Wetland Mitigation Monitoring Report for the FAP 319 (US 36) site near East Hannibal, Pike County, Illinois (Second monitoring year--2000)

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Summary

Based on observations made during the 2000 season (second year of monitoring), the following is a summary that relates the likelihood that the compensation site will meet each goal within the five-year monitoring period. The goals, objectives, and performance standards follow those outlined in the IDOT monitoring request (25 March 1999).

Overall Project goal: To create 18.3 acres of forested palustrine wetland, enhance 5.0 acres of emergent wetlands, and preserve 12.6 acres of existing forested wetlands and 13.3 acres of upland buffer.

Hydrophytic vegetation, hydric soils, and wetland hydrology are currently present over nearly all the wetland creation site, which is smaller than the originally planned size, because of the necessity of placing non-wetland buffers between the excavated site and existing wetlands. Vegetation that colonized the created site is mostly dominated by native, weedy species. Planted tree species appear to be doing well. However, more tree planting will be necessary in order to meet the performance standard of 100 trees/acre. The original wet meadow on the site is becoming overgrown with woody species.

Introduction

This report describes the second year of monitoring of an excavated wetland created to mitigate for wetlands affected by the construction of the FAP 319 (US 36) bridge at Hannibal, Missouri. The wetlands affected were located on the Illinois side of the bridge. Earthwork for the mitigation site was completed in 1997; trees were planted in the fall of 1997. More trees were planted in 1998 to replace planted trees that had died (pers. comm. from Mike Vanderhoff of the IDOT to Allen Plocher 1999). We observed that more tree seedlings were planted late in 1999 or early in 2000 to replace lost individuals.

This report discusses the goals, objectives, and performance criteria for the mitigation project, the methods used for monitoring the site, monitoring results, and discussion and recommendations. Methods and results are discussed for performance criteria for each goal.

Vegetation monitoring was previously conducted on a pre-existing wetland area within the mitigation site (Plocher and Tessene 1995, 1997; Tessene *et al.* 2000), and continues with this survey. Results of these surveys will be discussed.

Goals, Objectives, and Performance Criteria

The goals, objectives, and performance criteria described below follow those listed in the request to monitor the site (Tom Brooks, IDOT, 25 March 1999). 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 current federal standards.

Objective: The created wetland will be formed through excavation in an 18.3-acre former crop field.

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 less than 2 m (6.6 ft) or be saturated to the surface for at least 12.5% of the growing season.

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

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 100 planted trees per acre will be present and healthy in the created wetland site.

b. Native species abundance and cover: At the end of the five-year monitoring period, at least 75% of the area in the planned wetland should be covered by persistent hydrophytic vegetation. In the first year, percent coverage should be at least 15%. Native plants should be at least 50% of total species at the end of five years, at least 10% in the first year.

c. Dominant plant species: None of the three most dominant plant species in the planned wetland should be non-native species.

Project Goal 3: The previously existing wet meadow community will continue to be monitored.

Objective: A wet meadow community will be maintained through periodic prescribed fire.

Performance criteria:

Native species abundance and cover: Native perennial, non-woody species will continue to be the predominant species.

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), 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 of wetlands is met.

b) Occurrence of hydric soils

To monitor hydric soil development, the soil was sampled in 1999 and 2000. 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

Indicators of wetland hydrology include, but are not limited to, drift lines, wetland drainage patterns, sediment deposits on leaves, watermarks on trees, and visual observation of inundated or saturated soils (Environmental Laboratory 1987). Personnel from the Illinois State Geological Survey (ISGS) installed stage gages and monitoring wells in order to monitor the hydrology of the site. Monitoring well data from the ISGS (Watson and Pociask 2000) were used to determine the seasonal depth to the water table and the area of the site that meets the wetland hydrology criterion.

Project Goal 2

a) Planted species survivorship

In 1997 and 1998, 1951 total trees were planted on the site (Mike Vanderhoff, IDOT, pers. comm. to Allen Plocher, 1999). In 1999, trees were sampled rather than totally enumerated in the interest of time constraints. For each 1000 feet of a planted row of trees, 200 feet were sampled (20% sample), with each planted sapling assigned to species and noted if living or dead. Assuming that trees were planted regularly throughout the site, as was indicated, this method would provide a representation of the survival rate of each species.

Our observations during the 2000 survey suggested that more tree seedlings were planted to replace dead individuals. Thus, a total count of planted tree species was conducted to determine the total number of individuals. Because more seedlings were planted, direct comparisons between the 1999 and 2000 results cannot be made.

b) Native species abundance and cover, and

c) Dominant plant species

A complete vegetation survey of the excavated wetland basin was performed to tally all naturally occurring plant species present. Vegetation was also sampled in the wetland basin by placing 0.5 m^2 quadrats along four transects perpendicular to the access road. Two transects were placed on either side of the existing wetland site at approximately 20 m intervals. Quadrats were placed at 20 m intervals along each transect, for a total of 47 plots. Cover of each species encountered in each plot was assigned a cover class (Table 1) (modified from Daubenmire 1959).

Frequency (proportion of quadrats where a species occurred) and average cover (from midpoints for each cover class) were used to compute relative frequency (frequency of a species relative to total observations) and relative cover (or dominance)(cover relative to total observed cover). These two values were averaged to determine the importance value for each species sampled. Dominant species were determined by adding the importance values, listed in descending order. Those species that immediately exceed 50% of importance value, plus any additional species with an importance value of 20% or greater, are considered dominant species.

Table 1. Cover classes used in vegetation sampling.

