Sixth Year Wetland Mitigation and Corridor Revegetation Site Monitoring for FAP 658 (IL 29), Sangamon County, Illinois – 2005

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Introduction

Wetland mitigation activity has been initiated along Illinois Route 29 (FAP 658) in Sangamon County, Illinois. The legal location of the site is SE/4 of NW/4 of Sec. 33, T. 17 N., R. 5 W. (Athens, IL Quad). The wetland replacement site is located in a former agricultural field classified as prior converted wetland by the NRCS. The mitigation site assessment for this area suggested that floodplain forest would be the most likely development for this site (Plocher and Tessene 1995).

Plocher and Tessene (1995) surveyed the mitigation area in August 1995 and found 0.93 ha (2.3 ac) of NRCS Prior Converted Wetland that still met the three criteria for a wetland. Since then, the site has been excavated to create more low depressional ground to support wetland vegetation. The site is divided into two areas. Area A, the south half of the mitigation site, initially was to be planted with woody hydrophytic species. In 2001, however, the wetland compensation plan was modified for this area and it was planted with herbaceous vegetation only (Brooks 2001). Emergent herbs planted in Area A were *Asclepias incarnata*, *Leersia oryzoides*, *Eupatorium maculatum*, *Spartina pectinata*, and *Calamagrostis canadensis*. Field monitoring of this area began during the 2001 growing season and will continue for the standard five-year monitoring period (2001-2005) or until no longer required by the Illinois Department of Transportation (IDOT). Area B, at the north end of the mitigation site, was planted with a wetland grass seeding (*Elymus canadensis*, *Elymus virginicus*, *Spartina pectinata* and *Calamagrostis canadensis*) and with woody hydrophytic species (*Quercus palustris*, *Quercus bicolor*, *Betula nigra*, *Fraxinus pennsylvanica*, and *Carya illinoensis*). Field monitoring of this area began during the 2000 growing season and will also continue for the standard five years (2000-2004) or until no longer requested by IDOT (Early in 2005, the IDOT requested two additional years of monitoring at this site). The Illinois State Geological Survey (ISGS) has been tasked to monitor the hydrology of this mitigation site. Project goals, objectives, and performance criteria are included in this report, as are monitoring methods, monitoring results, summary information, and recommendations.

Project Goals, Objectives, and Performance Criteria

Proposed goals and objectives for the wetland mitigation project are based on information contained in the original IDOT project request (Brooks 2000) and in the modified project request (Brooks 2001). Performance criteria are based on those specified in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and *Guidelines for Developing*

Mitigation Proposals (USACOE 1993). Each goal should be attained by the end of the five-year monitoring period. Project goals, objectives and performance criteria are listed below.

Project Goal #1: At the end of the five-year monitoring period both created wetland communities should be jurisdictional wetlands as defined by current federal standards.

Objective: The created wetland should comprise 2.43 hectares (6.0 acres) of jurisdictional wetland.

Performance Criteria: The entire created wetland should satisfy the three criteria of the federal wetland definition: dominant hydrophytic vegetation, hydric soils, and wetland hydrology.

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 this site.

C. Presence of Wetland Hydrology – The compensation area must be either permanently or periodically inundated at average depths less than 2 m (6.6 ft) or have soils that are saturated to the surface for at least 12.5% of the growing season.*

Project Goal #2: In Area B, a floodplain forest wetland community will be created.

Objective: Planting the area with hydrophytic tree species should compensate for the loss of previously altered wetlands.

Performance Criteria: Seventy-five percent of the planted trees should be in a live and healthy condition each year for five years.

Project Goal #3: In Area A, a native, non-weedy, emergent wetland community will be created.

Objective: Planting the area with high quality native emergent vegetation should reduce the pressures from successional, non-native, weedy species.

Performance Criteria: In the Area A wetland site, at least 90% of the plant species present should be non-weedy, native, perennial and annual species, and none of the dominant plant species may be non-native or weedy species, such as cattails, sandbar willow or reed canary grass.

Methods

Monitoring is to be performed on two areas of the constructed wetland site. The monitoring for Area B, consisting of wetland determinations and tree survivorship surveys, began in 2000 and

* In some cases wetland hydrology can be met when a site is inundated or saturated for 5% to 12.5% of the growing season (Environmental Laboratory 1987).

will continue for a minimum of five years (2000-2004). Both the wet shrubland and upland shrubland communities will be assessed. Herbaceous vegetation in Area A (both wet meadow and forbland community) was monitored for the first time in 2001, after the area had been fully planted. Likewise, Area A will also be monitored for at least the standard five-year monitoring period (2001-2005). Illinois Natural History Survey (INHS) personnel will monitor the biological parameters while ISGS personnel will monitor hydrology. Yearly tree surveys in Area B and herbaceous sampling in Area A will be submitted in yearly monitoring reports submitted to IDOT on the status of the created wetland site. The likelihood of meeting the proposed goals and performance criteria will also be addressed. If, at any time during the monitoring period, it appears that the goals/performance criteria will not be met at the end of the five-year monitoring period, written management recommendations will be made to IDOT in an effort to correct any problems.

Floristic Quality Index (FQI)

For both Area A and Area B, a complete list of all plant species found in each plant community will be recorded and the FQI will be calculated (Taft *et al.* 1997). The FQI will be calculated both with and without planted species. This index provides a measure of the floristic integrity or level of disturbance of a site. Each native plant species 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 common and is likely to tolerate disturbed conditions; a species with a high C is relatively rare and is likely to require specific, undisturbed habitats. Species not identified to species level are not rated and are not included in the calculations.

To calculate the FQI, first compute the mean C value (also known as mean rated quality), $mCv = \sum C/N$, where $\sum C$ represents the sum of the numerical ratings (C) for all species recorded for a site, and N represents the number of plants on the site. The C value for each species is shown in the species list for the site (Appendix 2). Species that are not native to Illinois (indicated by * in the species list for each site) are not included in the calculations. The FQI for each site is determined by dividing the $\sum C$ value by the square root of N $[\sum C/(\sqrt{N})]$. An Index score below 10 suggests a site of low natural quality; below 5, a highly disturbed site. An FQI value of 20 ($mCv > 3$) or more suggests that a site has evidence of native character and may be considered an environmental asset.

Project Goal #1

Wetland delineations will be completed yearly for both wetland and upland community types at this creation site. Results of these determinations are summarized below and are described in more detail on the accompanying forms (Appendix 1). In addition, permanent photo stations have been established in each wetland restoration area and photos will be taken annually in order to help monitor changes in the vegetation.

A. Predominance of Hydrophytic Vegetation – The method for determining dominant hydrophytic vegetation is described in Environmental Laboratory (1987) and Federal Interagency Committee for Wetland Delineation (1989). This method is based on aerial coverage estimates for individual plant species. Each of the dominant plant species is assigned a wetland indicator

status rating (Reed 1988). Any plant rated facultative or wetter (i.e., FAC, FAC+, FACW-, FACW, FACW+ and OBL) is considered hydrophytic. A predominance of hydrophytic vegetation in the wetland plant community exists if greater than 50% of the dominant species present are hydrophytes. Planted species are not included in the percentage of dominant hydrophytic vegetation.

In Area A, dominant hydrophytic vegetation for all plant communities present will be determined each year based on results of systematic plant sampling. Area A will be monitored for at least the standard five-year monitoring period (2001 to 2005). Transects have been established perpendicular to the long axis of the adjacent field beginning at 15 m from the north end of Area A and continuing every 30 m afterwards. Quadrats (0.25 m^2) are to be placed at 4.5 m intervals along each transect so that each planting zone has equal opportunity to be sampled. A minimum of 30 quadrats will be sampled each year in Area A. Cover of all species in each plot is assigned a cover class (Table 1) (Daubenmire 1959). Frequency (proportion of quadrats in which a species occurred) and average cover (calculated using midpoints for each cover class) will be used to compute relative frequency (frequency of a species relative to total observations) and relative cover (cover relative to total observed cover), respectively. These two relative values are added to determine the importance value for each species sampled. Importance values will be used to determine dominant species. "Dominant species are the most abundant plant species (when ranked in descending order of abundance and cumulatively totaled) that immediately exceed 50% of the total dominance measure for the stratum, plus any additional species comprising 20% or more of the total dominance measure for the stratum" (FICWD 1989; Tiner 1999).

Table 1. Cover classes used in vegetation sampling at FAP 658 (IL 29), Sangamon County, Illinois.

Cover Class	Range of Cover (%)	Midpoint of Range (%)
1	0-5	3.0
2	5-25	15.0
3	25-50	37.5
4	50-75	62.5
5	75-95	85.0
6	95-100	97.5
		(Daubenmire 1959)

B. Presence of Hydric Soils – Soils, in each plant community, will be examined and described annually. A soil core collected from the same general area of the mitigation site will be examined for the presence of redoximorphic features. A detailed profile description of the soil using Munsell color charts to record soil colors will be included. Soil texture and structure will also be recorded. Hydric soils may develop slowly and characteristics may not be apparent during the first several years after project construction. In the absence of hydric soil indicators at that time, hydrologic data could be used as corroborative evidence that conditions favorable for hydric soil formation are present at the site.

