TRANSMITTAL

To: Bureau of Design and Environment
Attn: Matthew J. Sunderland
From: Illinois Natural History Survey
Topic: Mitigation Monitoring

Route and Location

Project Name: FAP 301 (US 20 - Freeport Bypass West)
County: Stephenson
Job Number: P92-029-02
Sequence Number: 10487
Section Number: 177-2
Location: At the wetland compensation site near the Jane Addams Bike Trail; ISGS Site 6W

Surveys Conducted by: Jesse Kurylo, Jeff Matthews, Eric Plankell (ISGS), Jason Zylka, and Brad Zercher (figures)

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Date Conducted: 15-16 September 2011

Project Summary:

We conducted the fifth year of monitoring of a site for wetland impact mitigation resulting from proposed construction and addition of lanes along the west Freeport bypass on US 20 in Stephenson County. The site involves the creation of wetlands. The Illinois Department of Transportation (IDOT) established the site and planted trees in 2006. The attached report includes an explanation of monitoring methods and results. We also discuss the progress toward attaining project goals.

Signed:_____
Dr. Allen E. Plocher
INHS/IDOT Project Coordinator

Date:_____02/06/2012_____

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Wetland Mitigation Monitoring Report for the FAP 301 (US 20 – Freeport Bypass West) site near the Jane Addams Trail, Stephenson County, Illinois (fifth monitoring year--2011)

Introduction

This report describes the fifth year of monitoring of a wetland mitigation site created to mitigate for wetlands affected by the construction of another set of lanes for the FAP 301 (US 20) bypass around Freeport (Figure 1, Appendix 1). The entire compensation site is 23.6 ac and the majority of that area (15.6 ac) is monitored for wetland creation. Trees were planted on former agricultural fields in the floodplain of the Pecatonica River on 25 May 2006. A drainage-way was plugged near its outlet into the oxbow at the west edge of the site on 27 September 2006 to hold water on the site for longer periods.

This report discusses the goals, objectives, and performance criteria for the mitigation project, the methods used for monitoring the site, and monitoring results. Methods and results are discussed for performance criteria for each goal. Wetland determination forms are in Appendix 2 and a map of the mitigation site can be found on Figure 2 in Appendix 1. Photo stations were established and photos can be found in Appendix 3.

Goals, Objectives, and Performance Criteria

The goals, objectives, and performance criteria described below follow those listed in the request to monitor the site (IDOT 2005). Each goal should be attained by the end of a five-year monitoring period.

Project Goal 1: The created wetland community should be a jurisdictional wetland as defined by federal standards in place in the Spring of 2007.

Objective: The created wetland will be formed through plugging a ditch that drained former crop fields on the site.

Performance criteria:

a. Predominance of hydrophytic vegetation: More than 50% of the dominant plant species must be hydrophytic.

b. Presence of hydric soils: Hydric soil characteristics should be present, or conditions favorable for hydric soil formation should persist at the site.

c. Presence of wetland hydrology: The area must be either permanently or periodically inundated at average depths of less than 2 m (6.6 ft) or be saturated to the surface for at least 5% of the growing season when the site also meets the soils and vegetation criteria, or 12.5% of the growing season if the other two criteria are not met.

Project Goal 2: The created wetland community should meet standards for floristic composition and vegetation cover.

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Objective: A floodplain forest will be created by planting native woody species. Herbaceous vegetation will be allowed to colonize the site naturally.

Performance criteria:

a. Planted species survivorship: At the end of the five-year monitoring period, at least 55 planted trees per acre will be present and healthy in the created wetland site.

b. Native species composition: At the end of the five-year monitoring period, at least 50% of total species should be non-weedy, native perennial species.

c. Dominant plant species: None of the three most dominant plant species in the planned wetland should be non-native or weedy species, such as cattail, sandbar willow, or reed canary grass.

Methods

Project Goal 1

a) Predominance of hydrophytic vegetation

The method for determining dominant hydrophytic vegetation at a wetland site is described in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), and is based on areal coverage estimates for individual plant species. Each of the dominant plant species is assigned its wetland indicator rating (Reed 1988). A plant species that is rated facultative or wetter (FAC, FAC+, FACW, or OBL) is considered to be hydrophytic. If more than 50% of the dominant species present are hydrophytic, this criterion is met. Botanical nomenclature follows Mohlenbrock (1986).

b) Occurrence of hydric soils

To monitor hydric soil development, the soil was sampled at various locations within each cover type. Soil profile morphology, including horizon color, texture, and structure was analyzed at representative points throughout the site. Additionally, the presence, type, size, and abundance of redoximorphic features were recorded. In the absence of hydric soil indicators, hydrologic data can be used to confirm that conditions favorable for hydric soil formation persist at the site (Environmental Laboratory 1987).

c) Presence of wetland hydrology

The extent of wetland hydrology at the Freeport Bypass West Potential Wetland Compensation was monitored by the Illinois State Geological Survey (ISGS) (Miner et al. 2011). The entire compensation site, totaling 23.6 ac with existing wetland areas, is monitored. The following methods are adapted from that ISGS report. An area must be inundated or saturated for no less than 5% of the growing season (9 days at this site) in order to satisfy wetland hydrology criterion using the 1987 Manual, or a minimum of 14 consecutive days when using the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0)* [U.S. Army Corps of Engineers (USACE) 2010)]. These areas will be determined to be jurisdictional wetlands if vegetation and soils criteria are also met. Areas that are inundated or saturated for greater than 12.5% of the growing season (23 days at this site) satisfy wetland hydrology criteria in a conclusive manner, and strongly indicate wetland conditions, especially where soil and/or vegetation data are inconclusive or slow to respond after site construction

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activities. To assist in proper characterization of wetland mitigation sites, the ISGS report shows areas that are inundated or saturated for greater than 5% and greater than 12.5% of the growing season. Areas satisfying wetland hydrology criterion according to the USACE 2010 Midwest Regional Supplement (14 consecutive days during the growing season) are also shown for comparison. Inundation occurs when surface water is present at depths no greater than 6.6 ft. Saturation occurs when the water table is no deeper than 1 ft below land surface. Furthermore, INHS personnel have surveyed the site annually for field indicators of wetland hydrology.

Inundation and saturation at the site were monitored using a combination of 15 monitoring wells and two staff gauges. Water levels were measured twice during March and April, three times in May, and monthly during the remainder of the year. Manual readings were supplemented by one datalogger, which records surface- and ground-water levels at regular intervals to document all hydrologic events. Additional details regarding site conditions and monitoring results for wetland hydrology in 2011 are summarized in the ISGS *Annual Report for Active IDOT Wetland Compensation and Hydrologic Monitoring Sites, September 1, 2010 to August 31, 2011* (Miner et al. 2011).

Project Goal 2

a) Planted species survivorship

In May 2006, saplings were planted on the two former crop fields within the wetland mitigation site at the rate of 100 per acre (IDOT 2005). All living planted trees were counted and identified to species. Apparently dead stems of the planted species were also counted. Planted tree species tallied on the site were *Carya illinoensis, Fraxinus pennsylvanica, Platanus occidentalis, Quercus bicolor,* and *Q. palustris. Juglans cinerea* saplings had also been planted on the site but all have died.

b) Native species composition, and

c) Dominant plant species

The entire wetland mitigation site is comprised of two former crop fields, with existing wetland and buffer areas also present. Areas of existing wetland (floodplain forest and a wet meadow drainage-way) and areas where no efforts are being made to restore or create wetlands were excluded from monitoring. Therefore, only the two former crop fields where trees are planted were monitored again this year.

A separate plant species list was made for each of the wetland determination sites, representing the different vegetation cover types of the site. Dominant plant species for each wetland determination site were determined by visual assessment of each area. Planted tree species were added to the species lists for the two wetland determination sites. *Fraxinus pennsylvanica* is listed as planted but also occurs as volunteers on each site from nearby floodplain forest.

