Appendix A

Quality Assurance Project Plan

QUALITY ASSURANCE PROJECT PLAN

ECOLOGICAL ASSESSMENT OF COMPENSATORY WETLAND MITIGATION

Assistance Agreement Number CD-98752301-0

prepared by
Iowa Department of Transportation

prepared for
United States Environmental Protection Agency Region 7

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DISTRIBUTION LIST

The following individuals will receive copies of the approved Quality Assurance Project Plan (QAPP) and subsequent revisions:

Talva Hayes, Project Officer, USEPA Region 7
Jason Daniels, Project Manager, USEPA Region 7
Diane Harris, Quality Assurance (QA) Officer, USEPA Region 7
Scott Marler, Project Supervisor/Interim QA Manager, IADOT
Kelly Poole, Project Manager/Interim QA Manager, IADOT
Terry VanDeWalle, Project Manager, Earth Tech

A. PROJECT MANAGEMENT

A4. Project/Task Organization

The IADOT and the USEPA are responsible for the completion of this study. The IADOT is tasked with planning, conducting and overseeing all work. USEPA will review the study planning documents and provide additional oversight and guidance. IADOT has retained Earth Tech as a consultant for executing the field research activities associated with this project. Earth Tech is responsible for overseeing the field sampling and laboratory analysis and conducting quality assurance oversight and records management. These tasks will be accomplished through several subcontractors and conducted by the Project Supervisor (project administration), Project Manager (coordination and oversight of field sampling, laboratory analysis, and records management) and Quality Assurance (QA) Manager (quality assurance management and data validation). Earth Tech will submit a list of individuals responsible for conducting the field research and laboratory analysis to update the QAPP once individual subcontracts have been executed. The individuals participating in the project are identified in the project organization chart (Figure 1).

The USEPA Project Manager will communicate any comments and instructions directly to the IADOT Project Manager. The IADOT Project Manager will convey these comments and instructions to the Earth Tech Project Manager. Responsibilities of key personnel are outlined below:

Talva Hayes, EPA Region 7 Project Officer: Overall project administration including QAPP review and approval in terms of program-specific requirements and making final project decisions. The Project Officer will also oversee the budget administration and ensure the project is implemented according to schedule.

Jason Daniels, EPA Region 7 Project Manager**:** Overall coordination of the project. Review and approve QAPP and subsequent revisions in terms of project scope and objectives and ensure QAPP implementation. Additional duties include:

1. Provide technical assistance to the IADOT Project Manager.
2. Review of quarterly and final reports, including draft reports prior to final edits

Diane Harris, EPA Region 7 QA Officer**:** Review and approval of QAPP and subsequent revisions in terms of quality assurance aspects. The QA Officer will be responsible for final review and approval of the QAPP and subsequent revisions for compliance with the current version of R-5, “EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations.” The QA Officer will provide QA technical assistance to the EPA Project Manager and will conduct QA audits of the project and report results upon request of the EPA Project Officer.

***Scott Marler, IADOT Project Supervisor and Interim QA Manager*:** Overall supervision of the project activities and responsible for quality assurance management:

1. Administration of contracts associated with project activities
2. Internal review and approval of QAPP
3. Conduct in-house audits of project operations including QA
4. Review of all project deliverables for consistency with QAPP objectives
5. Oversight of overall budget administration
6. Sign all reports

Kelly Poole, IADOT Project Manager and Interim QA Manager: Overall coordination of project activities and interim QA Manager. Responsibilities include:

1. Directing research activities with Earth Tech Project Manager
2. Preparation of QAPP
3. Reporting to the EPA Project Officer regarding the project status
4. Communication with stakeholders throughout the project
5. Development of assessment tool
6. Preparing quarterly and final reports to EPA

Joe Becker, Earth Tech Project Supervisor: Overall supervision of the project activities including:

1. Administration of contracts associated with project activities
2. Conducting in-house audits of project operations including QA
3. Oversight of subcontractor budget administration

Terry VanDeWalle, Earth Tech Project Manager: Overall coordination and supervision of subcontractor activities including field sampling and laboratory analysis, and records management.

1. Coordinate and monitor field and laboratory project activities
2. Distribute the approved QAPP (and subsequent revisions) to the subcontractors
3. Implement final, approved version of QAPP
4. Maintain sample records (voucher and laboratory)
5. Manage data records acquired from field investigations
6. Assemble data into tables for inclusion in the final reports
7. Report problems in the field to the IADOT Project Manager

To Be Determined, Earth Tech QA Manager: Responsible for quality assurance management.

1. Audit field activities to ensure that sampling methodology are being followed
2. Conduct on-site laboratory audits before and during sample analysis
3. Conduct field and laboratory data validation
4. Assist in resolving QA issues with field and laboratory personnel

Field Researcher: Vertebrates, Earth Tech Subcontractor: These individuals will perform vertebrate sampling in accordance with the QAPP and at the direction of the Earth Tech and IADOT Project Managers.

Field Researcher: Aquatic Micro-organisms, Earth Tech Subcontractor: These individuals will perform algae and aquatic micro-organism sampling in accordance with the QAPP and at the direction of the Earth Tech and IADOT Project Managers.

