

**Wetland Mitigation Monitoring Report for the FAS 67 (Stagecoach Trail) site
near the Galena River bridge, Jo Daviess County, Illinois
(Fourth monitoring year--2002)**

by Paul Tessene, Jesse Kurylo, Jeff Matthews, and Mary Ann Feist
Illinois Natural History Survey, Champaign

Summary

Based on observations made during the 2002 season, 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 (16 March 1998)(EnCAP 1995).

Project goal: To create an herbaceous wetland and upland buffer on a 9.7-acre site.

Hydrophytic vegetation dominates throughout the wetland creation site. Several flash floods contributed to the development of hydric soil features across the site, but the duration of the flooding was enough for conclusive evidence of wetland hydrology on only parts of the site. The flow of some incoming water that had been diverted appears to be restored. Vegetation that colonized the created site is dominated by native species, and planted species are spreading. Previous efforts to control *Phalaris*, *Typha* and *Salix* are evident from visual observation and vegetation sampling, but need to continue in order to meet project goals. The buffer around the wetland contains a number of planted trees, and evidence of the growth from the seeding of prairie plants in the buffer area was observed.

Introduction

This report details the fourth year of monitoring of an excavated wetland created to mitigate for wetlands affected by the construction of the FAS 67 (Stagecoach Trail) bridge over the Galena River (Burton's Bridge)(legal location: NE/4, SE/4, sec. 16, T.28N., R.1E., Galena 7.5 minute quadrangle). The wetlands affected were located in the path of the new bridge corridor, south of the former bridge (Tessene and Harrold 1994). Earthwork for the mitigation site was completed in 1998, with the recommendation that topsoil be returned to the excavated area from the excavation and the affected wetlands in order to provide a medium for the growth of wetland plants and a possible seedbank. Plantings of herbaceous species consistent with the desired wetland vegetation were also established; plant cover in these established cells was monitored by Steve Lorig of Midwest Ecological Services, Inc., on September 14, 1999 (Lorig 1999).

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.

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, 16 March 1998). 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 a 9.7-acre former pasture, to compensate for wetland loss and degradation to approximately 3.5 acres of wetland, including 3.2 acres with good quality.

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 sedge meadow/emergent wetland will be created by (1) returning topsoil from the excavation site and the wetlands affected by the bridge construction, (2) planting suitable wetland plants from available nursery stock, and (3) allowing natural colonization from the surrounding area.

Performance criteria:

- a. Planted species survivorship: At the end of the five-year monitoring period, at least 50% of planted species will be living.
- b. Native species abundance and cover: At the end of the five-year monitoring period, at least 75% of the area in the created 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 created wetland should be non-native species.

Project Goal 3: The buffer area around the constructed wetland should meet standards for floristic composition and vegetative cover.

Objective: Prairie vegetation will be established on the buffer around the wetland site. Trees will also be planted around the edges of the site nearest the bridge.

Performance criteria:

- Native species abundance and cover: Native perennial, non-woody species will continue to be the predominant species in the prairie planting. Planted trees will show suitable survival.

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). Plant species rated facultative or wetter (FAC, FAC+, FACW, or OBL) are considered hydrophytes. 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 during each monitoring survey. 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). The Illinois State Geological Survey established monitoring wells only in September 1999, so data for water table depths were not available the first year of monitoring (Fucciolo *et al.* 1999). However, they did have records of observations of site inundation. Surface and ground water were monitored monthly by ISGS personnel (Carr and Weaver 2000; Weaver and Carr 2001, 2002).

Project Goal 2

a) Planted species survivorship

Lorig (1999) assessed each of the 111 planting areas scattered throughout the site for the survival of planted species. He assigned numbers to each planting cell, determined total plant cover in each cell, assessed the general health of the planting beds, listed the planted species represented by living individuals, and estimated how many plants would be needed to restore each planting cell to its intended level of cover of 75%. Table 1 lists the 14 species planted at the wetland construction site in May 1999. In 2000, cursory visual assessments of the planting areas were deemed sufficient to determine their general health, for the planted species had spread outside their original plots, which were enclosed in fencing at establishment to lessen herbivory by geese.

Table 1. Species planted in plant cells at the Galena River wetland creation site (from Lorig 1999).

<i>Alisma plantago-aquatica</i>	<i>Asclepias incarnata</i>
<i>Calamagrostis canadensis</i>	<i>Carex comosa</i>
<i>Carex hystericina</i>	<i>Carex stricta</i>
<i>Carex vulpinoidea</i>	<i>Eupatorium maculatum</i>
<i>Iris versicolor</i>	<i>Juncus torreyi</i>
<i>Leersia oryzoides</i>	<i>Scirpus cyperinus</i>
<i>Scirpus validus</i>	<i>Spartina pectinata</i>

- b) Native species abundance and cover, and
 c) Dominant plant species

A complete survey of the excavated wetland basin was performed to tally all naturally occurring plant species present. Planted species that had spread beyond their planting areas by seed and/or vegetative increase were also included as natural vegetation.

Systematic plant sampling was also conducted during the survey of the site, using transects established at 25 m (82 ft) intervals parallel to the railroad tracks; 0.25 m² quadrats were placed at 25 m (82 ft) intervals along each transect. Cover of all species in each plot was assigned a cover class (Table 2) (Daubenmire 1959). Frequency (proportion of quadrats where a species occurred) and average cover (calculated using midpoints for each cover class) were 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 were averaged to determine the Importance Value for each species sampled.

Table 2. Cover classes used in vegetation sampling.

Cover Class	Range of Cover (%)	Midpoint of Range (%)
1	less than 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

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 likely to tolerate disturbed conditions; a species with a high c 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}), $\bar{c} = (\sum C)/N$, where $\sum C$ 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 ($\bar{c} \sqrt{N}$) (equivalent to $\sum C/\sqrt{N}$). An Index score below 10 suggests a site of low natural quality; below 5, a highly disturbed site. An FQI value of 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

Observations were made to determine the presence of prairie plants scheduled to be installed in the buffer area. Planted trees were inventoried and assigned to species.