C. Presence of Wetland Hydrology – The ISGS has been tasked to monitor hydrology at the proposed wetland site. To date they have installed two surface-water monitoring stations (RDS1 and RDS2), a rain gauge, five surface-water staff gauges (C, D, F, G, and H), and twelve shallow monitoring wells (1S – 12S) (Figure 1) (Pociask and Watson 2001; Pociask and Sabatini 2002; Pociask and Sabatini 2003; Pociask and Plankell 2004; Pociask and Plankell 2005). ISGS began hydrologic monitoring at Area B in September 2000. Hydrologic monitoring of Area A began in December 2001. ISGS personnel will measure water levels monthly. In addition, INHS scientists will survey the site annually for field indicators of wetland hydrology.

Project Goal #2

In Area B, tree survivorship will be assessed each year for a five-year monitoring period (2000 to 2004). Because of ice damage on the site, IDOT requested two additional years of tree monitoring. Initially the site was planted with a total of 544 trees. These trees included *Quercus palustris* (119), *Quercus bicolor* (106), *Betula nigra* (102), *Fraxinus pennsylvanica* (103) and *Carya illinoensis* (114). Some planting to replace dead trees has occurred since 2000. Annually, every tree will be located, identified to species, and determined to be alive or dead.

Project Goal #3

In the Area A wetland community, a complete species list will be compiled each year and species will be recorded as native or non-native and as weedy or non-weedy. Nativity of plants is determined by consulting Mohlenbrock (1986, 2002). Weedy species, for the purposes of this report, are defined as all non-native species and any native species assigned a Coefficient of Conservatism of 0 or 1 (Taft *et al*. 1997). Species given a C value of 0-1 correspond to Grime's ruderal species (Grime 1974; Grime *et al.* 1988), which include species adapted to frequent or severe disturbances (Taft *et al.* 1997).

Results

Floristic Quality Index (FQI): The FQI was calculated for this mitigation site using native species only. In Area B, the FQI was calculated in two ways. First the FQI was calculated using all species at the site, including the planted tree species. Then, the FQI was also calculated without planted species (spontaneous natives only). FQI for Area A was calculated using all native species in the species list.

Area A, comprised of both wet meadow and forbland communities, had a FQI of 16.3 and a mean C value of 2.5 for the wetland site. These values are indicative of fair natural quality. The upland forbland community of Area A had a FQI of 8.1 and a mean C value of 1.7. These values are indicative of an area with poor natural quality. There were 51 species found in the Area A wetland, 44 (86%) were native. Notable species in the Area A wet meadow community include *Ammania coccinea*, *Asclepias incarnata*, *Carex crus-corvi*, *Carex lupulina*, *Carex muskingumensis*, *Iris shrevei*, *Sagittaria latifolia*, and *Spartina pectinata*. Summary information for Area A is given in Tables 2 and 3.

Table 2. Summary table for Area A Wet Meadow (wetland) species list.	
Total Species Richness	51
Native Species Richness	44
% Native	86% (44/51)
% Native and Non-weedy	57% (29/51)
Mean Conservatism	2.5
Floristic Quality Index (FQI)	16.3
% Wetland Species (FAC to OBL)	86% (44/51)

Table 3. Summary table for Area A Forbland (upland) species list.	
Total Species Richness	26
Native Species Richness	22
% Native	85% (22/26)
% Native and Non-weedy	42% (11/26)
Mean Conservatism	1.7
Floristic Quality Index (FQI)	8.1
% Wetland Species (FAC to OBL)	73% (19/26)

Area B, comprised of a wet meadow and an upland shrubland community, had a FQI of 13.5 and a mean C value of 2.7 for the wetland site when planted material was included. These values dropped to 10.0 for the FQI and 2.2 for the mean C when planted species were excluded. These values are indicative of an area with fair natural quality. The Area B wetland site had a total of 27 species, 26 were native (96%) in 2005. Notable species in Area B wet meadow community include *Asclepias incarnata*, *Carex normalis*, *Eleocharis macrostachya*, *Elymus virginicus*, *and Panicum virgatum*. Summary information for Area B is given in Tables 4 and 5.

Table 4. Summary table for Area B Wet Meadow (wetland) species list.	
Total Species Richness (with planted material)	27
Native Species Richness (with planted material)	26
% Native	96% (26/27)
Mean Conservatism (with planted material)	2.7
Mean Conservatism (spontaneous natives only)	2.2
Floristic Quality Index (FQI) (with planted material)	13.5
FQI (spontaneous natives only)	10.0
% Wetland Species (OBL, FACW, FAC) (with planted material)	93% (25/27)

Table 5. Summary table for Area B Shrubland (upland) species list.	
Total Species Richness	49
Native Species Richness	40
% Native	82% (40/49)
Mean Conservatism (with planted material)	2.3
Mean Conservatism (spontaneous natives only)	1.9
Floristic Quality Index (FQI) (with planted material)	14.2
FQI (spontaneous natives only)	11.3
% Wetland Species (OBL, FACW, FAC) (with planted material)	61% (30/49)

Project Goal #1 At the end of the five-year monitoring period the created wetland communities should be a jurisdictional wetlands as defined by current federal standards.

A. Predominance of Hydrophytic Vegetation – The performance criterion requires that greater than 50% of the dominant plant species be hydrophytic. In Area A, 2005 vegetation sampling results indicate that the dominant species in the wet meadow community are *Iva annua* (FAC) and *Aster simplex* (FACW) (Table 6). Area B wetland site dominant species are: *Aster simplex* (FACW), *Eleocharis macrostachya* (OBL), and *Iva annua* (FAC). Greater than 50% (100%) of the dominant plant species are hydrophytes; therefore, both sites meet the criterion for predominance of hydrophytic vegetation.

Table 6. FAP 658 (IL 29) Wetland Mitigation Site vegetation sampling data for Area A wet meadow community including frequency, cover, and importance value for all species sampled in 2005.

Species	Indicator	Frequency	Rel. Freq.	Avg. Cover	Rel. Cover	IV
Iva annua	**FAC**	**1.0000**	**23.6994**	**39.5122**	**55.7659**	**39.7327**
Aster simplex	**FACW**	**0.6098**	**14.4509**	**7.9878**	**11.2737**	**12.8623**
Echinochloa muricata	OBL	0.3415	8.0925	5.2439	7.4010	7.7468
Eupatorium serotinum	FAC+	0.4634	10.9827	2.0732	2.9260	6.9543
Cyperus acuminatus	OBL	0.2927	6.9364	3.1098	4.3890	5.6627
Polygonum ramosissimum	FAC-	0.2927	6.9364	0.7317	1.0327	3.9846
Aster pilosus	FACU+	0.1951	4.6243	1.7073	2.4096	3.5170
Carex annectans/vulpinoidea	FACW/OBL	0.0976	2.3121	3.1707	4.4750	3.3936
Leersia oryzoides	OBL	0.0976	2.3121	2.8659	4.0448	3.1784
Ipomaea lacunosa	FACW	0.1707	4.0462	0.4268	0.6024	2.3243
Rumex crispus	FAC+	0.1220	2.8902	0.3049	0.4303	1.6602
Iris shrevei	OBL	0.0976	2.3121	0.5488	0.7745	1.5433
Polygonum aviculare	FAC-	0.0732	1.7341	0.1829	0.2582	0.9961
Spartina pectinata	FACW+	0.0244	0.5780	0.9146	1.2909	0.9345
Bidens frondosa	FACW	0.0488	1.1561	0.1220	0.1721	0.6641
Eleocharis obtusa	OBL	0.0488	1.1561	0.1220	0.1721	0.6641
Polygonum pensylvanicum	FACW+	0.0488	1.1561	0.1220	0.1721	0.6641
Carex molesta	FAC	0.0244	0.5780	0.3659	0.5164	0.5472
Eleocharis erythropoda	OBL	0.0244	0.5780	0.3659	0.5164	0.5472
Phyla lanceolata	OBL	0.0244	0.5780	0.3659	0.5164	0.5472
Solidago canadensis	FACU	0.0244	0.5780	0.3659	0.5164	0.5472
Acer saccharinum	FACW	0.0244	0.5780	0.0610	0.0861	0.3320
Asclepias incarnata	OBL	0.0244	0.5780	0.0610	0.0861	0.3320
Bidens comosa	OBL	0.0244	0.5780	0.0610	0.0861	0.3320
Polygonum persicaria	FACW	0.0244	0.5780	0.0610	0.0861	0.3320
		4.2195	100	70.8537	100	100
bare ground				40.5488		

Dominant species are in bold

B. Presence of Hydric Soils – The performance criterion requires that hydric soil characteristics be present, or conditions favorable for hydric soil formation should persist.

Hydric soil has developed at the Area A wet meadow site. The wet meadow site is situated at a lower elevation relative to the soils for the rest of Area A. These new soils should continue to remain hydric so long as the hydrology continues.

The sedimentation from the flood event three years ago was again less apparent than in previous years. Clean sand grains were very apparent in the second horizon. A typical pedon for the wet meadow community in Area A is described in Table 8.

Table 8. Description of the soils for Area A wet meadow community (wetland).

