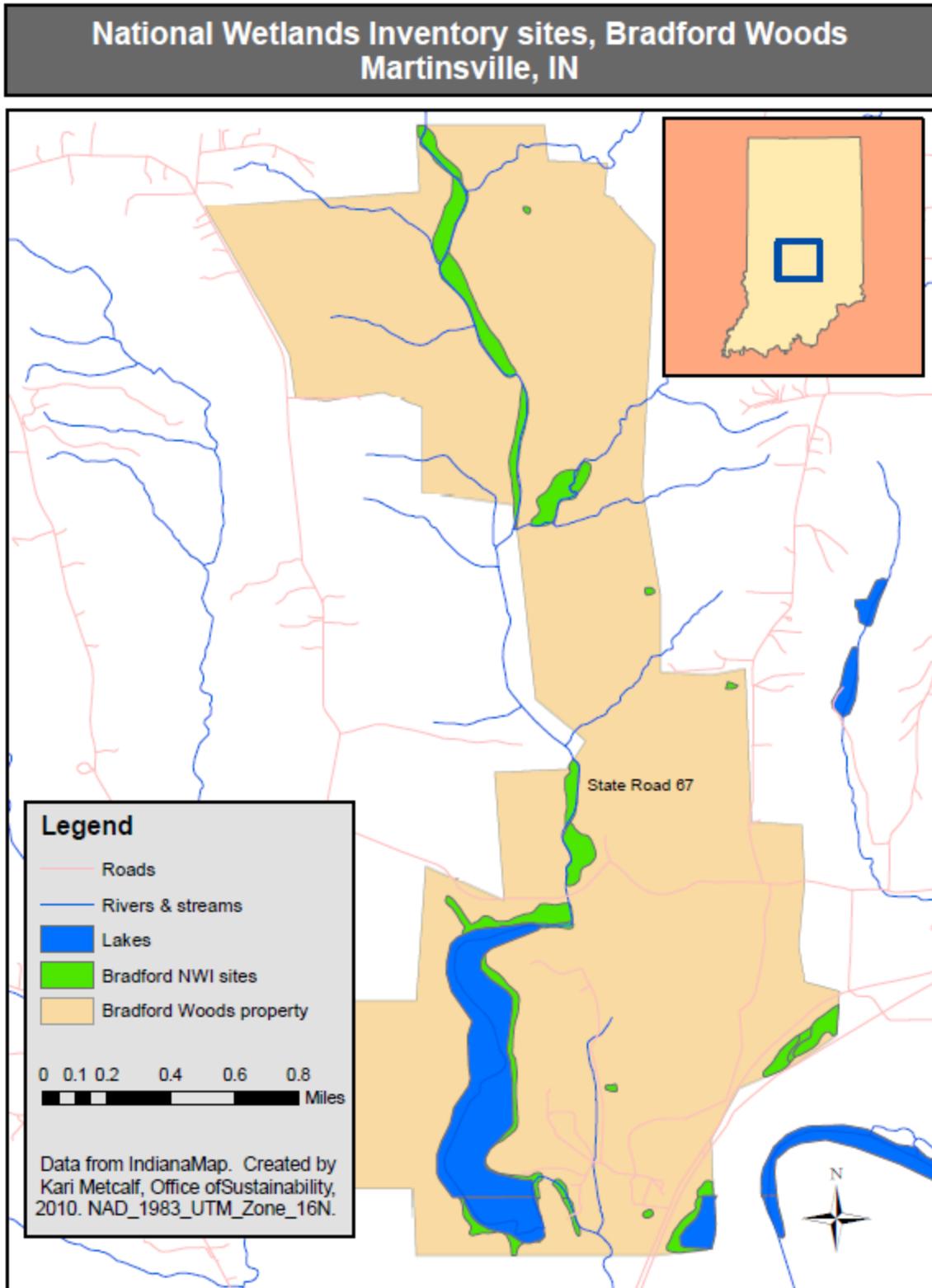
Table 2. Summary of site characteristics for the 2009-2010 wetland inventory.

Site	Coordinates	Wetland Characteristics	Jurisdictional Wetland?
1. Teaching Preserve Floodplain	N 39.19146 W 086.49986	<i>Packera aurea</i> , <i>Juglans nigra</i> , <i>Microstegium vimineum</i> Drift deposits, reduced soils	Yes, select sites
2. Indian Creek floodplain	N 39.19 W 86.496	<i>Packera aurea</i> , <i>Juglans nigra</i> , <i>Microstegium vimineum</i> Drift deposits, low chromas soils	Yes, select sites
3. Teaching Preserve-Headly Road	N 39.19281 W 086.51064	<i>Boehmeria cylindrica</i> , Gleyed soils, saturation, geomorphic position	Yes
4. University Lake	N 39.18729 W 086.50466	<i>Polygonum pensylvanicum</i> , <i>Carex</i> <i>spp.</i> High water table, saturation, reduced soils	Yes
5. Range Road remediation site	N 39.18461 W 086.49417	<i>Typha latifolia</i> , <i>Platanus occidentalis</i> , <i>Carex</i> sp. Low chroma soils, saturation	Yes
6. Cross Country drainage	N 39.17633 W 086.49562	<i>Carex lupulina</i> , <i>Panicum</i> sp. Sandy, disturbed soils. chromas 2-3	No, disturbed
7. Tamarack Trail	N 39.19191 W 086.52397	<i>Acer saccharinum</i> , <i>Faxinus</i> <i>pensylvanica</i> , <i>Lonicera japonica</i> Low chroma soils, drift deposits	Yes
8. Bradford Woods	---	<i>Typha latifolia</i> , <i>Equisetum hymale</i> , <i>Salix</i> spp. Reduced soils, organic soils, saturation	TBD

Map 1. Wetland sites surveyed on the I.U. Research and Teaching Preserve, IU Golf Course, Cross Country course, and other properties, 2009-2010. Location of potential rain garden sites marked by triangles.



Map 2. National Wetlands Inventory sites at Bradford Woods property.



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