Cover Class	Range of Cover (%)	Midpoint of Range (%)
1	0-1	0.5
2	1-5	3.0
3	5-25	15.0
4	25-50	37.5
5	50-75	62.5
6	75-95	85.0
7	95-100	97.5

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

To calculate the Floristic Quality Index (FQI), first compute the mean c value ($\bar{c}$), $\bar{c} = (\Sigma C)/N$, where ΣC represents the sum of the numerical ratings (c) for all species native to Illinois recorded for a site, and N represents the number of native species on the site. The c value for each species is shown in the species list for the site. The FQI of each site is determined by multiplying the mean c value by the square root of N ($\bar{c}\ \sqrt{N}$). An Index score below 10 suggests a site of low natural quality; below 5, a highly disturbed site. An FQI value of at least 20 ($\bar{c}$ above 3.0) suggests that a site has evidence of native character and may be considered an environmental asset.

Project Goal 3

Vegetation in the pre-existing wet meadow was sampled in 1994 and 1996 (Plocher and Tessene 1995, 1997). Earlier sampling compared vegetation before and after a prescribed burn in Spring 1996. Vegetation sampling conducted during the monitoring of the wetland restoration/reconstruction site followed the same methods. Transects were established perpendicular to the long axis of the wetland at 15 m (50 ft) intervals, and 0.5 m^2 quadrats were placed along the transects at 15 m (50 ft) intervals. Cover of each species in each plot was assigned a cover class, used in calculating frequency, relative frequency, average cover, relative cover, and importance values, as noted in the section above.

Results and discussion

Project goal 1

a) Predominance of hydrophytic vegetation

Dominant plant species for the created wetland are listed in Table 2. The majority of the dominant species are hydrophytic. Species encountered during vegetation sampling at the site, used to determine the dominant species, are listed in Table 5. A full list of plant species observed is presented in the wetland determination form at the end of this report (Appendix 1).

Table 2. Dominant plant species by stratum and wetland indicator status.

Dominant Plant Species	Indicator Status	Stratum
1. *Aster simplex*	FACW	herb
2. *Echinochloa muricata*	OBL	herb
3. *Setaria faberi*	FACU+	herb

The herbaceous species that colonized the site are dominated by taxa that tolerate or thrive under disturbed conditions, such as the original site excavation and periodic, prolonged inundation. *Echinochloa* remains a dominant, as it was in 1999. The other two dominants were relatively less common in 1999, when *Cyperus* and *Typha* were better established. Cattails remain locally dominant, especially in wetter areas, but do not dominate throughout the site. In parts of the site where planted trees become well-established, they should eventually shade out the cattails, but in other areas, cattails may come to dominate.

b) Presence of hydric soils

This site has been excavated. Soils mapped at the site include Fluvaquentic Hapludolls which are somewhat poorly drained (Shaffton and Coffeen series) and Fluvaquentic Endoaquolls which are poorly drained (Ambraw and Beaucoup series)(Struben and Lily 1999). Soils at the site were most similar to the Ambraw series, assuming the mollic epipedon had been removed during excavation. Soils in the Ambraw series are commonly found in this part of the Mississippi River floodplain. They consist of very deep soils formed in stratified loamy alluvium.

Soil cores were examined from several different areas at the site. Examples are presented in Tables 3a and 3b. The depth to a sandy alluvial layer ranged from 0.1 – 0.6 m (5 to 25 in). Redoximorphic features as dark yellowish-brown iron masses began within 0.08 m (3 in) from the soil surface and were distinct throughout the profile. Iron-manganese concretions were also observed. The depth to saturation was approximately 0.46-0.6 m (18-24 in) and there was evidence of episaturation. The site hydrology and morphological characteristics of these soils suggest that they are saturated long enough for anaerobic conditions to occur in the upper profile for a significant duration. Therefore, these soils are hydric.

Table 3a. Soil profile description: 2000, northwest portion of the site

Depth	Description
0-4 in	10YR 4/1, clay loam, 7.5YR 4/4 and 7.5YR 3/3 iron masses at the surface
4-6 in	10YR 4/1, sandy clay loam
6-18 in	10YR 4/4 and10YR 5/3, sand
18+	saturated

Table 3b. Soil profile description: 1999, east central portion of the site

Depth	Description
0-4 in	10YR 4/1, loam to clay loam, weak angular blocky to structureless (massive), common, distinct, fine to medium 10YR 4/4 and 10YR 4/6 iron masses
4-18 in	10YR 4/1, silty clay loam, structureless (massive), many, distinct, medium to coarse 10YR 4/4 and 10YR 4/6 iron masses
18-24	10YR 4/1, silty clay loam, structureless (massive), many, distinct, medium to coarse 10YR 4/4 and 10YR 4/6 iron masses
24+	saturated

c) Presence of wetland hydrology

Field evidence of wetland hydrology included the excavated depressional landscape position, water-borne sediment deposits, and bare areas that suggest prolonged ponding. Well data from instruments placed by ISGS personnel suggest that the total area of the created wetland that conclusively meets the wetland hydrology criterion is 6.5 ha (16.0 acres), out of an excavated basin of 7.0 ha (17.4 acres) (Watson and Pociask 2000)(Appendix 3). This compares with 6.7 ha (16.5 acres) in 1999 (Fucciolo *et al.* 1999).

Project Goal 2

a) Survival of planted trees

According to Mike Vanderhoff of the Illinois Department of Transportation (pers. comm. to Allen Plocher, 1999), 1636 trees (409 each of four different species) were originally planted on the 18.3 acre former crop field in the fall of 1997, after earth work was completed for the wetland compensation site. In the fall of 1998, 654 trees were planted to replace those that had died, in the original 20' by 20' spacing. Then, in order to avoid ponded areas on the site, the remaining 315 trees were planted between existing live stems, resulting in 10-foot spacing in some rows. As a result, the total number of live planted saplings on the planned wetland site was 1951 in the fall of 1998.