To calculate percent perennial, non-weedy native (PNWN) species, the total number of non-weedy (C value >1), native perennials was divided by the total number of species on the site. Trees were included as perennials, but biennials were excluded.

Included with the assessment of a site is the Floristic Quality Index (FQI), as described by Swink and Wilhelm (1994) and Taft et al. (1997). Although FQI is not a substitute for quantitative vegetation analysis in assessing plant communities, it provides a measure of the floristic integrity

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or level of disturbance of a site. Each plant species native to Illinois is assigned a rating between 0 and 10 (the Coefficient of Conservatism) that is a subjective indicator of how likely a plant may be found on an undisturbed site in a natural plant community. A plant species that has a low Coefficient of Conservatism (C) is likely to tolerate disturbed conditions; a species with a high C is likely to require specific, undisturbed habitats. Species that are not native to Illinois are not rated.

The FQI is calculated as follows: $FQI = R/\sqrt{N}$, where R represents the sum of the numerical ratings (C) for all species recorded for a site, and N represents the number of native plant species on the site. The mean C value (mCv) was also calculated for each site. This value is calculated as follows: $mCv = R/N$. The C value for each species is shown in the species list for the site. Species not native to Illinois (indicated by * in the species list for each site) were not included in calculations. An FQI score below 10 suggests a site of low natural quality; below five, a highly disturbed site. FQI values of 20 or more ($mCv > 3.0$) suggest that a site has evidence of native character and may be considered an environmental asset. Sites with FQI values of 35 of more ($mCv > 3.5$) are considered to be of natural area quality.

Results

Project goal 1 – Creation of a Jurisdictional Wetland

a) Predominance of hydrophytic vegetation

Dominant plant species for each of the wetland determination sites are presented in Tables 1 and 2. Site 2 met the hydrophytic vegetation criterion. Site 1 continues to lack dominant hydrophytic vegetation, therefore not meeting this performance criterion. A full list of plant species observed is presented in the wetland determination forms within Appendix 2.

Table 1 - Dominant plant species in the non-native grassland for wetland determination Site 1.

Dominant Plant Species	*Indicator Status*	*Stratum*
1. *Phalaris arundinacea*	FACW+	herb
2. *Poa pratensis*	FAC-	herb

Table 2 - Dominant plant species in the wet meadow for wetland determination Site 2.

Dominant Plant Species	*Indicator Status*	*Stratum*
1. *Elymus virginicus*	FACW-	herb
2. *Phalaris arundinacea*	FACW+	herb
3. *Poa pratensis*	FAC-	herb

b) Presence of hydric soils

Annual on-site soil sampling has been conducted since 2007. In this fifth year of monitoring the line demarking hydric from non-hydric soil on Figure 2 was mapped on-site using a GPS. Hydric soil covers 3.74 ac of the monitored area of the site (15.6 ac).

Site 1 is found in the northeast corner of the monitoring site and has a non-hydric soil. This sloping area has a low likelihood of developing hydric soil. The sample described below (Table 3) was taken in 2010; samples examined in 2011 did not show appreciable differences.

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Table 3 – Non-hydric soil sample from the northeast corner of the tree planting area (Site 1)

Depth [cm]	Matrix Color	Redox Concentrations	Redox Depletions	Texture	Structure
0-20	10YR 2/1	-	-	silty clay loam	subangular blocky
20-38	10YR 3/2.5	-	7.5YR 4/1 (20%)	silty clay loam	subangular blocky
38-51	10YR 3/2.5	7.5YR 2.5/1 (5%) & 2% concretions	-	silty clay loam	subangular blocky

Both a hydric and a non-hydric soil occur within Site 2. The non-hydric soil covers a larger area and is found at slightly higher elevation. The hydric soil occurs adjacent to the pre-existing drainage-way running through the monitoring site.

The non-hydric soil on the monitoring site is Batavia silt loam (Table 4). It is a well to moderately-well drained soil. Batavia silt loam covers the largest extent of all the soil mapping units within the monitored areas. The likelihood of this soil becoming hydric is undetermined and will be largely dependant on site hydrology.

Table 4 - Dominant non-hydric soil found in both tree planting areas (Site 2) (Batavia silt loam)

Depth [cm]	Matrix Color	Redox Concentrations	Redox Depletions	Texture	Structure
0-20	10YR 2/1	-	-	silty clay loam	subangular blocky
20-61	10YR 4/3	-	-	clay loam	subangular blocky

There are two different soils within the areas mapped with hydric soils. Sawmill silty clay loam, a poorly drained soil, is mapped within and along the wet meadow drainage-way running through the northeast corner and along the eastern side of the monitoring area. At a slightly higher elevation there is a hydric soil transitional between the Sawmill and Batavia soils. This soil makes up the majority of the hydric soils within the monitored areas. Soil sampling for 2011 again concentrated on areas outside of those that appeared to likely possess hydric soils, thereby capturing mostly the transitional soils. These soils had hydric soil indicators. A description of a typical transitional soil found on this site can be found in Table 5.

Table 5 – A transitional hydric soil found in both tree planting areas (Site 2)

Depth [cm]	Matrix Color	Redox Concentrations	Redox Depletions	Texture	Structure
0-18	10YR 2/1	7.5YR 3/3 (5%)	-	silty clay loam	subangular blocky
18-31	10YR 4/3	-	10YR 4/2 (5%)	silty clay loam	subangular blocky

c) <u>Presence of wetland hydrology</u>

Field evidence of wetland hydrology found within Site 2 during the 2011 site visit included areas of saturated soils, algal mats, a few sparsely vegetated concave areas and low landscape position

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over portions of the site (particularly adjacent to the preexisting wet meadow drainage-way). Throughout the site there was drift material and wetland drainage patterns. Site 1 contained some drift.

For the 2011 growing season, well data from instruments placed by ISGS personnel show that approximately 6.7 ac of the total compensation site (23.6 ac) had wetland hydrology for at least 12.5% of the growing season, while 8.0 ac had wetland hydrology for 5% of the growing season (Figure 3, Appendix 1). The site experienced above normal rainfall again this year. Despite 10.5 inches of rain over 10 days in late July, the subsequent flooding on the site was of short duration (Miner et al. 2011).

This site is in its fifth year of monitoring, therefore the estimated total area that met wetland hydrology for both 5 and 12.5% of the growing season in 3 out of 5 years was calculated (Figure 4, Appendix 1). Out of the total compensation site area of 23.6 ac, 23.3 ac had wetland hydrology for 5%, and 12.8 ac had wetland hydrology for 12.5%, of the growing season in 3 out of 5 years. A full summary of the hydrology at the compensation site over the last 5 years can be found in Appendix 4.

Figures 5 and 6 in Appendix 1 were made by overlaying the areas meeting wetland hydrology for 5% and 12.5% respectively of the growing season with the area of hydric soils within the created wetlands. Approximately 3.7 ac had both hydric soils and wetland hydrology for at least 5% of the growing season (Figure 5), and approximately 3.6 ac had both hydric soils and wetland hydrology for at least 12.5% of the growing season (Figure 6).

Project Goal 2 – The wetland should meet prescribed standards for vegetative cover and floristic composition.

a) Survival of planted trees

Table 6 presents data for planted tree survival, with numbers of observed live and apparently dead stems. Density of live stems per acre (within the 15.6 ac tree planting area) is also listed for each species.