Depth(in)	Matrix Color	Concentrations	Depletions	Concretions	Texture	Structure
0-2	10YR 2/1				Silt	Granular
2-23	2.5Y 3/1	10YR 4/4		Large 5%	Silty Clay	Subangular Blocky
23-31	2.5Y 4/1	10YR 3/4			Silty Clay	Subangular Blocky

Also of note, the remaining portion of Area A (forbland community) satisfies the criterion for hydric soil development. Soil development is underway on the remaining portion of this excavated site. There is distinct soil development and horizonation noticeable within the stratum. The colors observed, while still partially relic, are forming prominent hydric features. Based on field observations up to now, hydric soils have developed and should continue to remain hydric so long as the hydrology continues.

The sedimentation from the flood event three years ago was again less apparent than in previous years. A typical pedon for the forbland community in Area A is described in Table 9.

Table 9. Description of the soils for Area A forbland community (non-wetland).

Depth(in)	Matrix Color	Concentrations	Depletions	Concretions	Texture	Structure
0-1	10YR 2/1				Silt	granular
1-6	10YR 3/1 & 10YR 5/6	7.5YR 5/8		Large 5%	Silty Clay Loam	granular to subangular blocky
6 – 18	10YR 4/1	7.5YR 4/6		Large 5-10%	Silty Clay Loam	subangular blocky
18 – 24	2.5Y 5/2	7.5YR 5/8			Silty Clay Loam	subangular blocky

The soils within the wet meadow portion of Area B (forested wetland restoration) are situated slightly lower then the rest of Area B. Due to a slight elevation difference these soils appear more hydric than the soil located higher within the tree planted site. Concretions were evident. A typical pedon for the wet meadow community in Area B is described in Table 10.

Table 10. Description of the soils for Area B wet shrubland community (wetland).

Depth(in)	Matrix Color	Concentrations	Depletions	Concretions	Texture	Structure
0-2	10YR 3/1				Silt Loam	Subangular Blocky
2-8	10YR 4/1	10YR 5/8 & N2.5/0		Small to large, 20%	Silty Clay Loam	Subangular Blocky
8-12	10YR 4/2.5	10YR 5/8	10YR 4/1	Small to large, 20%	Silty Clay Loam	Subangular Blocky

Soil in the upland shrubland community of Area B shows distinct soil development and horizonation is noticeable within the excavated stratum. Prominent hydric features have formed. Based on this and previous years observations, hydric soils have developed and should continue to be hydric if hydrology is present. A typical pedon for the upland shrubland community of Area B is described in Table 11.

Table 11. Description of the soils for Area B upland shrubland community.

Depth(in)	Matrix Color	Concentrations	Depletions	Texture	Structure
0-2	10YR 3/1			Silt Loam	Granular
2-4	10YR 2/1	10YR 3/4	10YR 4/2	Silty Clay Loam	Subangular Blocky
4-24	10YR 2.5/1	10YR 4/4	10YR 4/2	Silty Clay Loam	Subangular Blocky

C. Presence of Wetland Hydrology – The performance criterion requires that the compensation area must be either permanently or periodically inundated at average depths less than 2m (6.6 ft) or have soils that are saturated to the surface for at least 12.5% of the growing season (Environmental Laboratory 1987)[*]. The ISGS initiated water level monitoring at Area A in December 2001 and at Area B in September 2000. Their findings for 2005 indicate that 0.63 ha (1.6 ac) of the mitigation area satisfied the wetland hydrology criterion for greater than 5% of the growing season (Pociask and Plankell 2005; Figure 1). Most of this area, ~ 0.59 ha (1.5 ac), corresponds to the INHS Area A wet meadow community. Approximately 0.04 ha (0.11 ac) corresponds to the small wetland centered on the RDS1 datalogger in Area B. The area of satisfactory wetland hydrology is down somewhat from 2004 [1.0 ha (2.4 ac)] and significantly lower than 2002 when the entire site conclusively satisfied the wetland hydrology criterion (Pociask and Sabatini 2002; Pociask and Plankell 2004). During visits to the site, the following indicators of wetland hydrology were present: drift lines, sediment deposits, areas of inundation, and many areas of surface or near surface saturation.

Unusual circumstances affected the hydrology of the site during 2002. Floodwater from the Sangamon River overtopped the levee and drift was deposited as high as the access road to the east of Area A. A water control structure located in the south part of the levee surrounding the mitigation area was closed prior to this late spring flooding. Therefore, water was artificially trapped on the site for a very long duration of the 2002 growing season. Apparently, the farmer who owns the adjacent property dug a hole through the levee wall allowing his field to drain for a late planting of soybeans. This hole in the levee still remains. Since hydrologic input to the site has changed since its establishment, future ISGS monitoring well data will be needed to make a conclusive determination and to establish extent of wetland hydrology.

[*] In some cases wetland hydrology can be met when a site is inundated or saturated for 5% to 12.5% of the growing season (Environmental Laboratory 1987).

Figure prepared by ISGS.

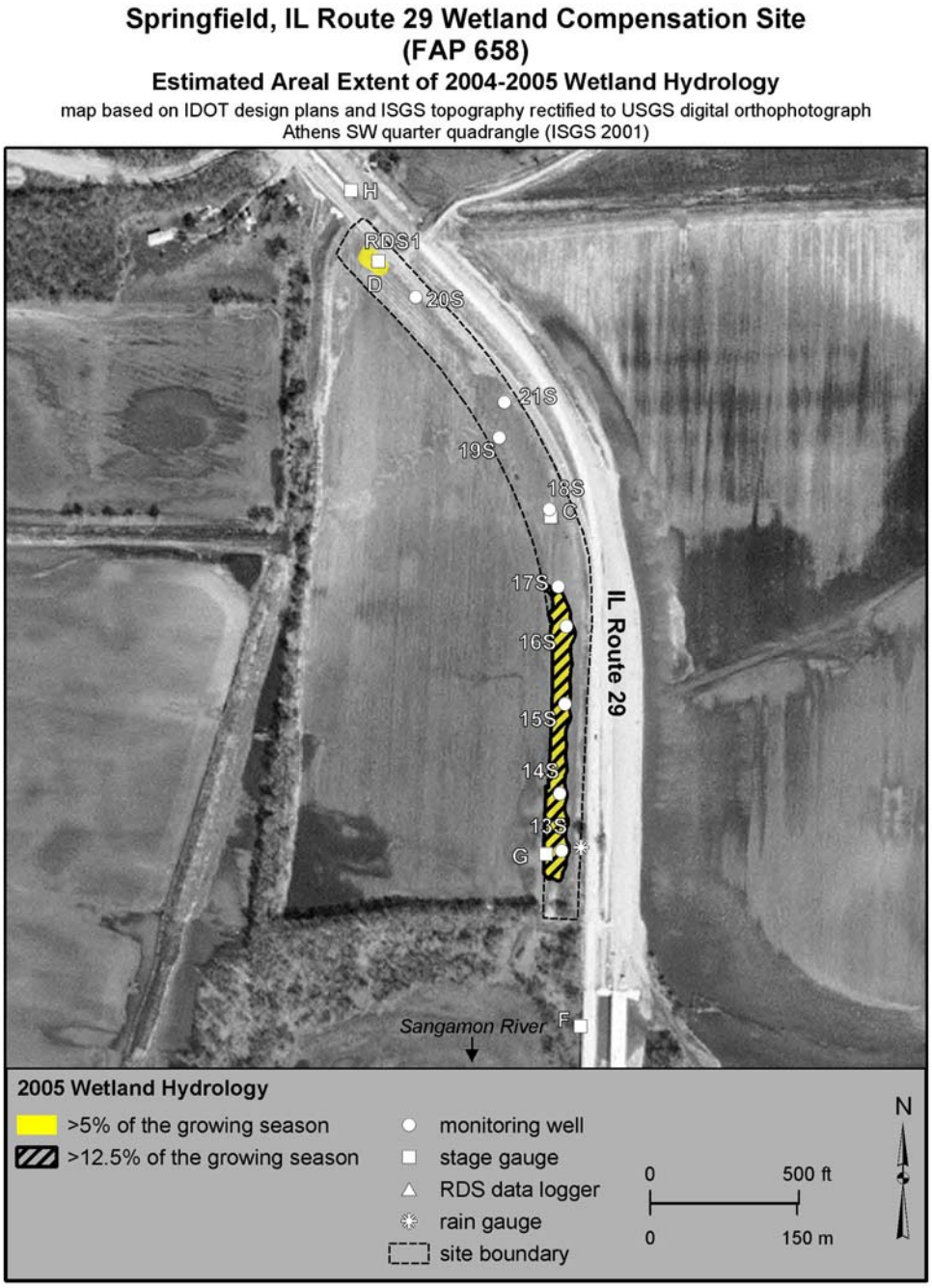

Figure 1. 2005 aerial extent of wetland hydrology for Area A and Area B (from ISGS, Pociask and Plankell 2005).

Project Goal #2: In Area B, a floodplain forest wetland community will be created.

All planted trees within Area B were located, identified and their condition was assessed. Because of numerous replantings, it has become impossible to keep a cumulative total for trees planted at this site; however, it is apparent that over 726 trees have been planted since this site was established in 2000. Many (135) trees died between the 2001 and 2002 tree monitoring, when an extended flood event occurred at this site. *Fraxinus pennsylvanica* was especially hard hit with 82 dead. In 2002, tree survival fell below the 75% survivorship requirement for the first time with 72.9% (416/571) alive (Marcum *et al*. 2002). After a massive replanting effort by IDOT in 2004, survival was up to 74% (538/726). A total of 514 trees, approximately 70.8% cumulative survival, were found alive in 2005. Many of these are resprouts from trees damaged by ice in late 2004/early 2005. Although cumulative survival at the mitigation site is 70.8%, 514 live trees on site represents 94.5% (514/544) of the total number of trees originally planted in 2000. Table 12 shows 2005 survival for each tree species planted in Area B.