Results and discussion

Project goal 1

a) Predominance of hydrophytic vegetation

Dominant plant species for the created wetland are listed in Table 3. All of the dominant species are hydrophytic. Table 6 presents summary information from vegetation sampling for the site. A full list of plant species observed is presented in the wetland determination form at the end of this report (Appendix 1).

The herbaceous species that colonized the site are dominated by taxa that tolerate or even thrive under disturbed conditions, such as the original site excavation and periodic, prolonged inundation. All of the four most common species sampled in 2002 are perennials, versus only one in the 2000 sampling. *Rumex crispus*, a non-native perennial, remains as the one species present as a dominant in all four years of sampling. Still, most species found in the created wetland are native, perennial hydrophytes; thus, the abundance of *Rumex* will likely have no long-term effect on the species composition of the site. In fact, this year's sampling (Table 6) suggests that *Rumex* is beginning to decline in abundance.

Table 3. Dominant plant species by stratum and wetland indicator status.

<u>Dominant Plant Species</u>	<u>Indicator Status</u>	<u>Stratum</u>
1. <i>Leersia oryzoides</i>	OBL	herb
2. <i>Carex trichocarpa</i>	OBL	herb
3. <i>Eleocharis erythropoda</i>	OBL	herb
4. <i>Rumex crispus</i>	FAC+	herb

b) Presence of hydric soils

The USDA soil survey for Jo Daviess County (Tegeler 1996) indicates that Dorchester silt loam (occasionally flooded), a moderately well drained Typic Udifluent with a buried A horizon, is found in the northernmost portion of the site. Huntsville silt loam (frequently flooded), a well drained Cumulic Hapludoll, was mapped in the remainder of the site.

Soils appear to have been excavated approximately 0.6- 0.9 m (24-36 in). Based on morphological features in the upper 12 inches, most of the soils present at the site before the 2002 monitoring survey appeared to be moderately well drained. The soils over a majority of the site did not exhibit redoximorphic features in the upper profile and could not be considered hydric.

In 1999, two portions of the site were inundated: one area fed by a ditch from the north and the other by the stream to the south of the wetland creation site. Hydrology appeared favorable for the development of hydric soil characteristics. At the time of the survey in 2000, neither surface saturated soils nor standing water were observed at the site. During the survey in 2001, the northeastern part of the site was inundated. The soils along the eastern side of the site were showing signs of becoming hydric, but these soils were in the minority for the overall site.

In 2002, soils over the whole site underwent major homogenizing changes. Across the site, heavy flooding deposited a large amount of sediment, and all the soils now exhibit abundant redox features. Situated between the sediment layer and the original soil surface is a thin layer of undecomposed plant material. The area of inundation in the northeastern section of the site appears to be growing larger. Table 4 provides a summary of the soils for the majority of the site.

Table 4. Description of the soils on the majority of the site

Depth(in)	Matrix Color	Concentrations	Depletions	Texture	Structure
2 – 0	10YR 4/2	10YR 3/4 & 4/6	None	Silt	Granular
A thin gray line with undecomposed leaf litter was apparent throughout the site					
0 – 4	10YR 2/1	10YR 4/6	None	Silt Loam	Granular
6 – 20	10YR 2/1	10YR 4/6	None	Silty Clay Loam	Angular to Sub-Blocky

c) Presence of wetland hydrology

Field evidence of wetland hydrology included the excavated depressional landscape position and observations by ISGS personnel (Weaver and Carr 2002). Wells were established in fall 1999, but observations of site saturation and inundation in relation to monthly precipitation were conducted previously (Fucciolo *et al.* 1999). In 2002, ISGS personnel estimated that only 1.2 ha (2.9 acres) of the 3.0 ha (7.4 acre) excavated site met the wetland hydrology criterion (see Appendix 2). However, they noted that flooding in May and July laid down sediment across the site (also in soils section above). For comparison, observations in 2000 suggested that 1.8 ha (4.5 acres) of the site met the wetland hydrology criterion (Carr and Weaver 2000), and 2001 observations suggested 2.8 ha (6.9 acres) met the wetland hydrology criterion (Weaver and Carr 2001).

One hopeful sign regarding the development of wetland hydrology on the site is the continuation of inflow in the northeast part of the site. This inflow was received by means of a tile line running from a nearby marsh (Site 2 in Tessene and Harrold (1994)) that had been disturbed during the construction of the bridge over the Galena River. The tile line was intended to catch water that would run off the site and divert it to the wetland creation site. Ditch work done during the completion of the bridge interrupted the flow from the tile line and sent it down the ditch instead, but the flow was eventually restored (Tessene, Coopriider, and Marcum 2001). This was evident in observations of saturated soils in the northeast part of the site in 2001 and 2002. No saturated soils were observed in the 2000 survey.

The southeast part of the created wetland site has hydrologic input and outflow by means of a ditch connecting the site to a ditched stream that connects with the Galena River west of the railroad tracks. This certainly contributes to the wetland hydrology of the site, but can be problematic, for there is no control structure where this ditch enters the site. A control structure could be used to regulate input, output, and duration of flooding from the stream, and would prevent erosion at the point where the ditch enters the site. However, a control structure would need periodic maintenance, and would also deviate from the objective of a wetland that could develop without intrusive input.

Project Goal 2

a) Survival of planted herbaceous species

Lorig (1999) observed cover of planted species in each planting station, and noted that most species appeared to be flourishing. At that time, the performance standards for these plantings were met, and only a few species were not observed.

Our observations in 2000 agreed that the cover in the plantings exceeded performance standards. During that survey, we did not directly sample any of the plantings, but we observed all planted species (Table 1 above) except *Calamagrostis* on the site, indicating that all but one of the species had spread beyond the planting enclosures by seed and vegetative means. Most of the planted species continued to spread in 2002; one of those species, *Leersia oryzoides*, is now a dominant on the site.

Steve Lorig (pers. comm. Feb. 2001) observed that a widely distributed species on the wetland site outside the planting areas, *Carex trichocarpa*, was originally installed on the site as plugs removed from the disturbed marsh (Site 2, Tessene and Harrold 1994). The sedge was moved as large sections of turf that were split up and scattered on the site the following spring after overwintering on the site under shallowly flooded conditions. This species increased in cover and abundance to become a dominant species in 2001, and remained a dominant in 2002.

b) Abundance and cover of native species

During a survey of naturally occurring plant species on the wetland creation site, 96 native and 20 non-native species were observed (see Appendix 1), including planted species that had spread beyond the planting areas. This compares with 36 native and 14 non-native species observed in 1999 (Tessene and Coopridner 1999). (These values are summarized in Table 5 below.) Therefore, 83% of the species are native to Illinois. Non-native species are expected to diminish in importance as site conditions stabilize. The FQI value for the site was 24.9 with a mean C value of 2.5, indicating good natural quality and the potential to become an environmental asset.