When we began to assess the planted trees during the current survey, we observed that new individuals had been planted to replace those that had died. This was especially apparent with the large number of pecan seedlings that we observed. However, we were not certain how many were planted. Thus, a total count of live and dead trees was made, instead of the sampling of 20% of total row length that was conducted in 1999.

Table 4 presents data for planted tree survival, with numbers of observed live and dead stems. Density of live stems of each species is also listed.

Table 4. Observed survival of planted trees in 2000 at East Hannibal wetland mitigation site.

Species	Live stems Observed	Dead stems Observed	Density live/acre (live/ha)
Carya illinoensis	310	4	17.22 (42.54)
Fraxinus pennsylvanica	503	19	27.94 (69.02)
Quercus bicolor	439	23	24.39 (60.24)
Quercus palustris	332	19	18.44 (45.56)
Prunus sp.	5	6	0.28 (0.69)
Unidentified		142	
Total	1589	213	88.56(218.74)

For comparison, Table 4a presents data for planted tree survival in 1999, with numbers of observed live and dead stems projected to the whole site (sampling included 20% of total row length). Density of live stems of each species, percent survival of observed stems, and survival in proportion to the original planted stems (where equal numbers of each species were planted) are also listed.

Table 4a. Observed survival of planted trees in 1999 at East Hannibal wetland mitigation site.

Species	Live stems Obs. (per site)	Dead stems Obs. (per site)	Density live/acre (live/ha)	% Survival (% of planted)
Carya illinoensis	27 (135)	9 (45)	7.38 (18.23)	27.66
Fraxinus pennsylvanica	90 (450)	11 (55)	24.59 (60.74)	92.21
Quercus bicolor	46 (230)	57(285)	12.57 (31.05)	47.13
Quercus palustris	44 (220)	24(120)	12.02 (29.69)	45.08
Total	207(1035)	101(505)	56.56(139.70)	53.05

From the above tables, one can note that numbers of individuals of all species increased between 1999 and 2000, confirming the hypothesis that more trees were planted. *Fraxinus* remains the most common species. Fewer dead stems were observed in 2000, and no species appeared to be hit especially hard. Unidentified stems include some that may be too weathered to identify, and some not indicated by the individuals recording field notes.

Some stems included in the table under *Quercus palustris* were marked with tags indicating *Q. shumardii*, a related species native further south in Illinois. Although the trees are not native this far north, they should be appropriate for site conditions. They could be conclusively placed in either species when the trees are old enough to bear acorns. A small number of other planted specimens, not bearing tags, appeared to be individuals of the genus *Prunus*, as shown by leaf characteristics; they did not appear to survive well under the site conditions.

In any case, the number of planted tree stems on the site does not meet performance standards, which state that 100 healthy stems per acre is necessary. Thus, more woody stems may need to be planted. On the other hand, other woody species will colonize the site, and some will become trees. *Acer saccharinum, Betula nigra,* (unplanted) *Fraxinus pennsylvanica, Populus deltoides, Salix exigua,* and *Salix nigra* stems were all recorded from the excavated wetland site in low numbers, and woody plants will certainly continue to invade the site from surrounding forests.

b) Abundance and cover of native species

Table 5 below presents the results of vegetation sampling in the created wetland site. We noted 38 species, 29 of which are native to Illinois, in the 47 quadrats. Thus, about 76% of the species and 75% of the importance value in the plots is contributed by native species. However, *Setaria faberi*, the third most common species, is a non-native, non-wetland species, which goes against project goals.

Table 5. Results of vegetation sampling in 2000 at East Hannibal wetland mitigation site.

Species	Frequency (%)	Relative Freq. (%)	Average Cover (%)	Relative Cover (%)	Importance Value
Echinochloa muricata	95.74	26.79	46.64	45.54	36.16
Aster simplex	57.45	16.07	9.90	9.67	12.87
Setaria faberi	38.30	10.71	8.64	8.44	9.57
Bidens cernua	25.53	7.14	10.71	10.46	8.80
Cyperus strigosus	27.66	7.74	4.09	3.99	5.86
Typha latifolia	21.28	5.95	5.18	5.06	5.51
Aster pilosus	23.40	6.55	3.11	3.03	4.79
Setaria glauca	12.77	3.57	5.90	5.77	4.67
Bidens frondosa	17.02	4.76	2.47	2.41	3.59
Asclepias incarnata	17.02	4.76	1.17	1.14	2.95
Eleocharis obtusa	12.77	3.57	1.83	1.79	2.68
Polygonum pensylvanicum	8.51	2.38	2.77	2.70	2.54
Panicum dichotomiflorum	10.64	2.98	1.84	1.80	2.39
Rumex crispus	14.89	4.17	0.60	0.58	2.37
Cassia fasciculata	6.38	1.79	2.45	2.39	2.09
Digitaria ischaemum	10.64	2.98	0.95	0.92	1.95
Populus deltoides	6.38	1.79	0.87	0.85	1.32
Polygonum hydropiper	4.26	1.19	1.34	1.31	1.25
Eleocharis compressa	2.13	0.60	1.33	1.30	0.95
Polygonum persicaria	2.13	0.60	1.33	1.30	0.95
Trifolium repens	2.13	0.60	1.33	1.30	0.95
Eupatorium serotinum	4.26	1.19	0.38	0.37	0.78
Sida spinosa	4.26	1.19	0.38	0.37	0.78
Ammania coccinea	4.26	1.19	0.07	0.07	0.63
Vitis riparia	4.26	1.19	0.02	0.02	0.61
Campsis radicans	2.13	0.60	0.32	0.31	0.45
Scirpus atrovirens	2.13	0.60	0.32	0.31	0.45
Apocynum sibiricum	2.13	0.60	0.06	0.06	0.33
Cyperus acuminatus	2.13	0.60	0.06	0.06	0.33
Eleocharis acicularis	2.13	0.60	0.06	0.06	0.33
Panicum capillare	2.13	0.60	0.06	0.06	0.33
Plantago rugellii	2.13	0.60	0.06	0.06	0.33
Solanum carolinianum	2.13	0.60	0.06	0.06	0.33
Bromus tectorum	2.13	0.60	0.01	0.01	0.30
Conyza canadensis	2.13	0.60	0.01	0.01	0.30
Euphorbia maculata	2.13	0.60	0.01	0.01	0.30
Fraxinus pennsylvanica	2.13	0.60	0.01	0.01	0.30
Salix nigra	2.13	0.60	0.01	0.01	0.30
Total	357.45	100.00		100.00	100.0