Table 6 - Observed survival of planted trees in 2011

Species	*Total stems observed*	*Total density live/acre*
Carya illinoensis	243	15.6
Fraxinus pennsylvanica	278	17.8
Platanus occidentalis	247	15.8
Quercus bicolor	211	13.4
Quercus palustris	322	20.6
Total live stems	1301	83.4
Dead	245	N/A

In the fifth year of observation, many of the planted trees still seem to be doing well. Survival continues to exceed the project goal of 55 established planted trees per acre and therefore this performance criterion was met. The number of total live stems has risen back to numbers closer to 2008 (1339 stems) and 2009 (1359 stems) (Kurylo et al. 2008 and 2009) from a low in 2010 of

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1234 (Kurylo et al. 2010). This is likely due to re-sprouting/stump sprouting on trees that were counted as dead in previous years, particularly *Platanus occidentalis* and *Quercus palustris*.

Seedlings and small shrub-sized individuals of native trees were also observed on the tree planting areas. These will continue to colonize from surrounding woodlands and hasten the development of floodplain forest on the planned wetland areas.

b) Native species composition and
c) Dominant plant species
Performance criteria require that the majority of species on the site be native, non-weedy perennials, and that none of the dominant species be non-native or weedy species such as reed canary grass, cattail, or sandbar willow. Table 7 presents the total number of plant species, number of native species, perennial non-weedy native species (PNWN) and percent of PNWN species for each of the wetland determination sites within the wetland mitigation site.

Table 7 - Percent perennial, non-weedy native species (PNWN)

Site #	*Total species*	*Native*	*PNWN*	*% PNWN*
1 non-native grassland	37	23	13	35.1
2 wet meadow	67	57	39	58.2

Again this year site 1 does not meet the performance criterion of greater than 50% perennial, non-weedy native species. Site 2 has again this year met this performance criterion. The number of perennial, non-weedy native species would normally be expected to increase over time, but this year showed a slight decrease in all categories in the above table.

The dominant species for both sites continue to be primarily non-native, weedy species. Since *Phalaris arundinacea* (reed canary grass) is a dominant on both Sites 1 and 2 the "dominant plant species" performance criterion is not met by either site. The existing wet meadow drainage-way continues to be dominated by *P. arundinacea* and most likely serves as the primary seed source for this species into the mitigation site. This non-native, disturbance-loving, aggressive perennial grass can spread quickly by seed and rhizomes under suitable conditions. Control with herbicides and/or well-timed mowing or burning should be considered, being careful to avoid other, more desirable, vegetation.

Summary and Recommendations

At the end of five years, most of Site 1 did not meet Project Goal 1 – wetland creation. This site has not met the hydric soil criterion in any of the past 5 years, and only met the hydrophytic vegetation criterion in 1 out of 5 years (Kurylo et al. 2008, Kurylo et al. 2009 and 2010, Tessene et al. 2007). A portion of the site met wetland hydrology for 5% of the growing season in 3 out of 5 years (Figure 5), but since the area did not meet the soils or vegetation criteria the site is not a wetland. A small portion of the site, less than one tenth of an acre, met wetland hydrology for 12.5% of the growing season in 3 out of 5 years (Figure 6), a measurement that can be used to define an area as wetland even if lacking hydrophytic vegetation and hydric soils.

At the end of 5 years, part of Site 2 has met Project Goal 1 – wetland creation. Situated along the existing wetland through the compensation area, 3.6 ac met all three wetland criteria. This area

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is discernible on Figure 5 using the areas with hydric soil within the area meeting wetland hydrology for 5% of the growing season. An additional 3.6 ac can also be considered wetland, despite a lack of hydric soils, because it met wetland hydrology for 12.5% of the growing season in 3 out of 5 years. Site 2 shows a total wetland acreage of 7.2 ac. The rest of Site 2 met the hydrophytic vegetation criterion in all 5 years (Kurylo et al. 2008, Kurylo et al. 2009 and 2010, Tessene et al. 2007) and met wetland hydrology for 5% of the growing season in 3 out of 5 years, but does not have hydric soils.

Total possible wetland acreage from Site 1 and Site 2 is 7.2 ac. Due to a slight discrepancy between ISGS and INHS in how far north the site was monitored (Figure 5 and Figure 6), up to an additional tenth of an acre may also be considered wetland, but determinative hydrological data are currently not available. It is comprised of 0.05 ac of hydric soil and an undetermined extent of area with wetland hydrology for 12.5% of the growing season.

Project Goal 2 – meeting floristic standards - was only partially met. Planted tree species continued to do well, exceeding the 55 trees/acre performance criterion. Natural colonization by woody species from the surrounding wetlands will also continue to augment tree density. Effort should be made to remove the wire cages from the trees along the wet meadow drainage-way in the northeastern portion of the site. Many of the trees have severe bark rubbing or the cage is disfigured enough to impede the growth/resprouting of the trees. As stated in previous reports, all the *Juglans cinerea* that were planted in the northwest portion of the site have died.

The performance criterion calling for no non-native or invasive dominants was unmet due to dominance by *Phalaris arundinacea* on both sites. The species is common in areas surrounding the site and is the only dominant in the wet meadow drainage-way running through the restoration site. Given that the overall goal for this site is to create floodplain forest, the long term dominance of this species may be diminished as the forest canopy closes and shades the site (Hovick and Reinartz 2007).

Phalaris arundinacea is rhizomatous and has non-dormant seeds creating a ready-to-germinate seed bank (Apfelbaum and Sams 1987). The literature suggests that a one-time application of herbicide, burning, or mowing will only reduce the species biomass temporarily (Lavergne and Molofsky 2006, Wilcox et al. 2007). A common practice of land managers for *P. arundinacea* abatement is a spring burn followed by spring herbicide treatment, but this often achieves only short term effectiveness. A spring burn followed by a late August or late September application of glyphosate was found to be more effective, although still a short term solution (Adams and Galatowitsch 2006). Rodeo®, a formulation of glyphosate recommended for wetlands, has been found to be effective in a handful of studies, but again, only in the short term (Lavergne and Molofsky 2006).

For long term control, efforts spread out over the year and over multiple years are found to be more effective. An Iowa study found reduced coverage of *P. arundinacea*in open areas of an oak savannah after two to four burns over seven years (Dettman and Mabry 2008). An Illinois Nature Preserve was able to push back and keep *P. arundinacea* at its margins with burns every two to three years (Apfelbaum and Rouffa 1983). According to Lavergne and Molofsky (2006), the most effective methods combine both chemical and physical practices for the long term control of *P. arundinacea*. A suggestion for the areas of this site where *P. arundinacea* is a problem,

namely the existing wet meadow drainage-way and the northwest corner of the site, may include a spring application of Rodeo® followed by mowing in the early fall of the same year, hydrology permitting. In the second year conservative application of Rodeo® in the fall, followed in the third year with a spring burn is recommended. Burning would be of concern where the planted trees are densely surrounded by *P. arundinacea* as the trees may not be old enough, or their bark thick enough, to withstand a low intensity fire. By applying herbicide and mowing in the first few years before burning, the amount of fuel and area needing to be burned should hopefully be reduced.