Table 5. Development of some aspects of the plant community in the excavated wetland basin.

Aspect	1999 value	2000 value	2001 value	2002 value
Species observed	50	87	97	116
Native species	36 (72.0%)	73 (83.9%)	82 (84.5%)	96 (82.8%)
Non-native spp.	14 (28.0%)	14 (16.1%)	15 (15.5%)	20 (17.2%)
Annual species	24 (48.0%)	29 (33.3%)	31 (32.0%)	35 (30.2%)
Perennial species	26 (52.0%)	58 (66.7%)	66 (68.0%)	81 (69.8%)
Woody species	4 (8.0%)	5 (5.7%)	6 (6.2%)	7 (6.0%)
Hydrophytes	40 (80.0%)	74 (85.1%)	79 (81.4%)	89 (76.7%)
Non-hydrophytes	10 (20.0%)	13 (14.9%)	18 (18.6%)	27 (23.3%)
FQI	13.3	22.9	22.2	24.9
Mean c value	2.2	2.7	2.5	2.5

Vegetation sampling on the site (Table 6) included 31 species, of which 24 are native and 7 are non-native species. Native species made up 87.5% of the number of species sampled (87.5% in 2001, 82% in 2000, and 77% in 1999) and 77.5% of importance values (75.8% in 2001, 73.2% in 2000, and 87.5% in 1999). Much of the importance value from species not native to Illinois comes from *Rumex crispus*, which has been a dominant species in all four years of sampling, but which may finally be diminishing as site conditions (hydrology and vegetation cover) stabilize. Nearly all species are hydrophytic (28 species, 99% of IV). The exceptions are opportunistic species sometimes found in the drier parts of disturbed wetlands.

Significant bare area was noted in only one of the 36 sample plots (compared with 83.3% of plots and 19.4% average cover, respectively, in 1999). Thus, this performance standard was exceeded. Annual species (12 of 31 species sampled, versus 11 of 32 in 2001, 18 of 39 in 2000, and 11 of 26 in 1999) included 21.3% of importance values (compared with 29.6% in 2001, 55.6% in 2000, and 43.7% in 1999). *Bidens tripartita* and *Polygonum hydropiper* are annuals that contributed significantly to importance value.

Woody species (5 of 31) include about 6% of importance values (compared with 5% in 2001, 9.6% in 2000, and 12.5% in 1999). Although these values imply that woody cover is diminishing or stable, patches of *Salix nigra* are locally common. Control of willow species should be maintained in order to prevent the site becoming a floodplain forest rather than an herbaceous wetland.

Table 6 provides the results of vegetation sampling (36 plots) in the wetland creation site. Information provided includes percent frequency, relative frequency, average percent cover, relative cover, and importance value for each species. A list of all plant species observed in the wetland site is presented in Appendix 1.

Table 6. Results of vegetation sampling at a wetland creation site near the Galena River bridge, 2002.

Species	Frequency (%)	Relative Freq. (%)	Average Cover (%)	Relative Cover (%)	Importance Value
<i>Leersia oryzoides</i>	63.89	13.77	37.17	21.61	17.69
<i>Carex trichocarpa</i>	52.78	11.38	29.38	17.08	14.23
<i>Eleocharis erythropoda</i>	47.22	10.18	30.49	17.72	13.95
<i>Rumex crispus</i>	47.22	10.18	10.24	5.95	8.07
<i>Polygonum hydropiper</i>	38.89	8.38	5.75	3.34	5.86
<i>Bidens tripartita</i>	27.78	5.99	7.94	4.62	5.30
<i>Phalaris arundinacea</i>	25.00	5.39	8.90	5.18	5.28
<i>Aster praealtus</i>	19.44	4.19	7.50	4.36	4.28
<i>Helenium autumnale</i>	19.44	4.19	6.11	3.55	3.87
<i>Salix nigra</i>	13.89	2.99	7.99	4.64	3.82
<i>Lycopus americanus</i>	13.89	2.99	2.38	1.38	2.19
<i>Polygonum persicaria</i>	13.89	2.99	2.38	1.38	2.19
<i>Bidens vulgata</i>	8.33	1.80	3.19	1.86	1.83
<i>Bidens frondosa</i>	11.11	2.40	1.67	0.97	1.68
<i>Polygonum pennsylvanicum</i>	8.33	1.80	1.25	0.73	1.26
<i>Ambrosia trifida</i>	5.56	1.20	1.46	0.85	1.02
<i>Salix amygdaloides</i>	2.78	0.60	2.36	1.37	0.99
<i>Cyperus esculentus</i>	5.56	1.20	0.50	0.29	0.74
<i>Echinochloa muricata</i>	5.56	1.20	0.50	0.29	0.74
<i>Polygonum amphibium</i>	2.78	0.60	1.04	0.61	0.60
<i>Populus deltoides</i>	2.78	0.60	1.04	0.61	0.60
<i>Sparganium eurycarpum</i>	2.78	0.60	1.04	0.61	0.60
<i>Carex cristatella</i>	2.78	0.60	0.42	0.24	0.42
<i>Panicum dichotomiflorum</i>	2.78	0.60	0.42	0.24	0.42
<i>Taraxacum officinale</i>	2.78	0.60	0.42	0.24	0.42
<i>Acer negundo</i>	2.78	0.60	0.08	0.05	0.32
<i>Acer saccharinum</i>	2.78	0.60	0.08	0.05	0.32
<i>Amaranthus tuberculatus</i>	2.78	0.60	0.08	0.05	0.32
<i>Digitaria ischaemum</i>	2.78	0.60	0.08	0.05	0.32
<i>Humulus japonicus</i>	2.78	0.60	0.08	0.05	0.32
<i>Solidago gigantea</i>	2.78	0.60	0.08	0.05	0.32
Total	463.89	100.00	172.01	100.00	100.00

c) Dominant plant species

Rumex crispus is the only species found as a dominant in all four monitoring surveys. It is not native to Illinois, but is beginning to diminish in importance as site conditions stabilize. Two annual species that were dominant in 1999 (*Amaranthus tuberculatus* and *Rorippa islandica*) were not even detected during the 2001 sampling. *Leersia oryzoides*, *Carex trichocarpa*, and *Eleocharis erythropoda*, native, rhizomatous perennial species, were the other dominants in 2002 sampling.