About 74% of species and almost 80% of importance value is supplied by hydrophytes. On the other hand, annual species comprise 50% of species and almost 80% of importance value, which goes against the goal of persistent hydrophytic vegetation. This proportion will probably diminish as site conditions become stabilized over the next few years. Also, planted and naturally established trees will eventually dominate the site.

During a survey of naturally occurring plant species on the wetland creation site, 69 native and 15 non-native species were observed (see Appendix 1), compared with 45 native and 12 non-native species in 1999. The FQI value for the site (unplanted species) was 17.8 with a mean C value of 2.1, indicating fair natural quality. Including the planted saplings, the FQI value was 19.4 with a mean C value of 2.3. These values compare with 14.6 and 2.2, respectively, for unplanted species, and 16.6 and 2.4, respectively, for all plant species in the wetland creation site.

c) Dominant plant species

The herbaceous species that colonized the site are dominated by weedy taxa that can tolerate or even thrive under disturbed conditions, such as the original site excavation and periodic, prolonged inundation. *Echinochloa* remains a dominant species, as it was in 1999. *Aster simplex*, a perennial, rhizomatous species, is widespread as well. *Setaria faberi*, which is a non-native annual that is not classified as a hydrophyte, is responding to the disturbed conditions on the site. One may expect the annual species *Echinochloa* and *Setaria* to become less important over time on most of the site as they are out-competed or shaded out by other, more long-lived species.

Cattails were considered dominant in 1999, but not in 2000. They dominate locally, but are not as widespread as some other species. *Cyperus*, another dominant in 1999, is still common, but was overtaken by other species.

Project Goal 3

Table 6 below provides the results of vegetation sampling on the wet meadow that existed at the wetland compensation site since the time when the adjacent land was a crop field. Information provided includes percent frequency, relative frequency, average percent cover, relative cover, and importance value for each species. A list of all species observed in the wet meadow is presented in Appendix 2.

Table 6. Results of plant sampling in the original wet meadow, E. Hannibal wetland mitigation site.

Species	Freq	Rel freq	Ave cov	Rel cov	IV
Leersia oryzoides	92.86	31.71	71.07	54.94	43.32
Aster simplex	42.86	14.63	12.18	9.41	12.02
Apocynum sibiricum	35.71	12.20	13.75	10.63	11.41
Polygonum pensylvanicum	28.57	9.76	9.29	7.18	8.47
Acer saccharinum	28.57	9.76	7.68	5.94	7.85
Salix exigua	21.43	7.32	9.82	7.59	7.45
Echinochloa muricata	21.43	7.32	3.21	2.48	4.90
Erechtites hieracifolia	7.14	2.44	1.07	0.83	1.63
Ludwigia palustris	7.14	2.44	1.07	0.83	1.63
Bidens frondosa	7.14	2.44	0.21	0.17	1.30
Ulmus americana	7.14	2.44	0.21	0.17	1.30
Total	292.86	100.00		100.00	100.0

The results are comparable with previous sampling by Plocher and Tessene (1995, 1997), Tessene *et al.* (2000), and the original wetland determinations by Keene and Tessene in 1992, which showed the same top three species as dominants. Several fewer species were sampled than in 1999. Perhaps some of this is a result of the fact that we were able to only sample 14 quadrats, rather than the 28 or so in previous surveys. This is because the site is becoming overgrown with woody growth, and we only sampled vegetation in open areas of the site.

An original goal of this wetland mitigation project was that this wetland area remains a wet meadow, and that woody growth be kept in check by controlled fire. This goal is not being met, but given the vigorous growth of *Fraxinus, Populus, Salix,* and other woody species on the site, a burn may not be enough to slow their growth and eventual dominance of the site. Cutting, along with herbicide application to the cut stumps, may also be necessary to control woody species in order to meet project goals.

Recommendations

Almost all of the excavated portion of the wetland creation site should develop into a wetland within five years, given that dominant hydrophytic vegetation and hydric soils are already present and that wetland hydrology is present on most of the excavation. However, it appears that the whole former field was 18.3 acres, and that the excavated basin was 7.0 ha (17.4 acres) (Fucciolo *et al.* 1999). Thus not all of the site can be called jurisdictional wetland. Given the nature of the site, there is not room to increase the basin.

More woody stems were planted in the wetland basin; however, they were not sufficient to meet project goals. In order to achieve the desired 100 live trees per acre, planting rates will need to be increased to allow for inevitable losses. Natural colonization by woody species growing in the surrounding wetlands will add to density somewhat.

Unplanted herbaceous species in the planned wetland basin are weedy species that tolerate disturbance, as one might expect on a recently created site. One of the three most common species sampled on the wetland basin (*Setaria faberi*) is a non-native, non-wetland annual species. By the end of five years of monitoring, it may not be as common; no control measures appear necessary at this time.

Typha may come to pose a threat to a diverse herbaceous cover on the site, even though it was relatively less common on the site as a whole. Further monitoring is necessary, and some type of control may be needed in the future. *Phalaris* is another potential threat, since it occurs in the wet meadow and also along the slough near the road (Keene and Tessene 1992, and personal observations).

