

**Wetland Mitigation and Corridor Revegetation Site Monitoring for FAP 658
(IL 29), Sangamon County, Illinois – 2000**

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Introduction

Wetland replacement activity has been initiated along the recently constructed section of Illinois Route 29 in Sangamon County, Illinois. The legal location of the site is SE1/4 of NW1/4 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).

Field monitoring of this area began in 2000 and will continue for five years as requested by the Illinois Department of Transportation. In 2000, field monitoring was conducted on 29 August. As of the 2000 field season, only Area B has been planted, so this is the only area included in this report. This area was planted with a wetland grass seeding (*Elymus canadensis*, *Elymus virginicus*, *Spartina pectinata* and *Calamagrostis canadensis*) and with woody hydrophytic vegetation (*Quercus palustris*, *Quercus bicolor*, *Betula nigra*, *Fraxinus pennsylvanica* and *Carya illinoensis*). Monitoring of Area A will begin after full planting has been completed. 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). 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.

Constructed Wetland Site

Project Goal #1: At the end of the five year monitoring period the created wetland community should be a jurisdictional wetland 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: A total of 2.43 hectares (6.0 acres) of forested wetland shall be created to compensate for previous loss of wetlands.

Objective: Planting with hydrophytic tree species should compensate for the loss of previously altered wetlands for a total creation of 6.0 acres of forested wetland.

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

Methods

Monitoring will be performed on two areas of the constructed wetland site. The monitoring for Area B began in 2000 and will continue for five years. Area A will be monitored in 2001, after the area has been fully planted. Illinois Natural History Survey personnel will monitor the biological parameters and Illinois State Geological Survey personnel will monitor hydrology. Yearly tree surveys and yearly monitoring reports will be submitted to the Illinois Department of Transportation 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

For both sites to be monitored, a complete list of all spontaneous (not planted) plant species found in the area will be recorded and the Floristic Quality Index will be calculated (Taft *et al.* 1997). The Floristic Quality Index will be calculated both with and without the inclusion of planted species. This index provides a measure of the

floristic integrity or level of disturbance of a site. Each 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 Floristic Quality Index (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. Species not native to Illinois (indicated by * in the species list for each site) are not included in calculations. The FQI for each site is determined by multiplying the mean C value times the square root of N [$mCv (\sqrt{N})$]. An Index score below 10 suggests a site of low natural quality; below 5, a highly disturbed site. An FQI value of 20 or more suggests that a site has evidence of native character and may be considered an environmental asset.

Project Goal #1

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 then 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 hydrophytic. Planted species were not included in the percentage of dominant hydrophytic vegetation.

B. **Presence of Hydric Soils** – Soils 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 Illinois State Geological Survey (ISGS) will install ground water monitoring wells at the site. ISGS personnel will measure water levels monthly. In addition, the site will be surveyed annually for field indicators of wetland hydrology.

Project Goal #2

Tree survivorship will be assessed each year for a five year monitoring period. Area A and Area B will be assessed separately. For each area, every tree will be located, identified and determined to be alive or dead. In Area B, a total of 544 trees were planted. These trees include *Quercus palustris* (119), *Quercus bicolor* (106), *Betula nigra* (102), *Fraxinus pennsylvanica* (103) and *Carya illinoensis* (114). Area A has not been planted.

Results

Floristic Quality Index The Floristic Quality Index including all planted species was 9.68 and the mean C value was 1.77. The Floristic Quality Index calculated without the planted species was only 5.31 with a mean C value of 1.08. These values are indicative of an area with poor natural quality. There were a total of thirty native species found at the site, including the six species from the planted material.

Summary Table for Species List

Total Species Richness	50
Native Species Richness	30
% Adventive	40% (20/50)
Mean Conservatism (with planted material)	1.77
Mean Conservatism (spontaneous natives only)	1.08
Floristic Quality Index (FQI) (with planted material)	9.68
FQI (spontaneous natives only)	5.31
% Wetland Species (OBL, FACW, FAC) (with planted material)	54% (27/50)
% Wetland Species (OBL, FACW, FAC) (w/o planted material)	52% (22/42)