Phalaris, *Typha*, and *Salix* spp. are present on the site, but are not dominants. Efforts to control these species need to continue. For long-term control of these species, it may be necessary to also control these aggressive species in neighboring wetland areas. Steve Lorig (pers. comm. Jan. 2003) stated that a prescribed burn was conducted on the site early in 2002, and that another was planned for early in 2003. He also said that he would continue to work to control willows and *Phalaris* on the site through cutting and herbicide.

Project Goal 3

Steve Lorig (pers. comm. 2000) stated that prairie was planted in the buffer area around the wetland site in fall 1999. In 2002, some of the planted species finally became apparent. These species include *Gaura biennis*, *Panicum virgatum*, *Physostegia virginiana*, *Ratibida pinnata*, *Silphium laciniatum*, and *S. perfoliatum*. The vegetation in the buffer area remains dominated by weedy species, with *Ambrosia trifida* prominent along much of the perimeter of the site. Still, the observation of native planted species is a favorable sign, and should help to decrease erosion and to filter runoff that enters the wetland site.

We recorded 42 planted trees along the north and northeast parts of the buffer in 2000. Many appeared to be stressed, and some seemed likely to perish. Some had died by the time of the current survey, but some apparently dead trees recovered, and some other trees may have been planted. Species present in 2002 (and number of individuals encountered) included *Juglans nigra* (8), *Platanus occidentalis* (6), *Populus deltoides* (2), *Quercus bicolor* (7), *Q. palustris* (9), and *Ulmus americana* (6).

Recommendations

Development of wetland hydrology on the site should continue, but will likely remain conclusive for only part of the site. A control structure at the inlet at the south end of the site could be used to regulate the depth and duration of flooding from water supplied from the ditched stream along the south border of the site, and would prevent erosion caused by fluctuating water levels. Hydric soil development appears slow on the wetland site, but will eventually come under the proper hydrologic conditions.

In general, unplanted species in the wetland basin are meeting performance standards. Most annual and non-native species have tended to decrease in cover as succession occurs on the site. The site currently meets criteria for vegetation cover and the proportion of native species. However, the presence of *Rumex crispus*, a non-native species, as a dominant species goes against project goals.

Overall planted herbaceous species cover in the wetland basin met performance standards, since the species that survived the initial planting have spread outside the planting beds. Some of the species planted as a prairie buffer around the wetland site finally became apparent this year. The buffer plantings require further monitoring. Some of the planted trees in the buffer had died, but some trees that appeared dead in 2001 had recovered; those that remain may require continued care.

Unplanted herbaceous species in the created wetland basin are species that tolerate disturbance, as one might expect on a recently constructed site. *Typha* and *Phalaris* are present but not dominant; further monitoring and continued control are necessary. In the future, control efforts may need to expand into adjacent wetlands off the property where these species are common and can contribute propagules to the constructed wetland site. *Phalaris* and *Salix exigua* are very common in a wetland southeast of the site across the ditched stream (Appendix 2). Although this site is degraded and is dominated by weedy species, it contains some interesting native species not found in the constructed wetland site, such as some sedges (*Carex* spp.), *Aster prenanthoides*, *Clematis virginiana*, and *Hypericum pyramidatum*.

Salix nigra, a common species in the constructed wetland basin, could change the character of the mitigation site from an herbaceous wetland to a floodplain forest if allowed to dominate the site. Continued control of this species by weeding, mowing, herbicide use, and controlled burns may be necessary to maintain the site as an herbaceous wetland.

Literature Cited

- Carr, K. W., and K. D. Weaver. 2000. ISGS #46: Galena River Bridge Wetland Compensation Site. Technical Report submitted to the Illinois Department of Transportation. 7 pp.
- Daubenmire, R. F. 1959. A canopy coverage method. *Northwest Science* 33: 43-64.
- EnCAP, Inc. (Environmental Consultants and Planners, DeKalb, IL). 1995. Mitigation and management plan, Burtons Bridge/Galena. Technical Report submitted for the JoDaviess County Highway Department. 18 pp. + Exhibits A and B.
- Environmental Laboratory. 1987. Corps of engineers wetlands delineation manual. Vicksburg, MS: US Department of the Army Waterways Experiment Station. 100 pp. + Appendices A-D.
- Fucciolo, C. S., J. J. Miner, S. E. Benton, D. B. Ketterling, and M. B. Miller. 1999. Annual water-level report for active IDOT sites, September 1, 1998, to September 1, 1999. ISGS #46: Galena River Bridge Wetland Compensation Site. Technical Report submitted to the Illinois Department of Transportation. 4 pp. introduction + 7 pp.
- Lorig, S. M. 1999. Copy of letter to John Schonoff of the Jo Daviess County Highway Department (detailing observations of planted species at the mitigation site). 3 pp. + appendix (Table 1).
- Reed, P. B., Jr. 1988. National list of plant species that occur in wetlands: Illinois. St. Petersburg, FL: National Wetlands Inventory. 23 pp. + iv + four appendices
- Swink, F., and G. Wilhelm. 1994. "Coefficients of Conservatism" and "Floristic Quality Assessment." In: *Plants of the Chicago Region*, fourth edition, pp. 8-9, 11-18. Indianapolis: Indiana Academy of Science. 921 pp. + xiv.
- 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, 95 pp.

Tegeler, K. C. 1996. Soil survey of Jo Daviess County, Illinois. United States Department of Agriculture Natural Resources Service in cooperation with the Illinois Agricultural Experiment Station. 224 pp. + 91 soil map sheets.