Table 12. 2005 tree survival for FAP 658 (IL 29) Area B.

Species	# Alive	# Alive by Resprout	Total Alive
Betula nigra	49	57	106
Carya illinoensis	65	55	120
Fraxinus pennsylvanica	42	51	93
Quercus bicolor	51	35	86
Quercus palustris	67	42	109
Totals	274	240	514

Project Goal #3: In Area A, a native, non-weedy, emergent wetland community will be created.

The performance criteria for project goal #3 states that, in the wetland site at Area A, at least 90% of the plant species present should be non-weedy, native, perennial and annual species. In Area A, many weedy and non-native species were present during the first year of sampling (Marcum *et al.* 2001). Eighteen of the forty-one species (44%) found at this site in 2001 were native, non-weedy species. During the 2002 survey of Area A, very little vegetation was observed on the site and there were no dominant species present. Vegetation in Area A had been killed by an artificially prolonged flood event. The few plant species that were present consisted of early successional, native, weedy species. Only four of the sixteen species present in 2002 were native and non-weedy (25%) (Marcum *et al*. 2002). The 2003 species list of 50 species included 41 natives (82%) (Marcum and Kurylo 2003). Native, non-weedy species, however, accounted for only 36% of the total (18/50). In 2004 the percentage of native, non-weedy species rose to 54% (14/26). Likewise, in 2005, the percentage of native, non-weedy species continued to rise (57%; 29/51). Once again this part of the performance criteria was not satisfied in 2005.

The performance criteria for project goal #3 also states that none of the dominant plant species may be non-native or weedy species, such as cattails, sandbar willow or reed canary grass. In 2005 the Area A wet meadow dominants were *Aster simplex* (FACW and *Iva annua* (FAC). Both of these species are native; however, *Iva annua* (mean C value of 0) is considered to be weedy. This part of the performance criteria was not satisfied in 2005.

Summary and Recommendations

Floristic Quality Index – Prolonged flooding in 2002 had a great impact on both Area A and B. Total species richness dropped (41 to 16 in Area A, 62 to 43 in Area B). Nonetheless, FQI and mean C scores have continued to show a gradual rise over the monitoring period. The FQI score for Area A (16.3) in 2005 was at its highest level in the five years of monitoring, and significantly higher than in 2002. Likewise, Area B's FQI scores have risen gradually since the initiation of monitoring activities. In 2005 the FQI for Area B was 13.5. While both sites have shown increases in natural quality, as measured by the FQI, the FQI scores remain relatively low. These values are indicative of fair natural quality.

Prolonged flooding, such as that which occurred in 2002, is not the normal circumstance. Under normal flooding regimes these sites should continue to develop into the predicted wetland communities with greater diversity than is now apparent. Planted emergent species have taken hold, especially in Area A. Furthermore, it appears that several new species have been introduced to the mitigation site as a result of recent flooding events.

Project Goal # 1 – The performance criterion requires that greater than 50% of the dominant plant species be hydrophytic, that hydric soil characteristics be present, or conditions favorable for hydric soil formation should persist, and that the compensation area must be either permanently or periodically inundated at average depths less than 2m (6.6 ft) or have soils that are saturated to the surface for at least 12.5% of the growing season[*].

Area A
In 2005, Area A contained both a wet meadow and a forbland community. The wet meadow community exhibited dominant hydrophytic vegetation, hydric soils, and wetland hydrology.

INHS personnel have been monitoring vegetation and soil development in Area A for the past five years. INHS and ISGS data from vegetation sampling, soil mapping, and hydrologic monitoring determine the aerial extent of the created wetland in Area A to be approximately 0.59 ha (1.5 ac) (Appendix 1, Figure 1).

Area B
In 2005, Area B contained both a wet meadow (with trees planted) and an upland shrubland community. The wet meadow community exhibited dominant hydrophytic vegetation, hydric soils, and wetland hydrology.

INHS personnel have been monitoring vegetation and soil development in Area B for the past six years. INHS and ISGS data from vegetation sampling, soil mapping, and hydrologic monitoring determine the aerial extent of the created wetland in Area B to be approximately 0.04 ha (0.11 ac) (Appendix 1, Figure 1). This small area, centered on the RDS1 datalogger, continues to satisfy the wetland hydrology criteria in most years. Additional area, in a narrow band south of the RDS1 datalogger, has satisfied wetland hydrology in past years (Pociask and Plankell 2004).

[*]In some cases wetland hydrology can be met when a site is inundated or saturated for 5% to 12.5% of the growing season (Environmental Laboratory 1987).

Also, the stated objective for project goal #1 is to create 2.43 ha (6.0 ac) of jurisdictional wetland. According to the ISGS, the total area of the excavation [2.2 ha (5.4 ac)] is less than the required area (Pociask and Sabatini 2002).

Project Goal # 2 – The performance criterion requires that seventy-five percent of the planted trees should be in a live and healthy condition each year for five years. The performance criterion for this project goal was easily attained during the first two years of monitoring. In 2000 over 97% of the planted trees survived. Some replanting was done in 2001 and tree survival remained very high at 96.5% overall. During 2002, however, a prolonged flood event occurred and many of the planted trees were killed. Survival fell to 72.9%, just below the performance criterion of 75%. *Quercus palustris* (95.0%), *Betula nigra* (89.1%), and *Carya illinoensis* (83.3%) fared best and remained at acceptable levels. *Quercus bicolor* (71.7%) and especially *Fraxinus pennsylvanica* (25.2%) showed significant decline. Considering the severity and length of flooding on this site in 2002, the overall percent survival is higher than might have been expected. The large, more mature size of the tree plantings is probably the reason for their greater success. In 2004, after a massive replanting in 2003-2004, the percent tree survival rose slightly to 74%. This value was just below 75%, the performance criterion set for this project goal. Although tree survival did not meet the proposed performance criterion for project goal #2 there were more live trees present within Area B in 2004 (538) than existed on the site in 2000 (530), when survival was well above the 75% threshold. Unfortunately, during the winter of 2004-2005 many trees were damaged by ice. Because of this unforeseen damage, monitoring was requested for an additional two years. In 2005, 514 trees were found in a live condition. Many of these trees were alive by resprouting (240). Although cumulative tree survival at the mitigation site is 70.8%, 514 live trees on site represents 94.5% (514/544) of the total number of trees originally planted in 2000. This performance criterion should be considered satisfied.

Project Goal #3 – The performance criterion requires that, in the Area A wetland site, at least 90% of the plant species present should be non-weedy, native, perennial and annual species, and none of the dominant plant species may be non-native or weedy species, such as cattails, sandbar willow or reed canary grass.

The species list for the Area A wet meadow community (Table 2) is made up of mostly native species (86%). However, many of these native species are also considered weedy species. Only 57% of the plant species present in the Area A wet meadow are considered native and non-weedy. This is well below the stated performance criterion of 90%. This part of the performance criteria was not satisfied in 2005. Although low, the percent of native, non-weedy species has continued to rise each year since monitoring was initiated in 2001. It should be noted, however, that 90% native, non-weedy species may be an unrealistic goal.

As stated in the performance criterion, none of the dominant species may be non-native or weedy. Currently at Area A, the dominant species present are *Aster simplex* (FACW) and *Iva annua* (FAC). Both of the dominants are considered native; however, Iva annua is considered to be a weedy native (C value of 0). This part of the performance criterion was not satisfied in 2005.

Literature Cited

Brooks, T. 2000. FAP 658 (IL 29) monitoring task order. Memorandum from the Illinois Department of Transportation, Springfield. 1p.

Brooks, T. 2001. FAP 658 (IL 29) modified task order. Memorandum from the Illinois Department of Transportation, Springfield. 1p.

Daubenmire, R. F. 1959. A canopy coverage method. Northwest Science 33:43-64.

Environmental Laboratory. 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1, U. S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi. 207 pp.

Federal Interagency Committee for Wetland Delineations. 1989. Federal Manual for Identifying and Delineating Jurisdictional Wetlands. Cooperative technical publication. U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and USDA Soil Conservation Service, Washington, D.C.

Grime, J. P. 1974. Vegetation classification by reference to strategies. Nature 250:26-31.

Grime, J. P., J. G. Hodgson, and R. Hunt. 1988. Comparative plant ecology: a functional approach to common British species. Unwin & Hyman, London.

Marcum, P. B. and J. Kurylo. 2004. Wetland Mitigation and Corridor Revegetation Site Monitoring for FAP 658 (IL 29) in Sangamon County, Illinois – 2003. Technical report submitted to the Illinois Department of Transportation. 30 pp.

Marcum, P. B. and J. Kurylo. 2005. Wetland Mitigation and Corridor Revegetation Site Monitoring for Fap 658 (IL 29) in Sangamon County, Illinois – 2004. Technical report submitted to the Illinois Department of Transportation. 42 pp.