The wet meadow originally present on the site is becoming overgrown by woody vegetation, a natural process, but one that goes against project goals. A controlled burn, and possible cutting along with limited use of herbicide may be necessary if this goal is still desirable.

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

Field Investigators: Tessene, Wilm, Cooprider, and Kurylo Date: 13 September 2000
Job No.: P96-037-73 Project Name: FAP 319 (US 36)
State: Illinois County: Pike Applicant: IDOT District 6
Site name: Marsh
Legal Description: NE/4, Sec. 17, T.4S., R.8W.
Location: Excavated part of wetland restoration/creation site at East Hannibal

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. *Aster simplex*	FACW	herb
2. *Echinochloa muricata*	OBL	herb
3. *Setaria faberi*	FACU+	herb

Percentage of dominant species that are OBL, FACW, FAC+, or FAC: 66.7%
Hydrophytic vegetation: Yes: X No:
Rationale: More than 50% of the dominants are OBL, FACW, FAC+, or FAC.

SOILS
Series and phase: Ambraw clay loam (Fluvaquentic Endoaquoll)
On Pike County hydric soils list? Yes: X No:
Is the soil a histosol? Yes: No: X Histic epipedon present? Yes: No: X
Redox Concentrations? Yes: X No: Colors: 10YR 4/4 and 10YR 4/6
Redox Depletions? Yes: No: X
Matrix color: 10YR 4/1
Other hydric soil indicators:
Hydric soils: Yes: X No:
Rationale: The site hydrology and morphological characteristics of this soil suggest that the soils are saturated long enough for anaerobic conditions to occur in the upper profile for a significant duration. Therefore, these soils are hydric.

HYDROLOGY
Inundated: Yes: No: X Depth of standing water: None
Depth to saturated soil: 0.6 m (24 in)
Overview of hydrologic flow through system: Precipitation and sheet flow contribute water to this site. Most wetland hydrology results from changing water table levels, which are greatly affected by levels on the Mississippi River and the tributary streams in the area such as Bird Slough. Water leaves the site by evapotranspiration and groundwater recharge.
Size of watershed: More than 318,000 km^2 (120,000 mi^2) for the Mississippi River
Other field evidence observed: This site is an excavated depression in the floodplain of a large river. We observed some areas that lack vegetation, suggesting prolonged ponding.
Wetland hydrology: Yes: X No:
Rationale: Landscape position and the evidence of prolonged ponding suggest that the site is inundated or saturated long enough during the growing season to meet the wetland hydrology criterion.

ROUTINE ONSITE WETLAND DETERMINATION

Site 1 (page 2 of 4)

Field Investigators: Tessene, Wilm, Cooprider, and Plocher Date: 13 September 2000
Job No.: P96-037-73 Project Name: FAP 319 (US 36)
State: Illinois County: Pike Applicant: IDOT District 6
Site name: Marsh
Legal Description: NE/4, Sec. 17, T.4S., R.8W.
Location: Excavated part of wetland restoration/creation site at East Hannibal

WETLAND DETERMINATION AND RATIONALE

Is the site a wetland? Yes: X No:

Rationale: This site meets all three wetland criteria. The site is not included in the NWI.

SPECIES LIST

Scientific name	Common name	Stratum	Wetland Indicator	C*
Acalypha rhomboidea	three-seeded mercury	herb	FACU	0
Acer negundo	box elder	shrub, herb	FACW-	1
Acer saccharinum	silver maple	shrub	FACW	1
Agalinis tenuifolia	slender false foxglove	herb	FACW	5
Alisma plantago-aquatica	water plantain	herb	OBL	2
Amaranthus tuberculatus	water hemp	herb	OBL	1
Ammania coccinea	scarlet loosestrife	herb	OBL	5
Ampelopsis cordata	raccoon grape	herb	FAC+	2
Andropogon virginicus	broomsedge	herb	FAC-	1
Apocynum sibiricum	prairie dogbane	herb	FAC+	2
Asclepias incarnata	swamp milkweed	herb	OBL	4
Aster pilosus	field aster	herb	FACU+	0
Aster simplex	panicled aster	herb	FACW	3
Betula nigra	river birch	shrub	FACW	4
Bidens cernua	nodding bur-marigold	herb	OBL	2
Bidens frondosa	beggar's ticks	herb	FACW	1
Bidens tripartita	beggar's ticks	herb	FACW	2
Boehmeria cylindrica	false nettle	herb	OBL	3
Boltonia asteroides	false aster	herb	FACW	5
Bromus tectorum	downy cheatgrass	herb	UPL	**
Campsis radicans	trumpet creeper	shrub, herb	FAC	2
Carex vulpinoidea	fox sedge	herb	OBL	3
Cassia fasciculata	partridge pea	herb	FACU-	1
Conyza canadensis	horseweed	herb	FAC-	0
Cornus drummondii	rough-leaved dogwood	shrub	FAC	2
Cynanchum laeve	climbing milkweed	herb	FAC	1
Cyperus aristatus	flatsedge	herb	OBL	2
Cyperus esculentus	yellow nutsedge	herb	FACW	0
Cyperus iria	iria flatsedge	herb	FACW	**
Cyperus strigosus	straw nutsedge	herb	FACW	0
Desmodium paniculatum	panicled tick trefoil	herb	FACU	2
Digitaria ischaemum	smooth crabgrass	herb	FACU	**

* Coefficient of Conservatism (see introduction)

** Species not native to Illinois

(Species list continues on next page)

ROUTINE ONSITE WETLAND DETERMINATION

Site 1 (page 3 of 4)

Field Investigators: Tessene, Wilm, Cooprider, and Plocher Date: 13 September 2000
Job No.: P96-037-73 Project Name: FAP 319 (US 36)
State: Illinois County: Pike Applicant: IDOT District 6
Site name: Marsh
Legal Description: NE/4, Sec. 17, T.4S., R.8W.
Location: Excavated part of wetland restoration/creation site at East Hannibal