Tessene, P., and M. Coopriider. 2000. Wetland mitigation monitoring report for the FAS 67 (Stagecoach Trail) site near the Galena River bridge, Jo Daviess County, Illinois [first monitoring year]. Technical report submitted to the Illinois Department of Transportation. 13 pp.

Tessene, P., M. Coopriider, and P. Marcum. 2001. Mitigation monitoring report for the FAS 67 (Stagecoach Trail) site near the Galena River bridge, Jo Daviess County, Illinois (second monitoring year—2000). Technical report submitted to the Illinois Department of Transportation. 17 pp.

Tessene, P., J. Kurylo, J. Matthews, and D. Busemeyer. 2002. Mitigation monitoring report for the FAS 67 (Stagecoach Trail) site near the Galena River bridge, Jo Daviess County, Illinois (third monitoring year—2001). Technical report submitted to the Illinois Department of Transportation. 17 pp.

Tessene, P., and S. Harrold. 1994. Wetland survey report for FAS 67 (Stagecoach Trail) at Burton's Bridge over the Galena River and C.C.P. Railroad, Jo Daviess County. Technical report submitted to the Illinois Department of Transportation. 9 pp.

Weaver, K. D., and Carr, K. W. 2001. ISGS #46: Galena River Bridge Wetland Compensation Site. Technical Report submitted to the Illinois Department of Transportation. 8 pp.

Weaver, K. D., and Carr, K. W. 2002. ISGS #46: Galena River Bridge Wetland Compensation Site. Technical Report submitted to the Illinois Department of Transportation. 8 pp.

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

Field Investigators: Tessene, Matthews, Kurylo, and Feist
Section No.: 88-00094-00-BR
State: Illinois
Site name: Marsh
Legal Description: NE/4, SE/4, sec. 16, T.28N., R.1E.
Location: Excavated part of wetland creation site south of the bridge over the Galena River on Stagecoach Trail

Date: 13 August 2002
Project Name: FAS 67 (Stagecoach Trail)
Applicant: IDOT District 2
County: Jo Daviess

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

VEGETATION

<u>Dominant Plant Species</u>	<u>Indicator Status</u>	<u>Stratum</u>
1. <i>Leersia oryzoides</i>	OBL	herb
2. <i>Carex trichocarpa</i>	OBL	herb
3. <i>Eleocharis erythropoda</i>	OBL	herb
4. <i>Rumex crispus</i>	FAC+	herb

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

Hydrophytic vegetation: Yes: No:

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

SOILS (representative profile for the majority of the site)

Series and phase: Undetermined

On Jo Daviess County hydric soils list? Yes: No: Undetermined:
Is the soil a histosol? Yes: No: Histic epipedon present? Yes: No:
Redox Concentrations? Yes: No: Colors: 10YR 4/6
Redox Depletions? Yes: No:
Matrix color: 10YR 2/1

Other hydric soil indicators: None

Hydric soils: Yes: No:

Rationale: Due to the heavy flooding events of this past year, the soils on this site have developed hydric characteristics. This soil also meets the F3 hydric soil indicator from NRCS.

HYDROLOGY

Inundated: Yes: No: Depth of standing water: None

Depth to saturated soil: From surface to more than 1.2 m (48 in)

Overview of hydrologic flow through system: Precipitation and sheet flow contribute water to this site. Especially important are stream flow from a tile line leading from a spring northeast of the site, and overflow through an inlet connected to a small tributary to the Galena River. Water leaves the site by evapotranspiration, soil infiltration, and drainage to the stream.

Size of watershed: Approximately 480 km² (185 mi²)(Galena River)

Other field evidence observed: This site is an excavated depression. We observed wetland drainage patterns and areas that appeared to have been ponded or saturated earlier in the year. Flooding in May and July 2002 dumped a few inches of sediment on the site. Direct and indirect observations by ISGS personnel suggest that parts of the site have wetland hydrology.

Wetland hydrology: Yes: No:

Rationale: Low landscape position and the observations of inundated and saturated areas suggest that wetland hydrology is developing on the site.

ROUTINE ONSITE WETLAND DETERMINATION

Site 1 (page 2 of 5)

Field Investigators: Tessene, Matthews, Kurylo, and Feist Date: 13 August 2002
 Section No.: 88-00094-00-BR Project Name: FAS 67 (Stagecoach Trail)
 State: Illinois County: Jo Daviess Applicant: IDOT District 2
 Site name: Marsh
 Legal Description: NE/4, SE/4, sec. 16, T.28N., R.1E.
 Location: Excavated part of wetland creation site south of the bridge over the Galena River
 on Stagecoach Trail

WETLAND DETERMINATION AND RATIONALE

Is the site a wetland? Undetermined

Rationale: Although dominant hydrophytic vegetation is present and hydric soil development has occurred, wetland hydrology is conclusive for only 1.2 ha (2.9 acres) of the 3.0 ha (7.4 acre) site. The site is not included in the NWI.

SPECIES LIST

Scientific name	Common name	Stratum	Wetland Indicator	C*
<i>Abutilon theophrasti</i>	velvetleaf	herb	FACU-	**
<i>Acalypha rhomboidea</i>	three-seeded mercury	herb	FACU	0
<i>Acer negundo</i>	box elder	shrub, herb	FACW-	1
<i>Acer saccharinum</i>	silver maple	herb	FACW	1
<i>Agropyron repens</i>	quack grass	herb	FACU	**
<i>Agrostis alba</i>	redtop	herb	FACW	0
<i>Alisma plantago-aquatica</i>	water plantain	herb	OBL	2
<i>Amaranthus retroflexus</i>	pigweed	herb	FACU+	**
<i>Amaranthus tuberculatus</i>	water hemp	herb	OBL	1
<i>Ambrosia artemisiifolia</i>	common ragweed	herb	FACU	0
<i>Ambrosia trifida</i>	giant ragweed	herb	FAC+	0
<i>Apocynum sibiricum</i>	prairie dogbane	herb	FAC+	2
<i>Asclepias incarnata</i>	swamp milkweed	herb	OBL	4
<i>Asclepias syriaca</i>	common milkweed	herb	UPL	0
<i>Aster pilosus</i>	field aster	herb	FACU+	0
<i>Aster praealtus</i>	willow-leaved aster	herb	OBL	4
<i>Aster simplex</i>	panicled aster	herb	FACW	3
<i>Bidens cernua</i>	nodding bur-marigold	herb	OBL	2
<i>Bidens frondosa</i>	beggar's ticks	herb	FACW	1
<i>Bidens tripartita</i>	beggar's ticks	herb	FACW	2
<i>Bidens vulgata</i>	tall beggar's ticks	herb	FACW	0
<i>Brassica kaber</i>	charlock	herb	UPL	0
<i>Calystegia sepium</i>	hedge bindweed	herb	FAC	1
<i>Campanula americana</i>	tall bellflower	herb	FAC	4
<i>Carex annectens</i>	sedge	herb	FACW	3
<i>Carex comosa</i>	sedge	herb	OBL	5
<i>Carex cristatella</i>	sedge	herb	FACW+	3
<i>Carex scoparia</i>	pointed broom sedge	herb	FACW	5
<i>Carex stipata</i>	sedge	herb	OBL	2
<i>Carex stricta</i>	hummock sedge	herb	OBL	5