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

A. Predominance of Hydrophytic Vegetation – The performance criteria requires that greater than 50% of the dominant plant species be hydrophytic. Results for 2000 indicate that the dominant herbaceous species in Area B are *Echinochloa muricata* (OBL), ♣ *Elymus canadensis* (FAC-), *Festuca pratensis* (FACU-), ♣ *Lolium perenne* (FACU) and ♣ *Triticum aestivum* (UPL). The shrub layer dominants are the five planted tree species: ♣ *Betula nigra* (FACW), ♣ *Carya illinoensis* (FACW), ♣ *Fraxinus pennsylvanica* (FACW), ♣ *Quercus bicolor* (FACW+) and ♣ *Quercus palustris* (FACW). Only 50% of the dominant plant species are hydrophytic (planted species omitted from the calculation of percent hydrophytic vegetation). This site does not meet the criterion for predominance of hydrophytic vegetation.

♣ *denotes planted species*

B. Presence of Hydric Soils – The performance criteria requires that hydric soil characteristics be present, or conditions favorable for hydric soil formation should persist. The soil characteristics observed are not representative of current conditions at this site, since recent excavation has exposed the subsoil. It remains to be seen whether these newly exposed soils will, in time, develop characteristics in response to the altered environment. However, based on hydrologic conditions, the potential for hydric soil development is very high.

Depth(in)	Matrix Color	Concentrations	Depletions	Texture	Structure
0 - 15	2.5Y 2.5/1	2.5Y5/6, 10YR 4/6	10YR 4/1	Silty Clay Loam	massive
15 - 21	10YR 4/1	2.5Y5/6, 10YR 4/6	10YR 5/1	Silty Clay Loam	massive
21 - 26	2.5Y 2.5/1	2.5Y 5/6, 10YR 4/6	10 YR 4/1	Silty Clay Loam	massive

C. Presence of Wetland Hydrology – The performance criteria 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. The Illinois Geological Survey has not initiated water level monitoring at this site. However, during a visit to the site in late August the following indicators of hydrology were present in Area B: drift lines, algal mats and mud cracks. In addition, there was a small area that was saturated to the surface. This site would appear to have sufficient hydrologic input, but data from Illinois Geological Survey monitoring wells will be needed to make this conclusive.

Project Goal #2: A total of 2.43 hectares (6.0 acres) of forested wetland shall be created to compensate for previous loss of wetlands.

The trees in Area B were all located, identified and their condition assessed. A total of 544 trees were planted and 530 were found to be alive. All five tree species easily surpassed the 75% survivorship requirement. Table 2 shows the survivorship for each tree species planted in Area B.

Species	Plant Area	# Alive	# Dead	Total Planted	% Survival
<i>Betula nigra</i>	B	100	2	102	98.0
<i>Carya illinoensis</i>	B	113	1	114	99.1
<i>Fraxinus pennsylvanica</i>	B	99	4	103	96.1
<i>Quercus bicolor</i>	B	103	3	106	97.2
<i>Quercus palustris</i>	B	115	4	119	96.6
Totals		530	14	544	97.4

Summary and Recommendations

Floristic Quality Index – The Floristic Quality Index was very low for this site (5.31 without planted material; 9.68 with planted material). However, the vegetation at this site is just beginning to be established. As is typical for recently disturbed areas; the naturally occurring vegetation at this site is made up of weedy, early successional native and non-

native species. Over time these species will likely be replaced by the more conservative, perennial species that will form a more stable plant community. If that happens, the Floristic Quality Index and the mean C value should rise. *Phalaris arundinacea* is present at this site. The abundance of this aggressive, persistent weed will be monitored.

Project Goal # 1 – Area B was assessed for the three wetland criteria as stipulated by the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987). Thus far, the mitigation site does not meet the three wetland criteria. The dominant vegetation at the site is not hydrophytic. However, I would expect this to change over the coming year and during the five year evaluation period. Wetland hydrology seems to be present but, without Illinois State Geological Survey well data, this can't be conclusively established. The soils at the site have been disturbed and it will take them time to show the characteristics of wetland soils.

Project Goal # 2 – The performance criteria for this project goal were easily attained during the first year of monitoring. Tree survival at the site is very encouraging with all five species exhibiting greater than 96% survival for the first year. The large, more mature size of these tree plantings is probably the reason for their great success.

At this time, the actual area, if any, of the wetland could not be determined. More monitoring of this site and better information about the hydrology will determine the presence and then the extent of the created wetland in Area B. Area A will be monitored once all plantings have been completed.