Marcum, P., J. Kurylo, B. Wilm, and S. Wiesbrook. 2000. Wetland Mitigation and Corridor Revegetation Site Monitoring for FAP 658 (IL 29) in Sangamon County, Illinois - 2000. Technical report submitted to the Illinois Department of Transportation. 12 pp.

Marcum, P., J. Kurylo, B. Wilm, A. Morgan, S. Wiesbrook, and J. Matthews. 2002. Wetland Mitigation and Corridor Revegetation Site Monitoring for FAP 658 (IL 29), Sangamon County, Illinois – 2001. Technical report submitted to the Illinois Department of Transportation by the Illinois Natural History Survey, Champaign, IL. 28 pp.

Marcum, P., J. Kurylo, and R. Larimore. 2002. Wetland Mitigation and Corridor Revegetation Site Monitoring for FAP 658 (IL 29), Sangamon County, Illinois – 2001. Technical report submitted to the Illinois Department of Transportation by the Illinois Natural History Survey, Champaign, IL. 31 pp.

Mohlenbrock, R. H. 1986. Guide to the vascular flora of Illinois. Southern Illinois University Press, Carbondale, Illinois. 507 pp.

Mohlenbrock, R. H. 2002. Vascular Flora of Illinois. Southern Illinois University Press, Carbondale, Illinois. 490 pp.

Plocher, A. and P. Tessene. 1995. FAP 658 (IL 29) Mitigation Site Assessment. Report submitted to the Illinois Department of Transportation by the Illinois Natural History Survey, Champaign. 18 pp.

Pociask, G. E. and E. T. Plankell. 2004. Annual Report for Active IDOT Wetland Compensation and Hydrologic Monitoring Sites. Technical Report submitted to the Illinois Department of Transportation. p. 167-173.

Pociask, G. E., and E. T. Plankell. 2005. Annual Report for Active IDOT Wetland Compensation and Hydrologic Monitoring Sites. Technical Report submitted to the Illinois Department of Transportation. p. 106-112.

Pociask, G. E. and P. Sabatini. 2002. Annual Report for Active IDOT Wetland Compensation and Hydrologic Monitoring Sites. Technical report submitted to the Illinois Department of Transportation. p. 241-249.

Pociask, G. E. and P. Sabatini. 2003. Annual Report for Active IDOT Wetland Compensation and Hydrologic Monitoring Sites. Technical report submitted to the Illinois Department of Transportation. p. 196-201.

Pociask, G. E. and B. A. Watson. 2001. Annual Report for Active IDOT Wetland Compensation and Hydrologic Monitoring Sites. Technical report submitted to the Illinois Department of Transportation. p. 248-255.

Reed, P. B., Jr. 1988. National list of plant species that occur in wetlands: Illinois. U. S. Fish and Wildlife Service. National Wetlands Inventory. NERC-88/18.13. 117 pp.

Steinkamp, J. F. 1980. Soil survey of Sangamon County, Illinois. United States Department of Agriculture – Soil Conservation Service in cooperation with Illinois Agriculture Experiment Station. Illinois Agriculture Experiment Station Soil Report No. 111. 139 pp. + maps.

Taft, J. B., G. S. Wilhelm, D. M. Ladd, and L. A. Masters. 1997. Floristic quality assessment for vegetation in Illinois: a method for assessing vegetation integrity. Erigenia 15: 3-95.

Tiner, R. W. 1999. Wetland Indicators: A Guide to Wetland Identification, Delineation, Classification, and Mapping. Lewis Publishers. 392 pp.

United States Army Corps of Engineers. 1993. Guidelines for developing mitigation proposals. Chicago District. September 1, 1993.

USDA, NRCS. 2002. Field Indicators of Hydric Soils in the United States, Version 5.0. G.W. Hurt, P.M. Whited, and R.F. Pringle (eds.). USDA, NRCS cooperation with the National Technical Committee for Hydric Soils, Fort Worth, TX.

Wicker, T. L., J. K. LaTour, and J. C. Maurer. 1997. Water resources data – Illinois, water year 1996. Volume 1. Illinois except Illinois River Basin. U. S. Geological Survey Water-Data Report IL-96-2. 398 pp.

Appendix 1. Wetland Determination Forms

ROUTINE ON-SITE WETLAND DETERMINATION
Area A – Wetland (page 1 of 4)

Field Investigators: Marcum and Kurylo
Date: 16 June and 4 October 2005 **Project Name:** FAP 658 (IL 29)
State: Illinois **County:** Sangamon
Site Name: Wet Meadow
Legal Description: E1/2 of NE1/4 of SW1/4, Sect. 33, T.17 N., R.5 W.
Location: The site is located immediately west of the new Illinois Route 29 embankment and begins approximately 488 m (1600 ft) north of the Sangamon River. This site continues north for approximately 427 m (1400 ft), where it meets Area B.

Do normal environmental conditions exist at this site? Yes: X No:
Has the vegetation, soils, or hydrology been significantly disturbed? Yes: X* No:
** This site is a recently excavated depression, created for mitigation purposes.*

VEGETATION

Dominant Plant Species	Indicator Status	Stratum
1. *Iva annua*	FAC	herb
2. *Aster simplex*	FACW	herb

Percentage of dominant species that are OBL, FACW, FAC+, or FAC: 100%

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

SOILS
Series and phase: NRCS mapped as Radford and Sawmill, revised to generic Mollic Endoaquent.

On county hydric soils list?	Yes:	No:	Undetermined: X
Is the soil a histosol?	Yes:	No: X	
Histic epipedon present?	Yes:	No: X	
Redox Concentrations?	Yes: X	No:	Color: 10YR 4/4
Redox Depletions?	Yes:	No: X	

Matrix color: 10YR 2/1 over 2.5Y 4/1
Other indicators: Concretions.

Hydric soils? Yes: X No:
Rationale: This site is an excavated depression built for the purpose of mitigation. Although the top layers were removed exposing a poorly drained substratum, pedogenic processes have taken hold and a new hydric soil has since developed. This is evidenced by a low chroma matrix, redox features, and concretions. This soil met the A12 – Thick Dark surface hydric soil indicator from NRCS.

ROUTINE ON-SITE WETLAND DETERMINATION
Area A- Wetland (page 2 of 4)

Field Investigators: Marcum and Kurylo
Date: 16 June and 4 October 2005 **Project Name:** FAP 658 (IL 29)
State: Illinois **County:** Sangamon
Site Name: Wet Meadow
Legal Description: E1/2 of NE1/4 of SW1/4, Sect. 33, T.17 N., R.5 W.
Location: The site is located immediately west of the new Illinois Route 29 embankment and begins approximately 488 m (1600 ft) north of the Sangamon River. This site continues north for approximately 427 m (1400 ft), where it meets Area B.

HYDROLOGY

Inundated: Yes: No: X Depth of standing water: NA
Depth to saturated soil: > 0.8 m (31 in)
Overview of hydrological flow through the system: This site receives water through precipitation, sheet flow from adjacent higher ground, and from flood events of the Sangamon River. In 2002, floodwater from the Sangamon River overtopped the levee surrounding this site. Water leaves the site via evapotranspiration, groundwater recharge, and normally through a water control structure in the levee at the south end of the site. Since 2002, a hole cut in the south levee wall allows floodwater to leave the site. This hole also allows water onto the site during less severe flood events.
Size of watershed: Approximately 3885 km^2 (1500 mi^2) (Wicker *et al.* 1997).
Other field evidence observed: This site has been excavated to hold water for longer periods. Drift lines, areas of inundation, sediment deposits and many areas of surface or near surface saturation were observed at this site in 2005.

Wetland hydrology: Yes: X No:
Rationale: Field evidence suggests that this site is inundated or saturated for a sufficient duration to satisfy the wetland hydrology criterion. 2005 ISGS hydrological monitoring has determined that approximately 0.59 ha (1.5 ac) satisfied the wetland hydrology criterion for at least 5% of the growing season (Pociask and Plankell 2005).

DETERMINATION AND RATIONALE:

Is the site a wetland? Yes: X No:
Rationale for decision: Dominant hydrophytic vegetation, hydric soils and wetland hydrology are present; therefore, this site is a wetland.

Determined by: Paul Marcum (vegetation and hydrology)
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ROUTINE ON-SITE WETLAND DETERMINATION

Area A - Wetland (page 3 of 4)

Field Investigators: Marcum and Kurylo
Date: 16 June and 4 October 2005 **Project Name:** FAP 658 (IL 29)
State: Illinois **County:** Sangamon
Site Name: Wet Meadow
Legal Description: E1/2 of NE1/4 of SW1/4, Sect. 33, T.17 N., R.5 W.
Location: The site is located immediately west of the new Illinois Route 29 embankment and begins approximately 488 m (1600 ft) north of the Sangamon River. This site continues north for approximately 427 m (1400 ft), where it meets Area B.