* Coefficient of Conservatism (see introduction)
 (Species list continues on next page)

** Species not native to Illinois

ROUTINE ONSITE WETLAND DETERMINATION
 Site 1 (page 3 of 5)

Field Investigators: Tessene, Matthews, Kurylo, and Feist Date: 13 August 2002
 Section No.: 88-00094-00-BR Project Name: FAS 67 (Stagecoach Trail)
 State: Illinois County: Jo Daviess Applicant: IDOT District 2
 Site name: Marsh
 Legal Description: NE/4, SE/4, sec. 16, T.28N., R.1E.
 Location: Excavated part of wetland creation site south of the bridge over the Galena River
 on Stagecoach Trail

SPECIES LIST (continued)

Scientific name	Common name	Stratum	Wetland Indicator	C*
<i>Carex trichocarpa</i>	sedge	herb	OBL	6
<i>Carex vulpinoidea</i>	fox sedge	herb	OBL	3
<i>Carex</i> sp.	sedge	herb	-	-
<i>Cassia fasciculata</i>	partridge pea	herb	FACU-	1
<i>Chenopodium album</i>	lamb's quarters	herb	FAC-	**
<i>Cirsium arvense</i>	creeping thistle	herb	FACU	**
<i>Cirsium vulgare</i>	bull thistle	herb	FACU-	**
<i>Conyza canadensis</i>	horseweed	herb	FAC-	0
<i>Cuscuta gronovii</i>	dodder	herb	FACW	2
<i>Cyperus esculentus</i>	yellow nutsedge	herb	FACW	0
<i>Cyperus strigosus</i>	straw nutsedge	herb	FACW	0
<i>Digitaria ischaemum</i>	smooth crabgrass	herb	FACU	**
<i>Echinochloa muricata</i>	barnyard grass	herb	OBL	0
<i>Eleocharis erythropoda</i>	spikerush	herb	OBL	3
<i>Epilobium coloratum</i>	cinnamon willow-herb	herb	OBL	3
<i>Erigeron annuus</i>	daisy fleabane	herb	FAC-	1
<i>Eupatorium maculatum</i>	spotted Joe-Pye weed	herb	OBL	5
<i>Eupatorium perfoliatum</i>	boneset	herb	FACW+	4
<i>Eupatorium serotinum</i>	late boneset	herb	FAC+	1
<i>Gaura biennis</i>	biennial gaura	herb	FACU-	2
<i>Glechoma hederacea</i>	creeping Charlie	herb	FACU	**
<i>Glyceria grandis</i>	tall manna grass	herb	OBL	10
<i>Glyceria striata</i>	fowl manna grass	herb	OBL	4
<i>Helenium autumnale</i>	sneezeweed	herb	FACW+	3
<i>Helianthus tuberosus</i>	Jerusalem artichoke	herb	FAC	3
<i>Humulus japonicus</i>	Japanese hops	herb	FACU	**
<i>Impatiens capensis</i>	orange jewelweed	herb	FACW	2
<i>Iris shrevei</i>	blue flag iris	herb	OBL	5
<i>Juncus torreyi</i>	rush	herb	FACW	3
<i>Lactuca serriola</i>	prickly lettuce	herb	FAC	**
<i>Leersia oryzoides</i>	rice cutgrass	herb	OBL	3
<i>Lemna minor</i>	duckweed	herb	OBL	3
<i>Lobelia siphilitica</i>	great blue lobelia	herb	FACW+	4
<i>Lycopus americanus</i>	bugleweed	herb	OBL	3
<i>Lycopus uniflorus</i>	northern bugleweed	herb	OBL	7
<i>Mentha arvensis</i>	field mint	herb	OBL	4
<i>Minulus ringens</i>	monkey flower	herb	FACW	4
<i>Myosoton aquaticum</i>	giant chickweed	herb	OBL	5
<i>Oenothera biennis</i>	evening primrose	herb	FAC+	**
<i>Oxalis dillenii</i>	yellow wood-sorrel	herb	FACU	1
			FACU	0

* Coefficient of Conservatism (see introduction)
 (Species list continues on next page)

** Species not native to Illinois

ROUTINE ONSITE WETLAND DETERMINATION
 Site 1 (page 4 of 5)

Field Investigators: Tessene, Matthews, Kurylo, and Feist
 Section No.: 88-00094-00-BR
 State: Illinois
 Site name: Marsh
 Legal Description: NE/4, SE/4, sec. 16, T.28N., R.1E.
 Location: Excavated part of wetland creation site south of the bridge over the Galena River on Stagecoach Trail

Date: 13 August 2002
 Project Name: FAS 67 (Stagecoach Trail)
 Applicant: IDOT District 2

County: Jo Daviess

SPECIES LIST (continued)