Literature Cited

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ROUTINE ON-SITE WETLAND DETERMINATION

Site 1 (page 1 of 4)

Field Investigators: Marcum, Kurylo, Wilm & Wiesbrook

Date: 29 August 2000

Project Name: FAP 658 (IL 29)

State: Illinois

County: Sangamon

Site Name: Shrubland/Meadow (Area B)

Legal Description: SE1/4 of NW1/4 of sec. 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: No:

Has the vegetation, soils, or hydrology been significantly disturbed? Yes: No:

* *This site is a recently (1 year) excavated depression, created for mitigation purposes.*

VEGETATION

Dominant Plant Species	Indicator Status	Stratum
1. <i>Betula nigra</i>	planted	shrub
2. <i>Carya illinoensis</i>	planted	shrub
3. <i>Fraxinus pennsylvanica</i>	planted	shrub
4. <i>Quercus bicolor</i>	planted	shrub
5. <i>Quercus palustris</i>	planted	shrub
6. <i>Echinochloa muricata</i>	OBL	herb
7. <i>Elymus canadensis</i>	planted	herb
8. <i>Festuca pratensis</i>	FACU-	herb
9. <i>Lolium perenne</i>	planted	herb
10. <i>Triticum aestivum</i>	planted	herb

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

Hydrophytic vegetation: Yes: No:

Rationale: Only 50% of the dominants are OBL, FACW, FAC+, or FAC.

* *at this point, the majority of dominant herbaceous vegetation is a planted cover crop.*

SOILS

Series and phase: NRCS mapped as Radford and Sawmill, revised to generic Aquic Udorthent

On county hydric soils list?

Yes: No:

Is the soil a histosol?

Yes: No:

Histic epipedon present?

Yes: No:

Redox Concentrations?

Yes: No: Color: 2.5Y 5/6, 10YR 4/6

Redox Depletions?

Yes: No: Color: 10YR 4/1, 10YR 5/1

Matrix color: 2.5Y 2.5/1, 10YR 4/1

Other indicators: None

Hydric soils? Undetermined

Rationale: This site is an excavated depression, built for the purpose of mitigation. The top layers of soil have been removed leaving a poorly drained substratum with little or no soil development at the surface. The colors observed are relict from the previous conditions. At this point and time it cannot be determined whether the soils are hydric.

ROUTINE ON-SITE WETLAND DETERMINATION

Site 1 (page 2 of 4)

Field Investigators: Marcum, Kurylo, Wilm & Wiesbrook

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HYDROLOGY

Inundated: Yes: No: Depth of standing water: NA

Depth to saturated soil: 0 - >.66 m (0 - >26 in)

Overview of hydrological flow through the system: This site receives water through precipitation, sheetflow from adjacent higher ground and from flood events of the Sangamon River. Water leaves the site via evapotranspiration, groundwater recharge and sheetflow back into the Sangamon River.

Size of watershed: Approximately 3885 km² (1500 mi²) (Wicker *et al.* 1997).

Other field evidence observed: This site has been excavated to hold water for longer periods. Algal mats, mud cracks, drift lines and areas of soil saturation were observed at this site.

Wetland hydrology: Yes: No:

Rationale: Field observations suggest that this site is flooded or saturated long enough to meet the wetland hydrology criterion. Data from Illinois State Geological Survey monitoring wells will help to make this conclusive.

DETERMINATION AND RATIONALE:

**Is the site a wetland?
Rationale for decision:**

Yes: No: Undetermined:
At this recently excavated site, the vegetation is dominated by planted species and the soil characteristics do not reflect current conditions. Therefore, dominant hydrophytic vegetation and hydric soils are absent. The site appears to have wetland hydrology.

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ROUTINE ON-SITE WETLAND DETERMINATION

Site 1 (page 3 of 4)