SPECIES LIST

Scientific name	Common name	Stratum	Wetland indicator status	C♦
Acer saccharinum	silver maple	shrub, herb	FACW	1
Alisma plantago-aquatica	broad-leaf water-plantain	herb	OBL	2
Ambrosia trifida	giant ragweed	herb	FAC+	0
Ammannia coccinea	long-leaved ammannia	herb	OBL	5
Apocynum cannabinum	dogbane	herb	FAC	2
Asclepias incarnata	swamp milkweed	herb	OBL	4
Aster pilosus	hairy aster	herb	FACU+	0
Aster simplex	panicled aster	herb	FACW	3
Bidens frondosa	common beggar's ticks	herb	FACW	1
Bidens tripartita	beggar's ticks	herb	OBL	2
Carex annectens	yellow fox sedge	herb	FACW	3
Carex conjuncta	green-headed fox sedge	herb	FACW	5
Carex crus-corvi	crowfoot fox sedge	herb	OBL	6
Carex frankii	Frank's sedge	herb	OBL	4
Carex lupulina	common hop sedge	herb	OBL	5
Carex molesta	field oval sedge	herb	FAC	2
Carex muskingumensis	swamp oval sedge	herb	OBL	6
Carex normalis	spreading oval sedge	herb	FACW	4
Carex tribuloides	awl-fruited oval sedge	herb	FACW+	3
Carex vulpinoidea	brown fox sedge	herb	OBL	3
Cassia fasciculata	partridge pea	herb	FACU-	1
Cyperus acuminatus	taperleaf flat sedge	herb	OBL	2
Echinochloa muricata	barnyard grass	herb	OBL	0
Eleocharis erythropoda	red-rooted spike rush	herb	OBL	3
Eleocharis obtusa	blunt spike rush	herb	OBL	2
Eupatorium altissimum	tall boneset	herb	FACU	2
Eupatorium serotinum	late boneset	herb	FAC+	1
Ipomoea lacunosa	small white morning-glory	herb	FACW	1
Iris shrevei	southern blue flag	herb	OBL	5
Iva annua	marsh elder	herb	FAC	0
Lactuca serriola	prickly lettuce	herb	FAC	*
Leersia oryzoides	rice cutgrass	herb	OBL	3
Ludwigia alternifolia	seedbox	herb	OBL	5

Species list continued on following page.

ROUTINE ON-SITE WETLAND DETERMINATION

Area A - Wetland (page 4 of 4)

Field Investigators: Marcum and Kurylo
Date: 16 June and 4 October 2005 **Project Name:** FAP 658 (IL 29)
State: Illinois **County:** Sangamon
Site Name: Wet Meadow
Legal Description: E1/2 of NE1/4 of SW1/4, Sect. 33, T.17 N., R.5 W.
Location: The site is located immediately west of the new Illinois Route 29 embankment and begins approximately 488 m (1600 ft) north of the Sangamon River. This site continues north for approximately 427 m (1400 ft), where it meets Area B.

SPECIES LIST

Scientific name	Common name	Stratum	Wetland indicator status	C♦
Melilotus sp.	sweet clover	herb	FACU	*
Phyla lanceolata	fog-fruit	herb	OBL	1
Polygonum amphibium	water smartweed	herb	OBL	3
Polygonum aviculare	knotweed	herb	FAC-	*
Polygonum pensylvanicum	giant smartweed	herb	FACW+	1
Polygonum persicaria	spotted lady's thumb	herb	FACW	*
Polygonum ramosissimum	bushy knotweed	herb	FAC-	3
Populus deltoides	eastern cottonwood	herb	FAC+	2
Rumex altissimus	pale dock	herb	FACW-	2
Rumex crispus	curly dock	herb	FAC+	*
Sagittaria latifolia	arrowhead	herb	OBL	4
Solidago canadensis	Canada goldenrod	herb	FACU	1
Spartina pectinata	freshwater cord grass	herb	FACW+	4
Trifolium pratense	red clover	herb	FACU+	*
Typha angustifolia	narrow-leaved cattail	herb	OBL	*
Typha latifolia	cattail	herb	OBL	1
Veronica peregrina	purslane speedwell	herb	FACW+	0
Xanthium strumarium	cocklebur	herb	FAC	0

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

mean C value (mCv) = $\sum C/N = 108/44 = 2.5$
FQI = $\sum C/\sqrt{N} = 108/\sqrt{44} = 16.3$

ROUTINE ON-SITE WETLAND DETERMINATION
Area A – Non-wetland (page 1 of 3)

Field Investigators: Marcum and Kurylo
Date: 16 June and 4 October 2004 **Project Name:** FAP 658 (IL 29)
State: Illinois **County:** Sangamon
Site Name: Forbland
Legal Description: E1/2 of NE1/4 of SW1/4, Sect. 33, T.17 N., R.5 W.
Location: The site is located immediately west of the new Illinois Route 29 embankment and begins approximately 488 m (1600 ft) north of the Sangamon River. This site continues north for approximately 427 m (1400 ft), where it meets Area B.

Do normal environmental conditions exist at this site? Yes: X No:
Has the vegetation, soils, or hydrology been significantly disturbed? Yes: X* No:
** This site is a recently excavated depression, created for mitigation purposes.*

VEGETATION

Dominant Plant Species	Indicator Status	Stratum
1. *Aster pilosus*	FACU+	herb
2. *Eupatorium serotinum*	FAC+	herb
3. *Iva annua*	FAC	herb
4. *Solidago canadensis*	FACU	herb

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

Hydrophytic vegetation: Yes: No: X
Rationale: Only 50% of the dominants are OBL, FACW, FAC+, or FAC.

SOILS
Series and phase: NRCS mapped as Radford and Sawmill, revised to generic Mollic Endoaquent.

On county hydric soils list?	Yes:	No:	Undetermined: X
Is the soil a histosol?	Yes:	No: X	
Histic epipedon present?	Yes:	No: X	
Redox Concentrations?	Yes: X	No:	Color: 7.5YR 4/6 and 5/8
Redox Depletions?	Yes: X	No:	Color: 10YR 4/2 and 2.5Y 4/1

Matrix color: 10YR 2/1 over 10YR 3/1 mixed with 10YR 5/6 over 10YR 4/1
Other indicators: Concretions.

Hydric soils? Yes: X No:
Rationale: This site is an excavated depression built for the purpose of mitigation. Although the top layers were removed exposing a poorly drained substratum, pedogenic processes have taken hold and a new hydric soil has since developed. This is evidenced by a low chroma matrix, redox features, and concretions within the soil profile. The F3 hydric soil indicator from NRCS is met by this soil.

ROUTINE ON-SITE WETLAND DETERMINATION
Area A – Non-wetland (page 2 of 3)

Field Investigators: Marcum and Kurylo
Date: 16 June and 4 October 2004 **Project Name:** FAP 658 (IL 29)
State: Illinois **County:** Sangamon
Site Name: Forbland
Legal Description: E1/2 of NE1/4 of SW1/4, Sect. 33, T.17 N., R.5 W.
Location: The site is located immediately west of the new Illinois Route 29 embankment and begins approximately 488 m (1600 ft) north of the Sangamon River. This site continues north for approximately 427 m (1400 ft), where it meets Area B.

HYDROLOGY

Inundated: Yes: No: X Depth of standing water: NA
Depth to saturated soil: > 0.6 m (24 in)
Overview of hydrological flow through the system: This site receives water through precipitation, sheet flow from adjacent higher ground, and from flood events of the Sangamon River. In 2002, floodwaters from the Sangamon River overtopped the levee surrounding this site. Water leaves the site via evapotranspiration, groundwater recharge, and normally through a water control structure in the levee at the south end of the site. Since 2002, a hole cut in the south levee wall allows floodwater to leave the site. This hole also allows water onto the site during less severe flood events.
Size of watershed: Approximately 3885 km^2 (1500 mi^2) (Wicker *et al.* 1997).
Other field evidence observed: This site has been excavated to hold water for longer periods.

Wetland hydrology: Yes: No: X
Rationale: This site is at a higher topographic position compared to the Area A wet meadow community. Furthermore, 2005 ISGS hydrological monitoring data determined that this site does not satisfy the wetland hydrology criterion.

DETERMINATION AND RATIONALE:

Is the site a wetland? Yes: No: X
Rationale for decision: Although hydric soils are present, dominant hydrophytic vegetation wetland hydrology are both absent. This site is not a wetland.

Determined by: Paul Marcum (vegetation and hydrology)
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ROUTINE ON-SITE WETLAND DETERMINATION

Area A – Non-wetland (page 3 of 3)

Field Investigators: Marcum and Kurylo
Date: 16 June and 4 October 2004 **Project Name:** FAP 658 (IL 29)
State: Illinois **County:** Sangamon
Site Name: Forbland
Legal Description: E1/2 of NE1/4 of SW1/4, Sect. 33, T.17 N., R.5 W.
Location: The site is located immediately west of the new Illinois Route 29 embankment and begins approximately 488 m (1600 ft) north of the Sangamon River. This site continues north for approximately 427 m (1400 ft), where it meets Area B.