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Appendix 1

Figure 1 – Mitigation Site Location Map
Figure 2 – Wetland Determination Sites and Hydric Soils Map
Figure 3 – ISGS Compensation Site Hydrology Map for 2011 Growing Season
Figure 4 – ISGS Compilation Map Covering 5 Years of Site Hydrology
Figure 5 – Hydric Soils Map With 5% Wetland Hydrology 2007-2011
Figure 6 – Hydric Soils Map With 12.5% Wetland Hydrology 2007-2011

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Figure 1
Mitigation Site Location Map (Miner et al. 2011)

Freeport Bypass West
Wetland Mitigation Site 6W
(FAP 301 [US 20])
General Study Area and Vicinity
from the USGS Topographic Series, Freeport West, IL, 7.5-minute Quadrangle (USGS 1998)
contour interval is 10 feet

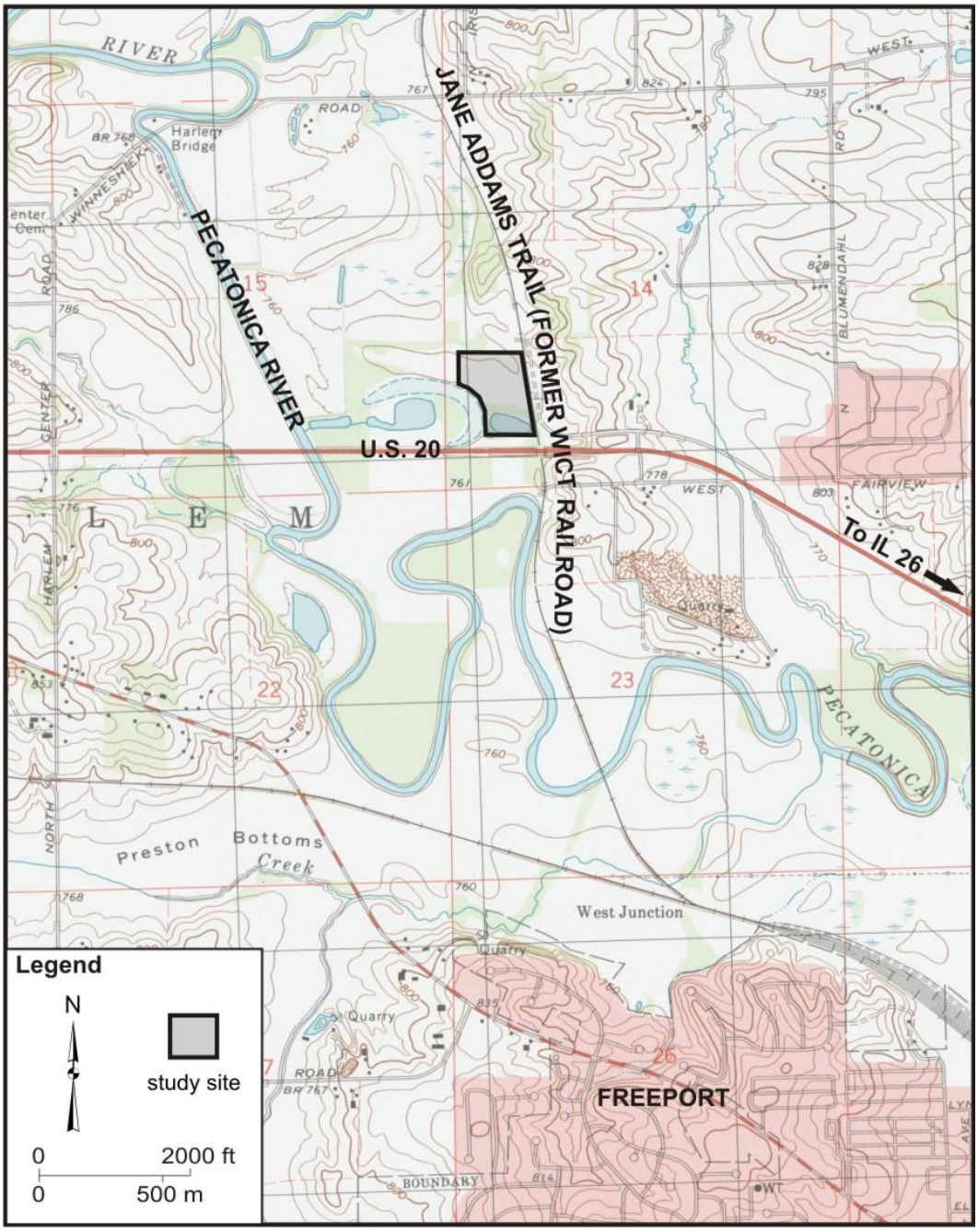

Figure 2
Wetland Determination Sites and Hydric Soils Map

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ILLINOIS
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Wetland Science Program
Illinois Natural History Survey
Prairie Research Institute
1816 South Oak Street
Champaign, Illinois 61820

Wetland Determination and Hydric Soils Map
FAP 301 (US 20 - Freeport Bypass West)
Stephenson County

Seq. No: 10487

0 Meters 50
1 : 2,400

0 Feet 200
1 inch : 200 feet

01/2012

Figure 2

N

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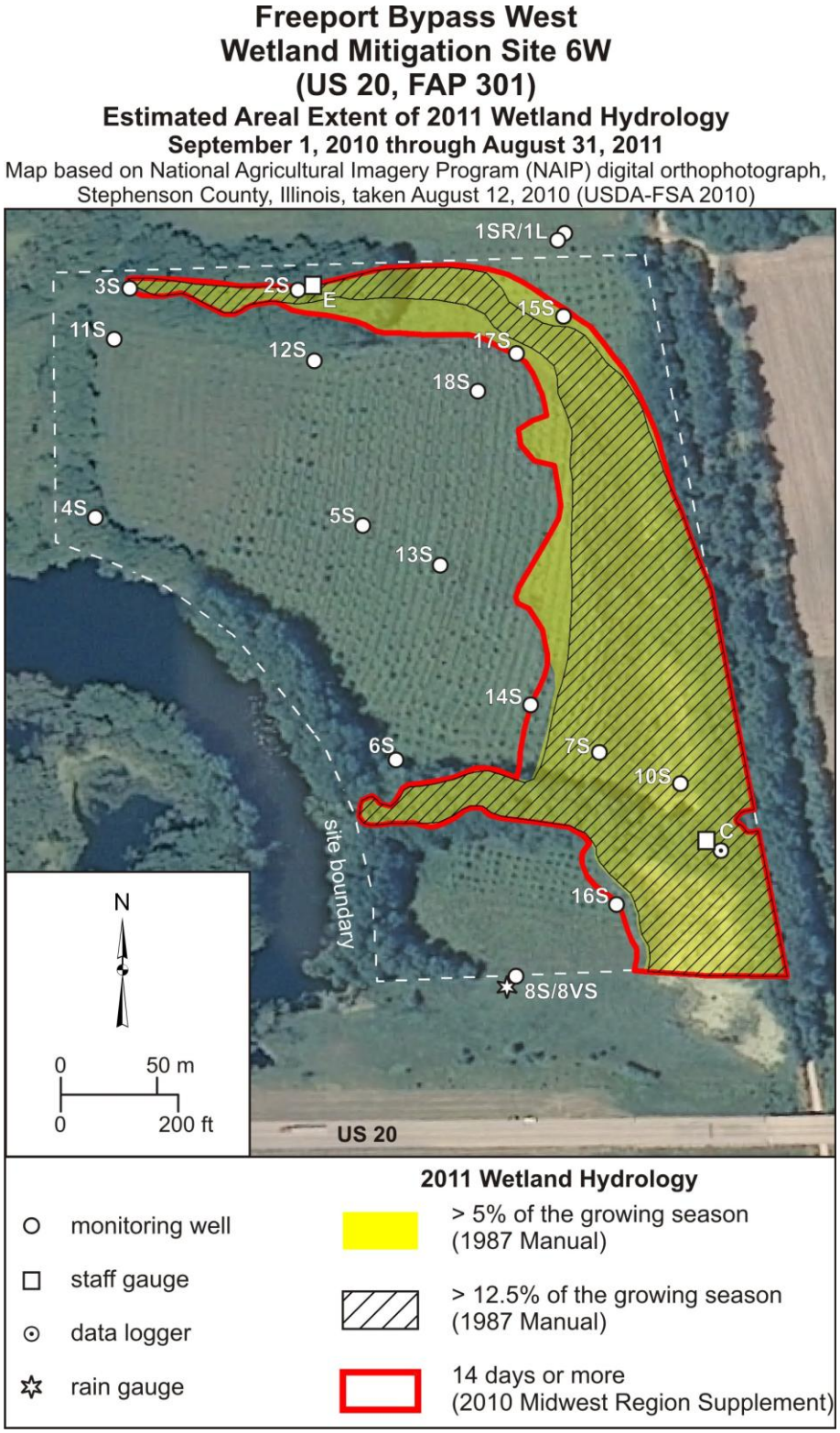
Figure 3
ISGS Compensation Site Hydrology Map for 2011 Growing Season
(Miner et al. 2011)