SPECIES LIST (continued)

Scientific name	Common name	Stratum	Wetland Indicator	C*
Echinochloa muricata	barnyard grass	herb	OBL	0
Echinodorus berteroi	lance-leaved burhead	herb	OBL	6
Eclipta prostrata	yerba de tajo	herb	FACW	2
Eleocharis acicularis	spike rush	herb	OBL	3
Eleocharis compressa	flat-stemmed spikerush	herb	FACW	7
Eleocharis obtusa	spike rush	herb	OBL	2
Erigeron annuus	daisy fleabane	herb	FAC-	1
Eupatorium serotinum	late boneset	herb	FAC+	1
Euphorbia maculata	nodding spruge	herb	FACU-	0
Fraxinus pennsylvanica	green ash	shrub, herb	FACW	2
Juncus tenuis	path rush	herb	FAC	0
Juncus torreyi	rush	herb	FACW	3
Lactuca biennis	biennial lettuce	herb	FAC	4
Lactuca serriola	prickly lettuce	herb	FAC	**
Leersia oryzoides	rice cutgrass	herb	OBL	3
Lindernia dubia	false pimpernel	herb	OBL	5
Lobelia cardinalis	cardinal flower	herb	OBL	6
Lobelia siphilitica	great blue lobelia	herb	FACW+	4
Lolium perenne	perennial ryegrass	herb	FACU	**
Lycopus americanus	bugleweed	herb	OBL	3
Lythrum alatum	winged loosestrife	herb	OBL	5
Mimulus ringens	monkey flower	herb	OBL	5
Mollugo verticillata	carpetweed	herb	FAC	**
Monarda punctata	horsemint	herb	UPL	5
Panicum capillare	witchgrass	herb	FAC	0
Panicum dichotomiflorum	fall panic grass	herb	FACW-	0
Phalaris arundinacea	reed canary grass	herb	FACW+	**
Plantago rugelii	Rugel's plantain	herb	FAC+	0
Polygonum hydropiper	water pepper	herb	OBL	**
Polygonum lapathifolium	nodding smartweed	herb	FACW+	0
Polygonum pensylvanicum	smooth smartweed	herb	FACW+	1
Polygonum persicaria	lady's-thumb	herb	FACW	**
Polygonum punctatum	dotted smartweed	herb	OBL	3
Populus deltoides	cottonwood	shrub, herb	FAC+	2
Potentilla norvegica	rough cinquefoil	herb	FAC	0
Pyrrhopappus carolinianus	false dandelion	herb	UPL	1
Rumex crispus	curly dock	herb	FAC+	**

* Coefficient of Conservatism (see introduction)
** Species not native to Illinois

(Species list concludes on next page)

ROUTINE ONSITE WETLAND DETERMINATION

Site 1 (page 4 of 4)

Field Investigators: Tessene, Wilm, Cooprider, and Plocher Date: 13 September 2000
Job No.: P96-037-73 Project Name: FAP 319 (US 36)
State: Illinois County: Pike Applicant: IDOT District 6
Site name: Marsh
Legal Description: NE/4, Sec. 17, T.4S., R.8W.
Location: Excavated part of wetland restoration/creation site at East Hannibal

SPECIES LIST (concluded)

Scientific name	Common name	Stratum	Wetland Indicator	C*
Sagittaria latifolia	common arrowhead	herb	OBL	4
Salix exigua	sandbar willow	shrub	OBL	1
Salix nigra	black willow	shrub, herb	OBL	3
Scirpus atrovirens	green bulrush	herb	OBL	4
Setaria faberi	giant foxtail	herb	FACU+	**
Setaria glauca	yellow foxtail	herb	FAC	**
Sida spinosa	prickly mallow	herb	FACU	**
Solanum caroliniense	horse nettle	herb	FACU-	0
Toxicodendron radicans	poison ivy	herb	FAC+	1
Tridens flavus	purpletop	herb	UPL	1
Trifolium pratense	red clover	herb	FACU+	**
Trifolium repens	white clover	herb	FACU+	**
Typha latifolia	common cattail	herb	OBL	1
Vitis riparia	riverbank grape	herb	FACW-	2
Xanthium strumarium	cocklebur	herb	FAC	0

* Coefficient of Conservatism (see introduction)
Mean c value = $\Sigma C/N = 148/69 = 2.1$

** Species not native to Illinois
$FQI = \overline{C}\sqrt{N} = (2.2)\sqrt{69} = 17.8$

Including planted tree species:

Carya illinoensis	pecan	sapling, shrub	FACW	6
Quercus bicolor	swamp white oak	sapling	FACW+	7
Quercus palustris	pin oak	sapling	FACW	4

Mean c value = $\Sigma C/N = 165/72 = 2.3$

$FQI = \overline{C}\sqrt{N} = (2.3)\sqrt{72} = 19.4$

Determined by: Paul Tessene and Brian Wilm (vegetation and hydrology)
Mary Cooprider and Jesse Kurylo (soils and hydrology)
Illinois Natural History Survey
Center for Wildlife Ecology
607 East Peabody Drive
Champaign, Illinois 61820
(217) 244-7984, 244-2176, 333-6560, 244-0692

Appendix 2
Plant species observed in pre-existing wet meadow at East Hannibal wetland compensation site, September 2000