SPECIES LIST

Scientific name	Common name	Stratum	Wetland indicator status	C♦
Acer saccharinum	silver maple	shrub, herb	FACW	1
Ambrosia artemisiifolia	common ragweed	herb	FACU	0
Ambrosia trifida	giant ragweed	herb	FAC+	0
Aster pilosus	hairy aster	herb	FACU+	0
Aster simplex	panicled aster	herb	FACW	3
Bidens tripartita	beggar's ticks	herb	OBL	2
Campsis radicans	trumpet creeper	herb	FAC	2
Carex crus-corvi	crowfoot fox sedge	herb	OBL	6
Carex molesta	field oval sedge	herb	FAC	2
Carex annectens	yellow fox sedge	herb	FACW	3
Cyperus acuminatus	taperleaf flat sedge	herb	OBL	2
Echinochloa muricata	barnyard grass	herb	OBL	0
Elymus virginicus	Virginia wild rye	herb	FACW-	4
Eupatorium serotinum	late boneset	herb	FAC+	1
Ipomoea lacunosa	small white morning-glory	herb	FACW	1
Iva annua	marsh elder	herb	FAC	0
Lactuca serriola	prickly lettuce	herb	FAC	*
Melilotus sp.	sweet clover	herb	FACU	*
Oenothera biennis	evening primrose	herb	FACU	1
Polygonum amphibium	water smartweed	herb	OBL	3
Polygonum aviculare	knotweed	herb	FAC-	*
Polygonum pensylvanicum	giant smartweed	herb	FACW+	1
Polygonum ramosissimum	bushy knotweed	herb	FAC-	3
Rumex altissimus	pale dock	herb	FACW-	2
Rumex crispus	curly dock	herb	FAC+	*
Solidago canadensis	Canada goldenrod	herb	FACU	1

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

mean C value (mCv) = $\sum C/N = 38/22 = 1.7$
FQI = $\sum C/\sqrt{N} = 38(\sqrt{22}) = 8.1$

ROUTINE ON-SITE WETLAND DETERMINATION
Area B - Wetland (page 1 of 4)

Field Investigators: Marcum and Kurylo
Date: 16 June and 4 October 2005 **Project Name:** FAP 658 (IL 29)
State: Illinois **County:** Sangamon
Site Name: Wet Meadow (within tree planting)
Legal Description: S1/2 of SE1/4 of NW1/4, Sect. 33, T.17 N., R.5 W. and NW1/4 of SE1/4 of NW1/4, Sect. 33, T. 17 N., R. 5 W.
Location: The site is located immediately west of the new Illinois Route 29 embankment and approximately 975 m (3200 ft) north of the Sangamon River.

Do normal environmental conditions exist at this site? Yes: X No:
Has the vegetation, soils, or hydrology been significantly disturbed? Yes: X* No:
** This site is a recently excavated depression, created for mitigation purposes.*

VEGETATION

Dominant Plant Species	Indicator Status	Stratum
1. *Aster simplex*	FACW	herb
2. *Eleocharis macrostachya*	OBL	herb
3. *Iva annua*	FAC	herb

Percentage of dominant species that are OBL, FACW, FAC+, or FAC: 100%
Hydrophytic vegetation: Yes: X No:
Rationale: More than 50% of the dominants are OBL, FACW, FAC+, or FAC.

SOILS
Series and phase: NRCS mapped as Radford and Sawmill, revised to generic Mollic Endoaquent.

On county hydric soils list?	Yes:	No:	Undetermined: X
Is the soil a histosol?	Yes:	No: X	
Histic epipedon present?	Yes:	No: X	
Redox Concentrations?	Yes: X	No:	Color: 10YR 5/8
Redox Depletions?	Yes:	No: X	

Matrix color: 10YR 3/1 over 10YR 4/1 atop 10YR 4/2.5
Other indicators: Concretions.

Hydric soils? Yes: X No:
Rationale: This site is an excavated depression built for the purpose of mitigation. The top layers of soil had been removed leaving a poorly drained substratum with little or no soil development at the surface. Over the past five years though, new hydric soils have developed, as evidenced by a low chroma matrix and more redox features within the profile. This soil meets the F3 – Depleted Matrix hydric soil indicator from NRCS.

ROUTINE ON-SITE WETLAND DETERMINATION
Area B - Wetland (page 2 of 4)

Field Investigators: Marcum and Kurylo
Date: 16 June and 4 October 2005 **Project Name:** FAP 658 (IL 29)
State: Illinois **County:** Sangamon
Site Name: Wet Meadow (within tree planting)
Legal Description: S1/2 of SE1/4 of NW1/4, Sect. 33, T.17 N., R.5 W. and NW1/4 of SE1/4 of NW1/4, Sect. 33, T. 17 N., R. 5 W.
Location: The site is located immediately west of the new Illinois Route 29 embankment and approximately 975 m (3200 ft) north of the Sangamon River.

HYDROLOGY

Inundated: Yes: No: X Depth of standing water: NA
Depth to saturated soil: >30.5 cm (12 in)
Overview of hydrological flow through the system: This site receives water through precipitation, sheet flow from adjacent higher ground and flood events of the Sangamon River. Water leaves the site via evapotranspiration, groundwater recharge, and sheetflow from this site to Area A.
Size of watershed: Approximately 3885 km^2 (1500 mi^2) (Wicker *et al.* 1997).
Other field evidence observed: This site has been excavated to hold water for longer periods. Drift lines, sediment deposits, areas of surface or near surface saturation as well as a few areas of apparently prolonged inundation were observed at the site. The area satisfying wetland hydrology in 2005 [~0.04 ha (0.11 ac); Pociask and Plankell 2005, Figure 1].

Wetland hydrology: Yes: X No:
Rationale: Field evidence of wetland hydrology suggests that this site is inundated or saturated for a sufficient duration to satisfy the wetland hydrology criterion. Furthermore, 2005 ISGS hydrological monitoring data has determined that approximately 0.04 ha (0.11 ac) satisfies the wetland hydrology criterion for greater than 5% of the growing season.

DETERMINATION AND RATIONALE:

Is the site a wetland? Yes: X No:
Rationale for decision: Dominant hydrophytic vegetation, hydric soils, and wetland hydrology are all present within the Area B wet meadow community; therefore, this site is a wetland.

Determined by: Paul Marcum (vegetation and hydrology)
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ROUTINE ON-SITE WETLAND DETERMINATION

Area B – Wetland (page 3 of 4)

Field Investigators: Marcum and Kurylo
Date: 16 June and 4 October 2005 **Project Name:** FAP 658 (IL 29)
State: Illinois **County:** Sangamon
Site Name: Wet Meadow (within tree planting)
Legal Description: S1/2 of SE1/4 of NW1/4, Sect. 33, T.17 N., R.5 W. and NW1/4 of SE1/4 of NW1/4, Sect. 33, T. 17 N., R. 5 W.
Location: The site is located immediately west of the new Illinois Route 29 embankment and approximately 975 m (3200 ft) north of the Sangamon River.

SPECIES LIST

Scientific name	Common name	Stratum	Wetland indicator status	C♦
Acer saccharinum	silver maple	herb	FACW	1
Asclepias incarnata	swamp milkweed	herb	OBL	4
Aster simplex	panicled aster	herb	FACW	3
♣*Betula nigra*	river birch	shrub	FACW	4
Bidens frondosa	common beggar's ticks	herb	FACW	1
Carex normalis	spreading oval sedge	herb	FACW	4
Carex vulpinoidea	brown fox sedge	herb	OBL	3
♣*Carya illinoensis*	pecan	shrub	FACW	6
Cyperus acuminatus	taperleaf flat sedge	herb	OBL	2
Echinochloa muricata	barnyard grass	herb	OBL	0
Eleocharis macrostachya	spike rush	herb	OBL	5
Elymus virginicus	Virginia wild rye	herb	FACW-	4
♣*Fraxinus pennsylvanica*	green ash	shrub	FACW	2
Iva annua	marsh elder	herb	FAC	0
Leersia oryzoides	rice cutgrass	herb	OBL	3
Panicum virgatum	prairie switchgrass	herb	FAC+	4
Polygonum amphibium	water smartweed	herb	OBL	3
Polygonum lapathifolium	curttop lady's thumb	herb	FACW+	0
Polygonum pensylvanicum	giant smartweed	herb	FACW+	1
Polygonum ramosissimum	bushy knotweed	herb	FAC-	3
Populus deltoides	eastern cottonwood	herb	FAC+	2
♣*Quercus bicolor*	swamp white oak	shrub	FACW+	7
♣*Quercus palustris*	pin oak	shrub	FACW	4
Rumex altissimus	pale dock	herb	FACW-	2
Salix exigua	sandbar willow	shrub	OBL	1
Trifolium hybridum	alsike clover	herb	FAC-	*
Veronica peregrina	purslane speedwell	herb	FACW+	0

♦Coefficient of Conservatism (Taft *et al.* 1997)
*Non-native species
♣ planted

with planted material
mean C value (mCv) = ∑C/N = 69/26 = 2.7
FQI = ∑C /√N = 69/√26 = 13.5

without planted material
mean C value (mCv) = ∑C/N = 46/21 = 2.2
FQI = ∑C /√N = 46/√21 = 10.0

ROUTINE ON-SITE WETLAND DETERMINATION
Area B – Non-wetland (page 1 of 4)

Field Investigators: Marcum and Kurylo
Date: 16 June and 4 October 2005 **Project Name:** FAP 658 (IL 29)
State: Illinois **County:** Sangamon
Site Name: Shrubland
Legal Description: S1/2 of SE1/4 of NW1/4, Sect. 33, T.17 N., R.5 W. and NW1/4 of SE1/4 of NW1/4, Sect. 33, T. 17 N., R. 5 W.
Location: The site is located immediately west of the new Illinois Route 29 embankment and approximately 975 m (3200 ft) north of the Sangamon River.