16

Figure 4
ISGS Compilation Map Covering 5 Years of Site Hydrology

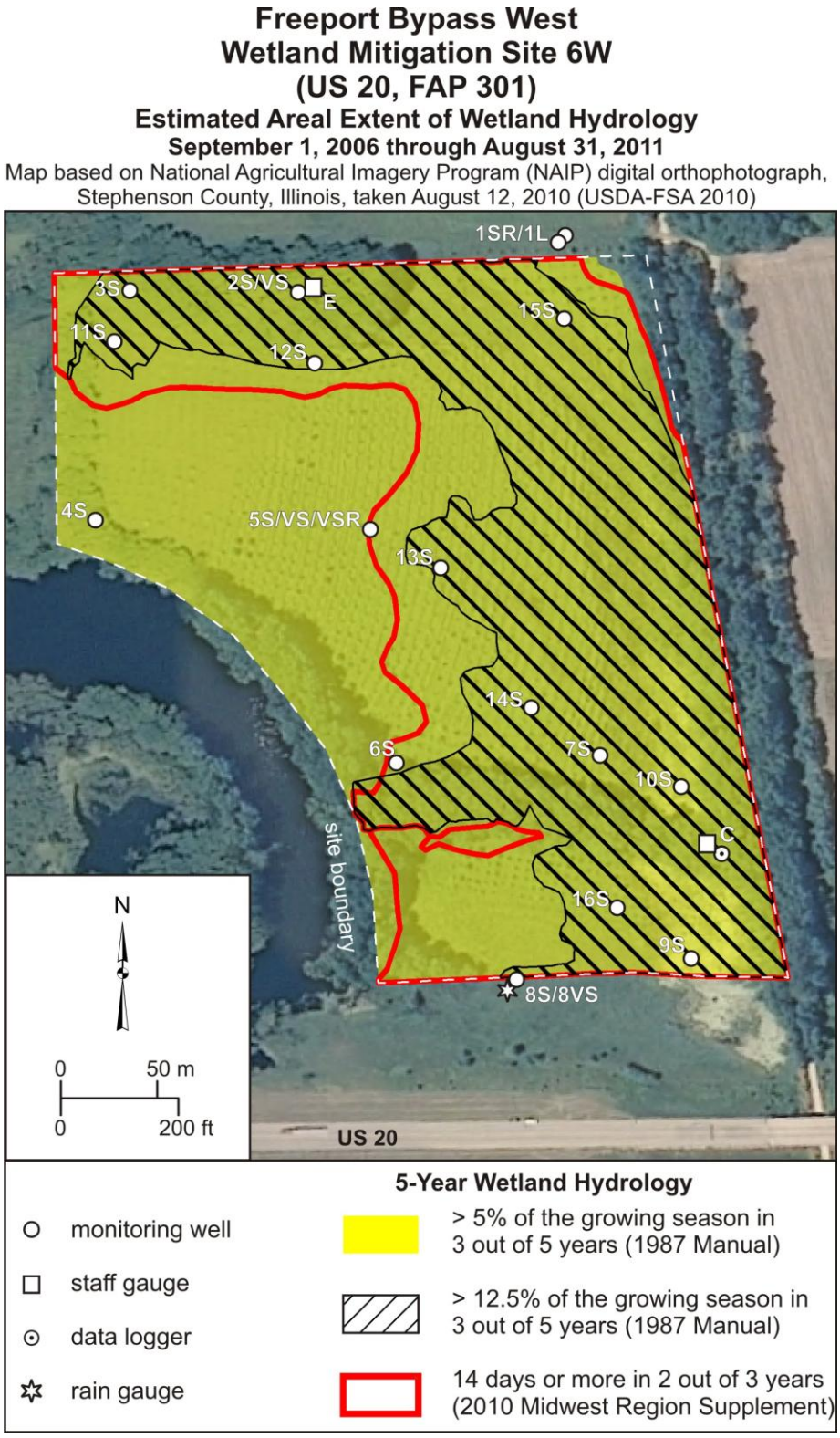
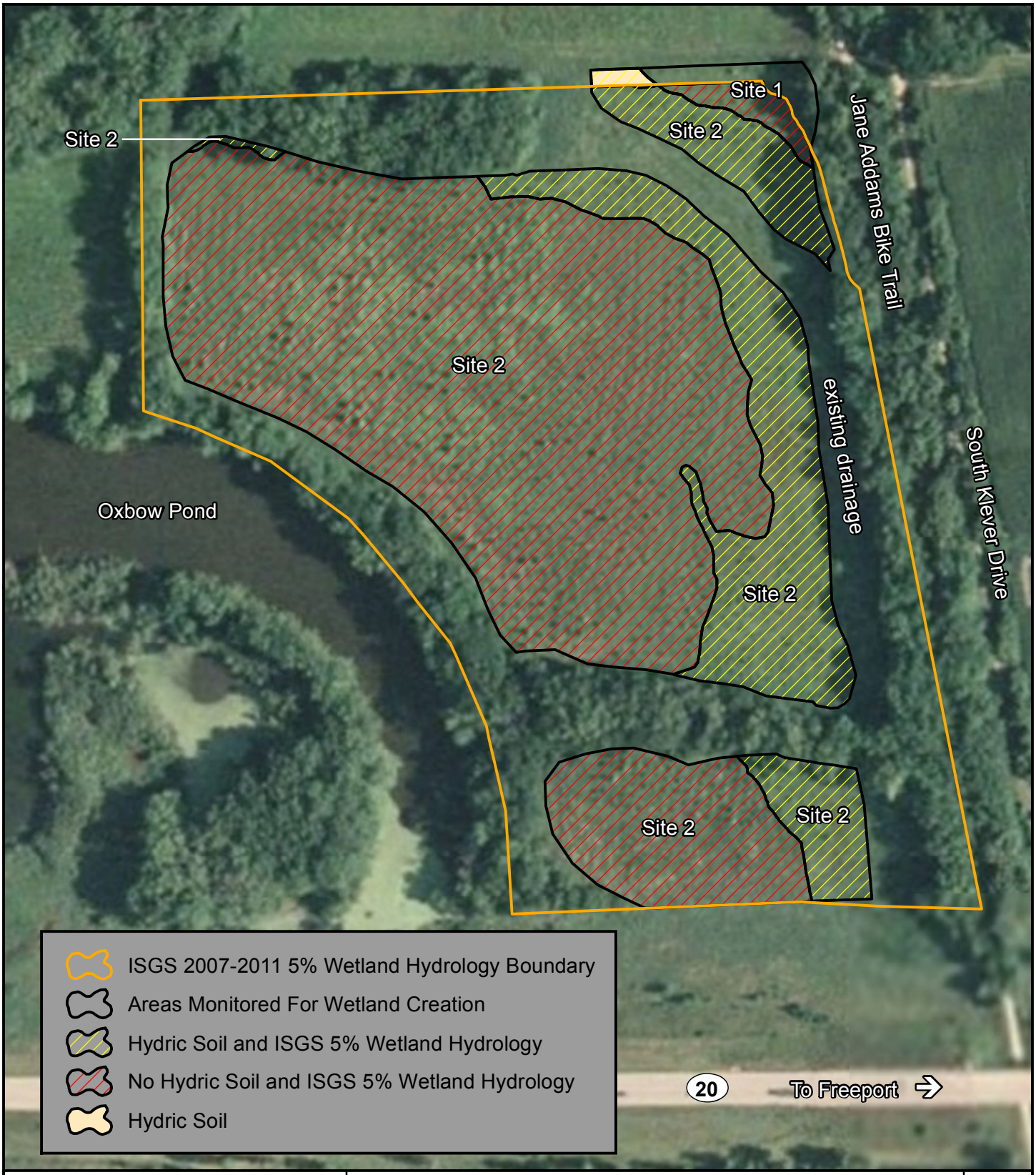