Scientific name	Common name	Stratum	Wetland Indicator	C*
<i>Panicum capillare</i>	witchgrass	herb	FAC	0
<i>Panicum dichotomiflorum</i>	fall panicum	herb	FACW-	0
<i>Panicum virgatum</i>	switch grass	herb	FAC+	4
<i>Penthorum sedoides</i>	ditch stonecrop	herb	OBL	2
<i>Phalaris arundinacea</i>	reed canary grass	herb	FACW+	**
<i>Physalis subglabrata</i>	smooth ground-cherry	herb	UPL	0
<i>Physostegia virginiana</i>	obedient plant	herb	FACW	6
<i>Plantago rugelii</i>	Rugel's plantain	herb	FAC+	0
<i>Poa pratensis</i>	Kentucky bluegrass	herb	FAC-	**
<i>Polygonum amphibium</i>	water smartweed	herb	OBL	3
<i>Polygonum aviculare</i>	knotweed	herb	FAC-	**
<i>Polygonum hydropiper</i>	water pepper	herb	OBL	**
<i>Polygonum lapathifolium</i>	nodding smartweed	herb	FACW+	0
<i>Polygonum pensylvanicum</i>	smooth smartweed	herb	FACW+	1
<i>Polygonum persicaria</i>	lady's-thumb	herb	FACW	**
<i>Polygonum scandens</i>	climbing knotweed	herb	FAC	2
<i>Populus deltoides</i>	cottonwood	shrub, herb	FAC+	2
<i>Potentilla norvegica</i>	rough cinquefoil	herb	FAC	0
<i>Ratibida pinnata</i>	yellow coneflower	herb	UPL	4
<i>Rorippa islandica</i>	yellow marsh cress	herb	OBL	4
<i>Rumex altissimus</i>	pale dock	herb	FACW-	2
<i>Rumex crispus</i>	curly dock	herb	FAC+	**
<i>Sagittaria latifolia</i>	common arrowhead	herb	OBL	4
<i>Salix amygdaloides</i>	peachleaf willow	shrub, herb	FACW	4
<i>Salix exigua</i>	sandbar willow	shrub, herb	OBL	1
<i>Salix nigra</i>	black willow	shrub, herb	OBL	3
<i>Sambucus canadensis</i>	elderberry	shrub, herb	FACW-	2
<i>Scirpus atrovirens</i>	green bulrush	herb	OBL	4
<i>Scirpus cyperinus</i>	woolgrass	herb	OBL	5
<i>Scirpus validus</i>	soft-stemmed bulrush	herb	OBL	4
<i>Scutellaria lateriflora</i>	mad-dog skullcaps	herb	OBL	4
<i>Setaria faberi</i>	giant foxtail	herb	FACU+	**
<i>Silphium laciniatum</i>	compass plant	herb	UPL	5
<i>Silphium perfoliatum</i>	cup-plant	herb	FACW-	4
<i>Solanum carolinense</i>	horse nettle	herb	FACU-	0
<i>Solidago canadensis</i>	Canada goldenrod	herb	FACU	1
<i>Solidago gigantea</i>	late goldenrod	herb	FACW	3
<i>Spartanium eurycarpum</i>	common bur-reed	herb	OBL	5
<i>Spartina pectinata</i>	prairie cordgrass	herb	FACW+	4
<i>Stachys tenuifolia</i>	hedge nettle	herb	FACW+	5

* Coefficient of Conservatism (see introduction)
 (Species list concludes on next page)

** Species not native to Illinois

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

Field Investigators: Tessene, Matthews, Kurylo, and Feist Date: 13 August 2002
 Section No.: 88-00094-00-BR Project Name: FAS 67 (Stagecoach Trail)
 State: Illinois County: Jo Daviess Applicant: IDOT District 2
 Site name: Marsh
 Legal Description: NE/4, SE/4, sec. 16, T.28N., R.1E.
 Location: Excavated part of wetland creation site south of the bridge over the Galena River
 on Stagecoach Trail

SPECIES LIST (concluded)

Scientific name	Common name	Stratum	Wetland Indicator	C*
<i>Taraxacum officinale</i>	dandelion	herb	FACU	**
<i>Teucrium canadense</i>	American germander	herb	FACW-	3
<i>Typha angustifolia</i>	narrowleaf cattail	herb	OBL	**
<i>Typha latifolia</i>	common cattail	herb	OBL	1
<i>Verbena hastata</i>	blue vervain	herb	FACW+	3
<i>Verbena urticifolia</i>	white vervain	herb	FAC+	3
<i>Vernonia fasciculata</i>	prairie ironweed	herb	FACW	5
<i>Xanthium strumarium</i>	cocklebur	herb	FAC	0

* Coefficient of Conservatism (see introduction)
 Mean c value = $\sum C/N = 245/97 = 2.5$

** Species not native to Illinois
 $FQI = \bar{c} \sqrt{N} = \sum C/\sqrt{N} = 245/\sqrt{97} = 24.9$

Determined by: Paul Tessene, Jeff Matthews, and Mary Ann Feist
 (vegetation and hydrology)
 Jesse Kurylo (soils and hydrology)
 Illinois Natural History Survey
 Center for Wildlife Ecology
 607 East Peabody Drive
 Champaign, Illinois 61820
 (217) 244-7984, 244-2168, 244-6858, 244-0692

Appendix 2: Plant species observed in disturbed wetland south of the wetland mitigation site

Scientific name	Common name	Stratum	Wetland Indicator	C*
<i>Acalypha rhomboidea</i>	three-seeded mercury	herb	FACU	0
<i>Acer negundo</i>	box elder	sapling, shrub	FACW-	1
<i>Agrostis alba</i>	redtop	herb	FACW	0
<i>Ambrosia trifida</i>	giant ragweed	herb	FAC+	0
<i>Aster prenanthoides</i>	crooked-stem aster	herb	FAC	10
<i>Aster simplex</i>	panicled aster	herb	FACW	3
<i>Bidens cernua</i>	nodding bur-marigold	herb	OBL	2
<i>Bidens tripartita</i>	beggar's ticks	herb	FACW	2
<i>Carex cristatella</i>	sedge	herb	FACW+	3
<i>Carex trichocarpa</i>	sedge	herb	OBL	6
<i>Carex vulpinoidea</i>	fox sedge	herb	OBL	3
<i>Carex sp.</i>	sedge	herb	-	-
<i>Clematis virginiana</i>	wild clematis	woody vine, herb	FAC	3
<i>Hypericum pyramidatum</i>	giant St. Johnswort	herb	FAC+	8
<i>Juncus dudleyi</i>	rush	herb	FAC+	4
<i>Leersia oryzoides</i>	rice cutgrass	herb	OBL	3
<i>Lobelia siphilitica</i>	great blue lobelia	herb	FACW+	4
<i>Lycopus americanus</i>	bugleweed	herb	OBL	3
<i>Myosoton aquaticum</i>	giant chickweed	herb	FAC+	**
<i>Phalaris arundinacea</i>	reed canary grass	herb	FACW+	**
<i>Phleum pratense</i>	timothy	herb	FACU	**
<i>Poa pratensis</i>	Kentucky bluegrass	herb	FAC-	**
<i>Polygonum hydropiper</i>	water pepper	herb	OBL	**
<i>Polygonum punctatum</i>	dotted smartweed	herb	OBL	3
<i>Salix exigua</i>	sandbar willow	sapling, shrub	OBL	1
<i>Sambucus canadensis</i>	elderberry	sapling, shrub	FACW-	2
<i>Solidago canadensis</i>	Canada goldenrod	herb	FACU	1
<i>Verbena hastata</i>	blue vervain	herb	FACW+	3
<i>Verbena urticifolia</i>	white vervain	herb	FAC+	3
<i>Vernonia fasciculata</i>	prairie ironweed	herb	FACW	5