Scientific name	Common name	Stratum	Wetland Indicator	C*
Acer saccharinum	silver maple	shrub, herb	FACW	1
Alisma plantago-aquatica	water plantain	herb	OBL	2
Apocynum sibiricum	prairie dogbane	herb	FAC+	2
Asclepias incarnata	swamp milkweed	herb	OBL	4
Aster simplex	panicled aster	herb	FACW	3
Bidens frondosa	beggar's ticks	herb	FACW	1
Boehmeria cylindrica	false nettle	herb	OBL	3
Campsis radicans	trumpet creeper	shrub, herb	FAC	2
Carex frankii	sedge	herb	OBL	4
Carex lupulina	hop sedge	herb	OBL	5
Carex vulpinoidea	fox sedge	herb	OBL	3
Carex sp.	sedge	herb	–	–
Cephalanthus occidentalis	buttonbush	shrub	OBL	4
Cuscuta sp.	dodder	herb	–	–
Cyperus esculentus	yellow nutsedge	herb	FACW	0
Echinochloa muricata	barnyard grass	herb	OBL	0
Epilobium coloratum	cinnamon willow-herb	herb	OBL	3
Erechtites hieracifolia	fireweed	herb	FACU	2
Eupatorium serotinum	late boneset	herb	FAC+	1
Fraxinus pennsylvanica	green ash	shrub	FACW	2
Hypericum mutilum	dwarf St. John's wort	herb	FACW	5
Ipomoea lacunosa	small morning glory	herb	FACW	1
Juncus interior	rush	herb	FAC+	3
Leersia oryzoides	rice cutgrass	herb	OBL	3
Lobelia siphilitica	great blue lobelia	herb	FACW+	4
Ludwigia palustris	marsh purslane	herb	OBL	4
Lycopus americanus	bugleweed	herb	OBL	3
Lythrum alatum	winged loosestrife	herb	OBL	5
Mimulus ringens	monkey flower	herb	OBL	5
Penthorum sedoides	ditch stonecrop	herb	OBL	2
Phalaris arundinacea	reed canary grass	herb	FACW+	**
Poa pratensis	Kentucky bluegrass	herb	FAC-	**
Polygonum amphibium	water smartweed	herb	OBL	3
Polygonum lapathifolium	nodding smartweed	herb	FACW+	0
Polygonum pensylvanicum	smooth smartweed	herb	FACW+	1
Populus deltoides	cottonwood	shrub	FAC+	2
Sagittaria latifolia	common arrowhead	herb	OBL	4
Salix amygdaloides	peachleaf willow	shrub	FACW	4
Salix exigua	sandbar willow	shrub	OBL	1
Salix nigra	black willow	sapling, shrub	OBL	3
Scirpus atrovirens	green bulrush	herb	OBL	4
Scirpus validus	soft-stemmed bulrush	herb	OBL	4
Typha latifolia	common cattail	herb	OBL	1
Ulmus americana	American elm	shrub	FACW-	5
Vitis riparia	riverbank grape	woody vine, herb	FACW-	2

* Coefficient of Conservatism (see introduction)
Mean c value = $\Sigma C/N = 110/41 = 2.7$

** Species not native to Illinois
$FQI = \bar{C}\sqrt{N} = (2.7)\sqrt{41} = 17.2$

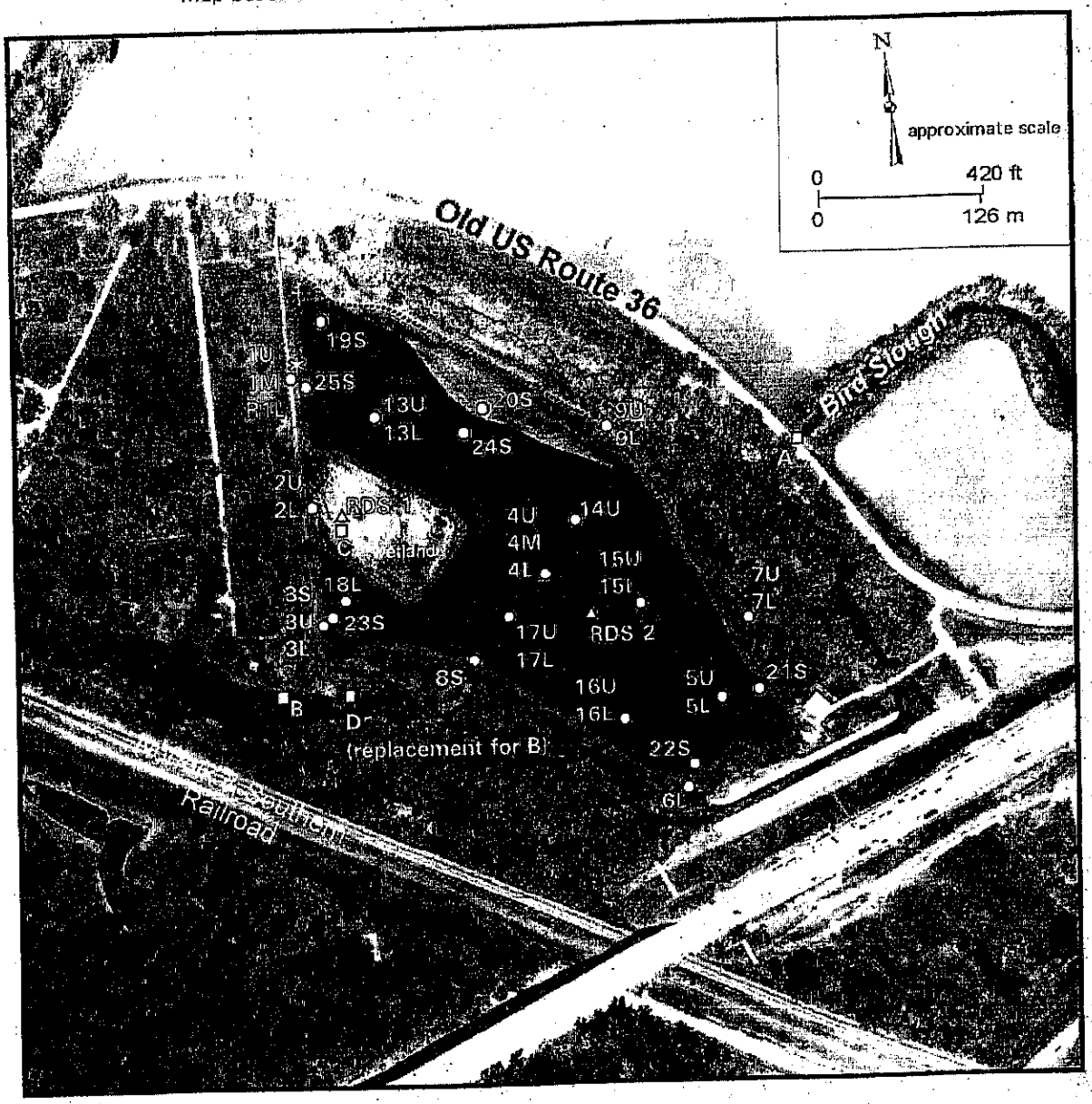
Hannibal Bridge Wetland Compensation Site