Figure 5
Hydric Soils Map with 5% Wetland Hydrology 2007-2011



ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Wetland Science Program
Illinois Natural History Survey
Prairie Research Institute
1816 South Oak Street
Champaign, Illinois 61820

Hydric Soils Map with 5% Wetland Hydrology 2007-2011
FAP 301 (US 20 - Freeport Bypass West)
Stephenson County

Seq. No: 10487

0 Meters 50
1 : 2,400

0 Feet 200
1 inch : 200 feet

01/2012

Figure 5

Figure 6
Hydric Soils Map with 12.5% Wetland Hydrology 2007-2011

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Hydric Soils Map with 12.5% Wetland Hydrology 2007-2011
FAP 301 (US 20 - Freeport Bypass West)
Stephenson County

Seq. No: 10487

0 Meters 50
1 : 2,400

0 Feet 200
1 inch : 200 feet

01/2012

Figure 6

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Appendix 2

Wetland Determination Forms

ROUTINE ONSITE WETLAND DETERMINATION
Site 1 (page 1 of 4)

Field Investigators: Kurylo, Matthews, and Zylka **Date:** 15-16 September 2011
Job No.: P92-029-02 **Project Name:** FAP 301 (US 20-Freeport bypass)
State: Illinois **County:** Stephenson **Applicant:** IDOT District 2
Site name: non-native grassland
Legal Description: Sec. 14, T27N, R7E
Location: Former crop field in the northeast corner of the mitigation site.

Do normal environmental conditions exist at this site? Yes: X No:
Has the vegetation, soils, or hydrology been significantly disturbed? Yes: No: X

VEGETATION

Dominant Plant Species	**Indicator Status**	**Stratum**
1. *Phalaris arundinacea*	FACW+	herb
2. *Poa pratensis*	FAC-	herb

Percentage of dominant species that are OBL, FACW, or FAC: 50%

Hydrophytic vegetation? Yes: No: X
Rationale: Not more than 50% of the dominants are OBL, FACW, or FAC.

SOILS
Series and phase: NRCS mapped as Lawson silt loam, revised to Dickenson sandy loam
On Stephenson County hydric soils list? Yes: No: X
Is the soil a histosol? Yes: No: X
Histic epipedon present? Yes: No: X
Redox concentrations? Yes: No: X Color: N/A
Redox depletions? Yes: X No: Color: 7.5YR 4/1
Matrix color: 10YR 2/1 over 10YR 3/2.5
Other indicators: Most of this site is situated on a slope above the rest of the project area.

Hydric soils: Yes: No: X
Rationale: This soil has a subsurface matrix color too bright to be considered hydric.

ROUTINE ONSITE WETLAND DETERMINATION
Site 1 (page 2 of 4)

Field Investigators: Kurylo, Matthews, and Zylka **Date:** 15-16 September 2011
Job No.: P92-029-02 **Project Name:** FAP 301 (US 20-Freeport bypass)
State: Illinois **County:** Stephenson **Applicant:** IDOT District 2
Site name: non-native grassland
Legal Description: Sec. 14, T27N, R7E
Location: Former crop field in the northeast corner of the mitigation site.

HYDROLOGY
Inundated: Yes: No: X Depth of standing water: None
Depth to saturated soil: More than20 in
Overview of hydrologic flow through system: Precipitation, sheet flow, and overflow from the Pecatonica River contribute water to this site. Water leaves the site by evapotranspiration, soil infiltration, and sheet flow to Site 2 and the drainage-way running through the restoration site.
Size of watershed: approximately 1297 mi^2 (U.S. Geological Survey 2010)
Other field evidence observed: Drift was observed on site despite its location on a slope at the edge of a floodplain.

Wetland hydrology: Yes: X No:
Rationale: According to the ISGS, no portion of this site met wetland hydrology for 5% or 12.5% of the 2011 growing season (Miner et al. 2011) (see also Figure 3 in Appendix 2). While the lower portion of this site met wetland hydrology for 5% of the growing season in 3 out of 5 years (see Figures 4 and 5). For that same 5 year period, though, an area amounting to less than one tenth of an acre of the site met wetland hydrology for 12.5% of the growing season, thus could be called wetland.

WETLAND DETERMINATION AND RATIONALE

Is the site a wetland? Yes: No: X
Rationale: The majority of this site does not possess any of the three criteria for a wetland.

Determined by: Jesse Kurylo (soils and hydrology)
Jeff Matthews and Jason Zylka (vegetation and hydrology)
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Illinois Natural History Survey
Eric Plankell (hydrology)
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ROUTINE ONSITE WETLAND DETERMINATION

Site 1 (page 3 of 4)

Field Investigators: Kurylo, Matthews, and Zylka **Date:** 15-16 September 2011
Job No.: P92-029-02 **Project Name:** FAP 301 (US 20-Freeport bypass)
State: Illinois **County:** Stephenson **Applicant:** IDOT District 2
Site name: non-native grassland
Legal Description: Sec. 14, T27N, R7E
Location: Former crop field in the northeast corner of the mitigation site.

SPECIES LIST

Scientific Name	Common Name	Stratum	Wetland indicator status	C**
Acer negundo	box elder	herb	FACW-	1
Acer saccharinum	silver maple	herb	FACW	1
Ambrosia artemisiifolia	common ragweed	herb	FACU	0
Ambrosia trifida	giant ragweed	herb	FAC+	0
Aster pilosus	hairy aster	herb	FACU+	0
Boehmeria cylindrica	false nettle	herb	OBL	3
Bromus inermis	awnless brome grass	herb	UPL	*
†*Carya illinoensis*	pecan	sapling	FACW	6
Cichorium intybus	chickory	herb	UPL	*
Cirsium arvense	Canada thistle	herb	FACU	*
Cirsium vulgare	bull thistle	herb	FACU-	*
Daucus carota	Queen Anne's lace	herb	UPL	*
Elymus virginicus	Virginia wild rye	herb	FACW-	4
†*Fraxinus pennsylvanica*	green ash	sapling, herb	FACW	2
Gleditsia triacanthos	honey locust	herb	FAC	2
Lonicera tatarica	Tartarian honeysuckle	shrub	FACU	*
Lycopus americanus	common water horehound	herb	OBL	3
Lysimachia nummularia	moneywort	herb	FACW+	*
Phalaris arundinacea	reed canary grass	herb	FACW+	*
†*Platanus occidentalis*	sycamore	sapling	FACW	3
Poa pratensis	Kentucky bluegrass	herb	FAC-	*
Populus deltoides	eastern cottonwood	herb	FAC+	2
Potentilla norvegica	rough cinquefoil	herb	FAC	0
Prunus serotina	wild black cherry	herb	FACU	1
†*Quercus bicolor*	swamp white oak	sapling	FACW+	7
†*Quercus palustris*	pin oak	sapling	FACW	4
Rubus pensylvanicus	blackberry	shrub	FAC-	2
Rumex crispus	curly dock	herb	FAC+	*
Scutellaria lateriflora	mad-dog skullcap	herb	OBL	4
Setaria glauca	pigeon grass	herb	FAC	*
Solanum carolinense	horse nettle	herb	FACU-	0
Solidago canadensis	Canada goldenrod	herb	FACU	1
Taraxacum officinale	common dandelion	herb	FACU	*
Toxicodendron radicans	poison ivy	herb	FAC+	1

Species list continues on next page.

ROUTINE ONSITE WETLAND DETERMINATION

Site 1 (page 4 of 4)

Field Investigators: Kurylo, Matthews, and Zylka **Date:** 15-16 September 2011
Job No.: P92-029-02 **Project Name:** FAP 301 (US 20-Freeport bypass)
State: Illinois **County:** Stephenson **Applicant:** IDOT District 2
Site name: non-native grassland
Legal Description: Sec. 14, T27N, R7E
Location: Former crop field in the northeast corner of the mitigation site.