* Coefficient of Conservatism (see introduction)
 Mean c value = $\sum C/N = 73/24 = 3.0$

** Species not native to Illinois
 $FQI = \bar{c} \sqrt{N} = \sum C/\sqrt{N} = 73/\sqrt{24} = 14.9$

Conclusive wetland hydrology at Stagecoach Trail (FAS 67) wetland creation site, Jo Daviess County, August 2002.

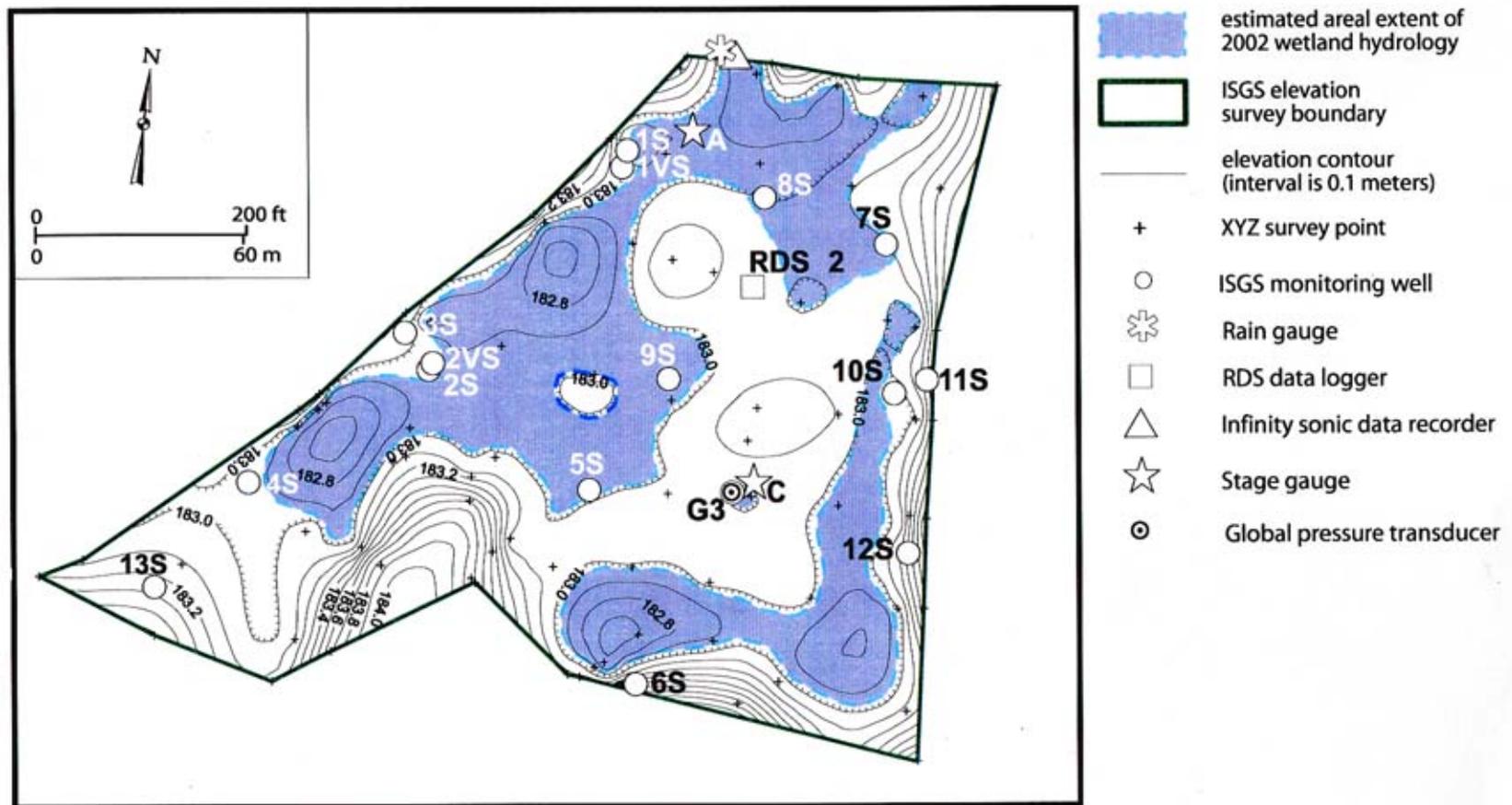


Figure prepared by ISGS



Stagecoach Trail (FAS 67) wetland creation site, August 2002.

At northwest corner, looking southeast.

Note dense herbaceous wetland vegetation beyond ragweed in foreground. Note also sandbar willow/box elder thicker at base of slope in background--natural wetland to the southeast of wetland creation site.



Stagecoach Trail (FAS 67) wetland creation site, August 2002.

At northeast corner, facing southwest.

Note ragweed and planted tree species in foreground, dense vegetation on site in middle of image.



Stagecoach Trail (FAS 67) wetland creation site, August 2002.

Near southeast corner, facing northwest.

Note ragweed and planted trees in foreground, dense wetland vegetation in middle of image, box elders and stagecoach in background.