Do normal environmental conditions exist at this site? Yes: X No:
Has the vegetation, soils, or hydrology been significantly disturbed? Yes: X* No:
** This site is a recently excavated depression, created for mitigation purposes.*

VEGETATION

Dominant Plant Species	Indicator Status	Stratum
1. *Betula nigra*	planted	shrub/sapling
2. *Carya illinoensis*	planted	shrub/sapling
3. *Fraxinus pennsylvanica*	planted	shrub/sapling
4. *Quercus bicolor*	planted	shrub/sapling
5. *Quercus palustris*	planted	shrub/sapling
6. *Aster pilosus*	FACU+	herb
7. *Eupatorium serotinum*	FAC+	herb
8. *Iva annua*	FAC	herb
9. *Solidago canadensis*	FACU	herb

Percentage of dominant species that are OBL, FACW, FAC+, or FAC: 50%
Hydrophytic vegetation: Yes: No: X
Rationale: Only 50% of the dominants are OBL, FACW, FAC+, or FAC.

SOILS
Series and phase: NRCS mapped as Radford and Sawmill, revised to generic Mollic Endoaquent.

On county hydric soils list?	Yes:	No:	Undetermined: X
Is the soil a histosol?	Yes:	No: X	
Histic epipedon present?	Yes:	No: X	
Redox Concentrations?	Yes: X	No:	Color: 10YR 3/4 & 10YR 4/4
Redox Depletions?	Yes: X	No:	Color: 10YR 4/2

Matrix color: 10YR 3/1 over 10YR 2/1 over 10YR 2.5/1
Other indicators: None.
Hydric soils? Yes: X No:
Rationale: This site is an excavated depression built for the purpose of mitigation. The top layers of soil had been removed leaving a poorly drained substratum with little or no soil development at the surface. Over the past five years though, new hydric soils have developed, as evidenced by a low chroma matrix and more redox features within the profile. This soil did not meet any of the current NRCS hydric soil indicators.

ROUTINE ON-SITE WETLAND DETERMINATION
Area B – Non-wetland (page 2 of 4)

Field Investigators: Marcum and Kurylo
Date: 16 June and 4 October 2005 **Project Name:** FAP 658 (IL 29)
State: Illinois **County:** Sangamon
Site Name: Shrubland
Legal Description: S1/2 of SE1/4 of NW1/4, Sect. 33, T.17 N., R.5 W. and NW1/4 of SE1/4 of NW1/4, Sect. 33, T. 17 N., R. 5 W.
Location: The site is located immediately west of the new Illinois Route 29 embankment and approximately 975 m (3200 ft) north of the Sangamon River.

HYDROLOGY

Inundated: Yes: No: X Depth of standing water: NA
Depth to saturated soil: >0.6 m (24 in)
Overview of hydrological flow through the system: This site receives water through precipitation, sheetflow from adjacent higher ground and flood events of the Sangamon River. Water leaves the site via evapotranspiration, groundwater recharge, and sheetflow from this site to Area B wet shrubland community and then to Area A.
Size of watershed: Approximately 3885 km^2 (1500 mi^2) (Wicker *et al.* 1997).
Other field evidence observed: This site has been excavated to hold water for longer periods. This site is located at a higher topographic position when compared to the Area B wet meadow site.

Wetland hydrology: Yes: No: X
Rationale: This site is at a higher topographic position compared to the Area B wet meadow community. Furthermore, 2005 ISGS hydrological monitoring data determined that this site does not satisfy the wetland hydrology criterion.

DETERMINATION AND RATIONALE:

Is the site a wetland? Yes: No: X
Rationale for decision: Although hydric soils are present, dominant hydrophytic vegetation and wetland hydrology are both absent. This site is not a wetland.

Determined by: Paul Marcum (vegetation and hydrology)
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ROUTINE ON-SITE WETLAND DETERMINATION

Area B – Non-wetland (page 3 of 4)

Field Investigators: Marcum and Kurylo
Date: 16 June and 4 October 2005 **Project Name:** FAP 658 (IL 29)
State: Illinois **County:** Sangamon
Site Name: Shrubland
Legal Description: S1/2 of SE1/4 of NW1/4, Sect. 33, T.17 N., R.5 W. and NW1/4 of SE1/4 of NW1/4, Sect. 33, T. 17 N., R. 5 W.
Location: The site is located immediately west of the new Illinois Route 29 embankment and approximately 975 m (3200 ft) north of the Sangamon River.

SPECIES LIST

Scientific name	Common name	Stratum	Wetland indicator status	C♦
Acer saccharinum	silver maple	tree	FACW	1
Ambrosia artemisiifolia	common ragweed	herb	FACU	0
Ambrosia trifida	giant ragweed	herb	FAC+	0
Apocynum cannabinum	dogbane	herb	FAC	2
Apocynum sibiricum	Indian hemp	herb	FAC+	2
Asclepias incarnata	swamp milkweed	herb	OBL	4
Aster ontarionis	Ontario aster	herb	FAC	4
Aster pilosus	hairy aster	herb	FACU+	0
Aster simplex	panicled aster	herb	FACW	3
♣*Betula nigra*	river birch	shrub	FACW	4
Bidens frondosa	common beggar's ticks	herb	FACW	1
Carex annectens	yellow fox sedge	herb	FACW	3
Carex cephalophora	short-headed bracted sedge	herb	FACU	3
Carex conjuncta	green-headed fox sedge	herb	FACW	5
Carex molesta	field oval sedge	herb	FAC	2
Carex shortiana	Short's sedge	herb	FACW+	4
♣*Carya illinoensis*	pecan	shrub	FACW	6
Cassia fasciculata	partridge pea	herb	FACU-	1
Conyza canadensis	horseweed	herb	FAC-	0
Elymus virginicus	Virginia wild rye	herb	FACW-	4
Erigeron annuus	annual fleabane	herb	FAC-	1
Eupatorium coelestinum	blue boneset	herb	FAC+	3
Eupatorium serotinum	late boneset	herb	FAC+	1
♣*Fraxinus pennsylvanica*	green ash	shrub	FACW	2
Geranium carolinianum	wild cranesbill	herb	UPL	2
Helianthus annuus	common sunflower	herb	FAC-	*
Ipomoea pandurata	wild sweet potato vine	herb	FACU	2
Iva annua	marsh elder	herb	FAC	0
Juncus tenuis	path rush	herb	FAC	0
Medicago lupulina	black medic	herb	FAC-	*
Melilotus sp.	sweet clover	herb	FACU	*
Oenothera biennis	evening primrose	herb	FACU	1
Panicum virgatum	prairie switchgrass	herb	FAC+	4

Species list continued on following page.

ROUTINE ON-SITE WETLAND DETERMINATION

Area B – Non-wetland (page 4 of 4)

Field Investigators: Marcum and Kurylo
Date: 16 June and 4 October 2005 **Project Name:** FAP 658 (IL 29)
State: Illinois **County:** Sangamon
Site Name: Shrubland
Legal Description: S1/2 of SE1/4 of NW1/4, Sect. 33, T.17 N., R.5 W. and NW1/4 of SE1/4 of NW1/4, Sect. 33, T. 17 N., R. 5 W.
Location: The site is located immediately west of the new Illinois Route 29 embankment and approximately 975 m (3200 ft) north of the Sangamon River.

SPECIES LIST (continued)

Scientific name	Common name	Stratum	Wetland indicator status	C♦
Polygonum amphibium	water smartweed	herb	OBL	3
Polygonum arenastrum	knotweed	herb	UPL	*
Polygonum lapathifolium	curttop lady's thumb	herb	FACW+	0
Polygonum pensylvanicum	giant smartweed	herb	FACW+	1
Polygonum ramosissimum	bushy knotweed	herb	FAC-	3
Populus deltoides	eastern cottonwood	shrub, herb	FAC+	2
♣*Quercus bicolor*	swamp white oak	tree	FACW+	7
♣*Quercus palustris*	pin oak	tree	FACW	4
Rumex altissimus	pale dock	herb	FACW-	2
Rumex crispus	curly dock	herb	FAC+	*
Salix exigua	sandbar willow	shrub	OBL	1
Setaria faberi	giant foxtail	herb	FACU+	*
Solidago canadensis	Canada goldenrod	herb	FACU	1
Trifolium hybridum	alsike clover	herb	FAC-	*
Trifolium pratense	red clover	herb	FACU+	*
Trifolium repens	white clover	herb	FACU+	*

♦Coefficient of Conservatism (Taft *et al.* 1997)
*Non-native species
♣ planted

with planted material
mean C value (mCv) = ∑C/N = 90/40 = 2.3
FQI = ∑C /√N = 90/√40 = 14.2

without planted material
mean C value (mCv) = ∑C/N = 67/35 = 1.9
FQI = ∑C /√N = 67/(√35) = 11.3

Appendix 2. Photos of FAP 658 (IL 29) wetland creation sites.

Photo 1. View from south end of Area A, looking due north.

Photo 2. View from north end of Area A, looking due south.

Photo 3. View from the northeast corner of Area A, looking south.

Photo 4. View from the north end of Area B, looking due south.

Photo 5. View from the northeast corner of Area B, looking south.

Photo 6. View from the eastside center of Area B, looking south.

Photo 7. Result of ice damage to tree plantings.

Photo 8. Line of young cottonwoods (Populus deltoides).