SPECIES LIST Continued

Scientific Name	Common Name	Stratum	Wetland indicator status	C**
Trifolium hybridum	alsike clover	herb	FAC-	*
Trifolium pratense	red clover	herb	FACU+	*
Vitis riparia	riverbank grape	herb	FACW-	2

** Coefficient of Conservatism (Taft et al. 1997)
* Non-native species
† Planted species

With planted species:
mCv = ∑C/N = 49/23 = 2.5
FQI = ∑C/√N = 49/√23 = 10.2
Without planted species:
mCv = ∑C/N = 29/19 = 1.5
FQI = ∑C/√N = 29/√19 = 6.7

ROUTINE ONSITE WETLAND DETERMINATION
Site 2 (page 1 of 5)

Field Investigators: Kurylo, Matthews, and Zylka **Date:** 15-16 September 2011
Job No.: P92-029-02 **Project Name:** FAP 301 (US 20-Freeport bypass)
State: Illinois **County:** Stephenson **Applicant:** IDOT District 2
Site name: wet meadow
Legal Description: Sec. 14, T27N, R7E
Location: The majority of the former crop fields away from the drainage-way running along the east side of the mitigation site.

Do normal environmental conditions exist at this site? Yes: X No:
Has the vegetation, soils, or hydrology been significantly disturbed? Yes: No: X

VEGETATION

Dominant Plant Species	**Indicator Status**	**Stratum**
1. *Elymus virginicus*	FACW-	herb
2. *Phalaris arundinacea*	FACW+	herb
3. *Poa pratensis*	FAC-	herb

Percentage of dominant species that are OBL, FACW, or FAC: 66.7%

Hydrophytic vegetation? Yes: X No:
Rationale: Greater than 50% of the dominants are OBL, FACW, or FAC.

SOILS (see Figure 2 in Appendix 2 for approximate extents)
Series and phase: Sawmill silty clay loam (eastern part of site), Batavia silt loam (western part of site), and a transitional soil was also found on the site
On Stephenson County hydric soils list? Yes: X (Sawmill) No:
Is the soil a histosol? Yes: No: X
Histic epipedon present? Yes: No: X
Redox concentrations? Yes: X No: (Sawmill and transitional soil)
Redox depletions? Yes: X No: (Sawmill and transitional soil)
Matrix color: 10YR 2/1 over 10YR 4/2 (Sawmill), 10YR 3/1 over 10YR 4/3 (Batavia), 10YR 2/1 over 10YR 4/3 (transitional)
Other indicators: Soft masses in the subsurface horizons were found in the Sawmill soils and hard concretions were found in the transitional soils.
Hydric soils: Yes: X (in parts) No:
Rationale: The Natural Resources Conservation Service classifies Sawmill as poorly drained and Batavia as well to moderately well drained soil. Approximately 3.7 ac are hydric soils (Sawmill and the transitional hydric soil). Both hydric soils have a low chroma matrix in the surface horizon with redox concentrations and the Sawmill areas also have a depleted matrix in the subsurface. The transitional soil also meets the F6 (redox dark surface) hydric soil indicator, while the Sawmill meets A12 (thick dark surface) hydric soil indicator from the NRCS. The Batavia soils do not display characteristics of a hydric soil.

ROUTINE ONSITE WETLAND DETERMINATION
Site 2 (page 2 of 5)

Field Investigators: Kurylo, Matthews, and Zylka **Date:** 15-16 September 2011
Job No.: P92-029-02 **Project Name:** FAP 301 (US 20-Freeport bypass)
State: Illinois **County:** Stephenson **Applicant:** IDOT District 2
Site name: wet meadow
Legal Description: Sec. 14, T27N, R7E
Location: The majority of the former crop fields away from the drainage-way running along the east side of the mitigation site.

HYDROLOGY
Inundated: Yes: No: X Depth of standing water: None
Depth to saturated soil: at surface to starting below 30 in or greater
Overview of hydrologic flow through system: Precipitation, sheet flow, and overflow from the Pecatonica River and drainage-way running through the compensation site contribute water to this site. Water leaves the site by evapotranspiration, soil infiltration, and sheet flow to the drainage-way.
Size of watershed: approximately 1297 mi^2 (U.S. Geological Survey 2010)
Other field evidence observed: Landscape position, areas of saturated soils, drift, algal mats, and areas of sparsely vegetated concave surfaces were observed this year.

Wetland hydrology: Yes: X No:
Rationale: For the 2011 growing season, a small portion of Site 2 along the existing wetlands was inundated or saturated for at least 12.5% of the growing season. A slightly larger portion met wetland hydrology for 5% of the growing season (Miner et al. 2011) (see also Figures 2 and 3 in Appendix 2).

WETLAND DETERMINATION AND RATIONALE
Is the site a wetland? Yes: X (parts) No:
Rationale: Approximately 7.2 ac of the site met wetland hydrology for 12.5% of the growing season in 3 out of 5 years and is therefore a jurisdictional wetland (see Figure 6). Despite meeting wetland hydrology for 5% of or the growing season, the rest of Site 2 (the western half) lacks hydric soil and therefore is not a wetland.

Determined by: Jesse Kurylo (soils and hydrology)
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ROUTINE ONSITE WETLAND DETERMINATION

Site 2 (page 3 of 5)

Field Investigators: Kurylo, Matthews, and Zylka **Date:** 15-16 September 2011
Job No.: P92-029-02 **Project Name:** FAP 301 (US 20-Freeport bypass)
State: Illinois **County:** Stephenson **Applicant:** IDOT District 2
Site name: wet meadow
Legal Description: Sec. 14, T27N, R7E
Location: The majority of the former crop fields away from the drainage-way running along the east side of the mitigation site.

SPECIES LIST

Scientific Name	Common Name	Stratum	Wetland indicator status	C**
Acer negundo	box elder	herb	FACW-	1
Acer saccharinum	silver maple	herb	FACW	1
Alisma plantago-aquatica	broad-leaf water-plantain	herb	OBL	2
Amaranthus tuberculatus	tall waterhemp	herb	OBL	1
Ambrosia artemisiifolia	common ragweed	herb	FACU	0
Ambrosia trifida	giant ragweed	herb	FAC+	0
Antenoron virginianum	Virginia knotweed	herb	FAC	3
Apocynum cannabinum	dogbane	herb	FAC	2
Asclepias incarnata	swamp milkweed	herb	OBL	4
Asclepias syriaca	common milkweed	herb	UPL	0
Aster ontarionis	Ontario aster	herb	FAC	4
Aster simplex	panicled aster	herb	FACW	3
Bidens comosa	beggar's ticks	herb	OBL	2
Bidens frondosa	common beggar's ticks	herb	FACW	1
Boehmeria cylindrica	false nettle	herb	OBL	3
Boltonia asteroides	false aster	herb	FACW	5
Bromus japonicus	Japanese brome	herb	FACU	*
Campanulastrum americanum	American bellflower	herb	FAC	4
Carex grayi	bur sedge	herb	FACW+	6
Carex sp.	sedge	herb	-----	--
Carex trichocarpa	sedge	herb	OBL	6
†*Carya illinoensis*	pecan	shrub	FACW	6
Cirsium vulgare	bull thistle	herb	FACU-	*
Conyza canadensis	horseweed	herb	FAC-	0
Cornus obliqua	pale dogwood	shrub	FACW+	4
Eleocharis acicularis	needle spike rush	herb	OBL	3
Elymus canadensis	Canada wild rye	herb	FAC-	4
Elymus virginicus	Virginia wild rye	herb	FACW-	4
Erigeron annuus	annual fleabane	herb	FAC-	1
Fallopia scandens	climbing buckwheat	herb	FAC	2
†*Fraxinus pennsylvanica*	green ash	shrub, herb	FACW	2
Geum canadense	white avens	herb	FAC	2
Gleditsia triacanthos	honey locust	herb	FAC	2

Species list continues on next page.