(FAP 319)

Estimated Areal Extent of 2000 Wetland Hydrology

based on data collected between September 1, 1999 and September 1, 2000

map based on unrectified aerial photography from IDOT (May 2, 2000)



estimated areal extent of 2000 wetland hydrology

estimated areal extent of excavated basin

○ monitoring well

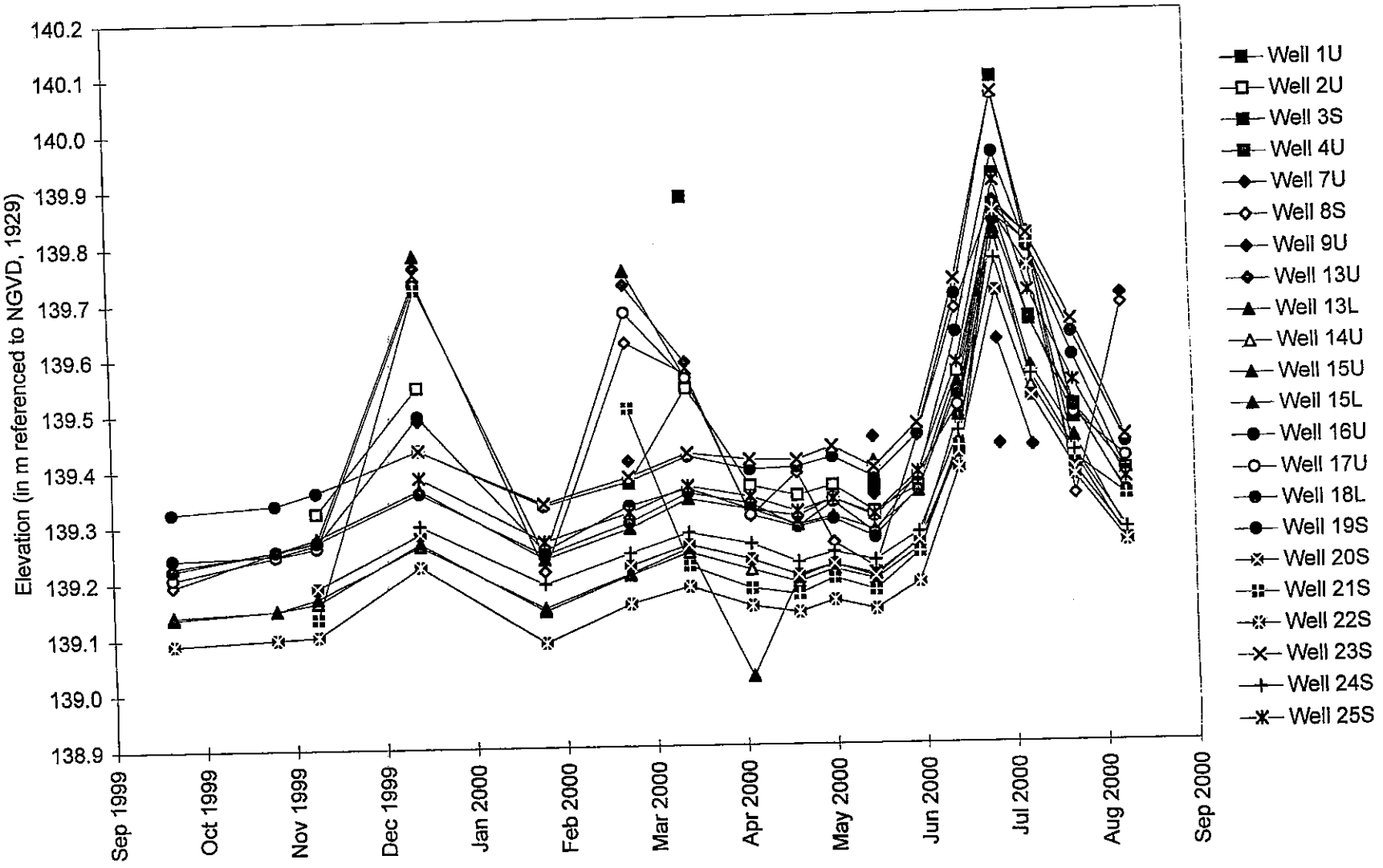
□ stage gauge

△ RDS data logger

❄ rain gauge

Hannibal Bridge Wetland Compensation Site
September 1, 1999 to September 1, 2000

Water-Level Elevations
in Wells used to Determine Areas Satisfying Wetland Hydrology Criteria



Hannibal Bridge Wetland Compensation Site
September 1, 1999 to September 1, 2000

Depth to Water
in Wells Used to Determine Areas Satisfying Wetland Hydrology Criteria