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SPECIES LIST

Scientific name	Common name	Stratum	Wetland indicator status	C♦
<i>Abutilon theophrasti</i>	velvet-leaf	herb	FACU-	*
<i>Acer negundo</i>	box elder	herb	FACW-	1
<i>Acer saccharinum</i>	silver maple	herb	FACW	1
<i>Amaranthus tuberculatus</i>	tall waterhemp	herb	OBL	1
<i>Ambrosia artemisiifolia</i>	common ragweed	herb	FACU	0
<i>Ambrosia trifida</i>	giant ragweed	herb	FAC+	0
<i>Ammannia coccinea</i>	long-leaved ammannia	herb	OBL	5
<i>Apocynum cannabinum</i>	dogbane	herb	FAC	2
♣ <i>Betula nigra</i>	river birch	shrub	FACW	4
<i>Bidens frondosa</i>	common beggar-ticks	herb	FACW	1
♣ <i>Carya illinoensis</i>	pecan	shrub	FACW	6
<i>Cassia fasciculata</i>	partridge pea	herb	FACU-	1
<i>Chamaesyce maculata</i>	nodding spurge	herb	FACU-	0
<i>Chenopodium album</i>	lamb's quarters	herb	FAC-	*
<i>Conyza canadensis</i>	horseweed	herb	FAC-	0
<i>Cyperus strigosus</i>	long scaled nut sedge	herb	FACW	0
<i>Daucus carota</i>	Queen-Anne's-lace	herb	UPL	*
<i>Echinochloa muricata</i>	barnyard grass	herb	OBL	0
♣ <i>Elymus canadensis</i>	Canada wild rye	herb	FAC-	4
<i>Erigeron annuus</i>	annual fleabane	herb	FAC-	1
<i>Eupatorium serotinum</i>	late boneset	herb	FAC+	1
<i>Festuca pratensis</i>	meadow fescue	herb	FACU-	*
♣ <i>Fraxinus pennsylvanica</i>	green ash	shrub	FACW	2
<i>Ipomoea purpurea</i>	common morning-glory	herb	FACU-	*
♣ <i>Lolium perenne</i>	crested rye grass	herb	FACU	*
<i>Medicago sativa</i>	alfalfa	herb	UPL	*
<i>Melilotus alba</i>	white sweet clover	herb	FACU	*
<i>Oenothera biennis</i>	evening primrose	herb	FACU	1
<i>Panicum dichotomiflorum</i>	fall panicum	herb	FACW-	0
<i>Phalaris arundinacea</i>	reed canary grass	herb	FACW+	*

Species list continued on following page.

ROUTINE ON-SITE WETLAND DETERMINATION

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SPECIES LIST (continued)

Scientific name	Common name	Stratum	Wetland indicator status	C♦
<i>Plantago lanceolata</i>	buckhorn	herb	FAC	*
<i>Poa pratensis</i>	Kentucky bluegrass	herb	FAC-	*
<i>Polygonum lapathifolium</i>	pale smartweed	herb	FACW+	0
<i>Polygonum pensylvanicum</i>	giant smartweed	herb	FACW+	1
<i>Polygonum scandens</i>	climbing buckwheat	herb	FAC	2
<i>Populus deltoides</i>	eastern cottonwood	herb	FAC+	2
<i>Portulaca oleracea</i>	purslane	herb	FAC-	*
♣ <i>Quercus bicolor</i>	swamp white oak	shrub	FACW+	7
♣ <i>Quercus palustris</i>	pin oak	shrub	FACW	4
<i>Rorippa islandica</i>	marsh yellow cress	herb	OBL	4
<i>Rumex altissimus</i>	pale dock	herb	FACW-	2
<i>Rumex crispus</i>	curly dock	herb	FAC+	*
<i>Rumex obtusifolius</i>	bitter dock	herb	FACW	*
<i>Setaria faberi</i>	giant foxtail	herb	FACU+	*
<i>Sida spinosa</i>	prickly sida	herb	FACU	*
<i>Sonchus arvensis</i>	field sowthistle	herb	FAC-	*
<i>Trifolium pratense</i>	red clover	herb	FACU+	*
<i>Trifolium repens</i>	white clover	herb	FACU+	*
♣ <i>Triticum aestivum</i>	bearded wheat	herb	UPL	*
<i>Xanthium strumarium</i>	cockle bur	herb	FAC	0

♦ Coefficient of Conservatism (Taft *et al.* 1997)

*Non-native species

♣ planted

With planted material

$$\text{mean C value (mCv)} = \sum C/N = 53/30 = 1.8$$

$$\text{FQI} = \text{mCv} (\sqrt{N}) = 1.8 (\sqrt{30}) = 9.7$$

Without planted material

$$\text{mean C value (mCv)} = \sum C/N = 26/24 = 1.1$$

$$\text{FQI} = \text{mCv} (\sqrt{N}) = 1.18 (\sqrt{24}) = 5.3$$