ROUTINE ONSITE WETLAND DETERMINATION
Site 2 (page 4 of 5)

Field Investigators: Kurylo, Matthews, and Zylka **Date:** 15-16 September 2011
Job No.: P92-029-02 **Project Name:** FAP 301 (US 20-Freeport bypass)
State: Illinois **County:** Stephenson **Applicant:** IDOT District 2
Site name: wet meadow
Legal Description: Sec. 14, T27N, R7E
Location: The majority of the former crop fields away from the drainage-way running along the east side of the mitigation site.

SPECIES LIST, continued

Scientific Name	Common Name	Stratum	Wetland indicator status	C**
Hordeum jubatum	squirrel-tail	herb	FAC+	*
Laportea canadensis	wood nettle	herb	FACW	2
Leersia oryzoides	rice cutgrass	herb	OBL	3
Lolium perenne	crested rye grass	herb	FACU	*
Lycopus virginicus	bugle weed	herb	OBL	5
Lysimachia nummularia	moneywort	herb	FACW+	*
Morus alba	white mulberry	sapling, herb	FAC	*
Parthenocissus quinquefolia	Virginia creeper	herb	FAC-	2
Penthorum sedoides	ditch stonecrop	herb	OBL	2
Persicaria amphibium	water smartweed	herb	OBL	3
Persicaria hydropiper	common smartweed	herb	OBL	*
Persicaria pensylvanica	giant smartweed	herb	FACW+	1
Persicaria punctata	dotted smartweed	herb	OBL	3
Phalaris arundinacea	reed canary grass	herb	FACW+	*
Phleum pratense	Timothy	herb	FACU	*
Physostegia virginiana	false dragonhead	herb	FACW	6
Pilea pumila	Canada clearweed	herb	FACW	3
Plantago rugelii	red-stalked plantain	herb	FAC	0
†*Platanus occidentalis*	sycamore	shrub	FACW	3
Poa pratensis	Kentucky bluegrass	herb	FAC-	*
Populus deltoides	eastern cottonwood	herb	FAC+	2
Potentilla simplex	common cinquefoil	herb	FACU-	3
†*Quercus bicolor*	swamp white oak	shrub	FACW+	7
†*Quercus palustris*	pin oak	shrub	FACW	4
Rhamnus cathartica	common buckthorn	herb	FACU	*
Rorippa palustris	marsh yellow cress	herb	OBL	4
Rosa multiflora	multiflora rose	shrub	FACU	*
Rudbeckia laciniata	cutleaf coneflower	herb	FACW+	3
Rumex crispus	curly dock	herb	FAC+	*
Sagittaria latifolia	arrowhead	herb	OBL	4

Species list continues on next page.

ROUTINE ONSITE WETLAND DETERMINATION

Site 2 (page 5 of 5)

Field Investigators: Kurylo, Matthews, and Zylka **Date:** 15-16 September 2011
Job No.: P92-029-02 **Project Name:** FAP 301 (US 20-Freeport bypass)
State: Illinois **County:** Stephenson **Applicant:** IDOT District 2
Site name: wet meadow
Legal Description: Sec. 14, T27N, R7E
Location: The majority of the former crop fields away from the drainage-way running along the east side of the mitigation site.

SPECIES LIST Continued

Scientific Name	Common Name	Stratum	Wetland indicator status	C**
Salix nigra	black willow	shrub, herb	OBL	3
Setaria faberi	giant foxtail	herb	FACU+	*
Setaria glauca	pigeon grass	herb	FAC	*
Sium suave	water parsnip	herb	OBL	5
Solanum carolinense	horse nettle	herb	FACU-	0
Sparganium eurycarpum	burreed	herb	OBL	5
Taraxacum officinale	common dandelion	herb	FACU	*
Teucrium canadense	American germander	herb	FACW-	3
Toxicodendron radicans	poison ivy	herb	FAC+	1
Trifolium hybridum	alsike clover	herb	FAC-	*
Ulmus americana	American elm	herb	FACW-	5
Viola pratincola	common blue violet	herb	FAC	1

** Coefficient of Conservatism (Taft et al. 1997)
* Non-native species
† Planted species

With planted species:
mCv = ∑C/N = 161/57 = 2.8
FQI = ∑C/√N = 161/√57 = 21.3
Without planted species:
mCv = ∑C/N = 141/53 = 2.7
FQI = ∑C/√N = 141/√53 = 19.4

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Appendix 3

Site Photos for 2011

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Photo Station 1 – South field, northeast corner looking southwest.

Photo Station 2 – South field, southwest corner looking northeast.

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Photo Station 3 – North field, southwest corner looking northeast.

Photo Station 4 – North field, northwest corner looking southeast.

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Photo Station 5 – North field, northeast corner looking southwest.

Photo Station 6 – North field, southeast corner looking northwest.

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Appendix 4

5 Year Wetland Hydrology Assessment

FREEPORT BYPASS WEST **ISGS #72**
WETLAND MITIGATION SITE 6W
US 20
FAP 301
Sequence #10487
Stephenson County, near Freeport, Illinois
Primary Project Manager: Eric T. Plankell
Secondary Project Manager: not assigned

SITE HISTORY

- December 2003: ISGS monitoring network was installed.
- Summer 2006: Tree planting was completed and a berm was installed at the western end of the central drainage ditch.
- February 2007: ISGS submitted a Level II hydrogeologic characterization report to IDOT (ISGS Open-File Series 2007–01).

WETLAND HYDROLOGY SUMMARY FOR 2007-2011

The estimated total area that satisfied wetland hydrology criteria (Environmental Laboratory 1987) for greater than 5% of the growing season in 3 out of 5 years is 9.4 ha (23.3 ac), and the area that satisfied wetland hydrology criteria for greater than 12.5% of the growing season in 3 out of 5 years is 5.2 ha (12.8 ac) out of a total site area of 9.6 ha (23.6 ac). Using the 2010 Midwest Region Supplement (U.S. Army Corps of Engineers 2010) to the 1987 Manual, it is estimated that 7.0 ha (17.2 ac) satisfied wetland hydrology criteria for 14 or more consecutive days during the growing season in 2 out of 3 years (2009-2011) when this method of analysis was completed. These estimates are based on the following factors:

- Water levels measured in all soil-zone (S and VS) monitoring wells satisfied wetland hydrology criteria for greater than 5% of the growing season in 3 out of 5 years. Water levels measured in wells 2S, 3S, 7S, 8VS, 10S, 11S, 12S, 13S, 14S, 15S, and 16S satisfied wetland hydrology criteria for greater than 12.5% of the growing season in 3 out of 5 years. According to the 2010 Midwest Region Supplement, water levels measured in all monitoring wells except well 4S satisfied wetland hydrology criteria for 14 or more consecutive days of the growing season in 2 out of 3 years (2009-2001) when this method of analysis was completed.

- Surface-water levels recorded by the data logger at Gauge C indicated on-site inundation at or above 231.51 m (759.55 ft) for greater than 5% of the growing season in 3 out of 5 years, and inundation at or above 231.146 m (758.35 ft) for greater than 12.5% of the growing season in 3 out of 5 years, according to the 1987 Manual. Based on the 2010 Midwest Region Supplement, water levels recorded by the data logger at Gauge C indicated inundation at or above 230.86 m (757.41 ft) for 14 or more consecutive days of the growing season in 2 out of 3 years. This latter value was derived from the 3 monitoring years (2009-2011) during which the 2010 Midwest Region Supplement was used by the ISGS, while the 5% and 12.5% values were derived from the entire 5 year monitoring period (2007-2011).