Field Researcher: Invertebrates, Earth Tech Subcontractor: These individuals will perform Lepidoptera sampling in accordance with the QAPP and at the direction of the Earth Tech and IADOT Project Managers.

Field Researcher: Plants, Earth Tech Subcontractor: These individuals will perform plant sampling in accordance with the QAPP and at the direction of the Earth Tech and IADOT Project Managers.

Field Researcher: Water Quality, Earth Tech Subcontractor: These individuals will perform water quality sampling in accordance with the QAPP and at the direction of the Earth Tech and IADOT Project Managers.

Field Researcher: Landscape Assessement, Earth Tech Subcontractor: These individuals will perform landscape analysis in accordance with the QAPP and at the direction of the Earth Tech and IADOT Project Managers.

A5. Problem Definition/Background

The success of compensatory wetland mitigation in meeting regulatory permit requirements and at replacing the ecological values of impacted wetlands is increasingly questioned (Storm and Stellini 1994; National Research Council 2001; Robb 2002; and Morgan and Roberts 2003). As a result, a national priority of advancing ecologically meaningful and scientifically based compensatory mitigation was established in 2002 (http://www.mitigationactionplan.gov/). Currently, IADOT compensatory wetland mitigation projects are assessed by the total number of wetland mitigation acres attained compared with Section 404 permit requirements. In the absence of an ecological assessment tool to measure wetland condition, little is known about the ecological performance of IADOT mitigation wetlands. By evaluating mitigation wetland condition and establishing ecological performance standards, the IADOT (the principal data user) as well as project stakeholders (e.g., regulatory agencies) could improve the existing monitoring and assessment programs and gain valuable knowledge toward improving the overall ecological effectiveness of compensatory mitigation.

A6. Project/Task Description and Schedule

Ecological condition will be determined by completing a wetland biological assessment (WBA) on mitigation and reference wetlands (US EPA 2002a; US EPA 2002b). For the WBA, measurement data will be collected on the following assemblages: amphibians, reptiles, birds, small mammals, algae, protozoa, aquatic micro-invertebrates, Lepidoptera, and vascular plants.

In addition, measurement data will be collected to assess water quality and landscape features at each site. Measurement data is critical for completing the WBA. All measurement data collected will follow standard methods (see Section B, *Data Measurement Acquisition*). Scientists, subcontracted to conduct project related field research, will collect environmental data over two field seasons beginning in 2005 and ending in 2006 (Table 1).

To assess the ecological condition, the WBA for mitigation wetlands will be compared to the WBA of reference wetlands. Numeric values for each metric will be compared to determine if mitigation wetlands are performing differently than reference wetlands.

The IADOT will also use the data to develop a rapid assessment tool to improve wetland monitoring and assessment. Development of this tool will be accomplished by using methods described by the US EPA (2002b) and/or adapting existing wetland assessment tools (Fennessy et. al. 2004)

Assessment techniques planned for this project include field and laboratory audits, data quality assessment, and data validation (see *Assessment/Oversight*, Section C and *Data Validation and Usability*, Section D).

The most important records for this project are the data collection worksheets used to record the environmental data for each study group. Reports produced for this project include monthly, quarterly and final reports (see Section A9, *Documents and Records*).

A7. Quality Objectives and Criteria for Measurement Data

The project data quality objective is to provide valid environmental data of known and documented quality for the purposes of assessing the ecological condition of mitigation wetlands and developing a rapid assessment tool. Data quality indicators for this project include representativeness, comparability, completeness and accuracy.

Representativeness. Representativeness will be assured by each study group using a statistically significant number of samples and by collecting random samples. This type of random sampling within the study wetlands will assure that a representative collection of samples occurred. Details are provided in Section B, *Data Measurement Acquisition*.

Completeness. To determine the ecological condition of mitigation wetlands, 90% of the critical samples must be collected and analyzed. If 90% of the critical samples are not collected and analyzed, re-sampling will occur.

Comparability. For this project, comparability will be addressed through the use of common and accepted sampling and analytical techniques and by reporting data in standard units. All global positioning system (GPS) field data collected for this project will be in accordance with IADOT standards and formats (Appendix A).

Accuracy. Quality control for accuracy of data entry will occur with each study group. All data collection worksheets will be checked against data files by two people. Field identifications will

be confirmed by two persons and voucher samples collected for this project will be verified and checked by comparison to museum specimens.

A8. Special Training Requirements/Certification

Field researchers (subcontractors) will be degreed professionals/scientists proficient in relevant aspects of biological and ecological sample collection, handling, and analysis; data reporting, management, and validation; and the related quality control (QC) requirements and practices; and experienced in field sampling and laboratory analysis. Field researchers are also responsible for acquiring State and Federal permits required for making scientific collections.

A9. Documents and Records

Records

The records to be used for project documentation include project field notebooks, data collection worksheets, photographs, chain of custody (COC) forms, field activity reports, and analytical activity reports. Records (including raw data – hard and electronic copies) will be managed by the Earth Tech Project Manager throughout the project. Copies of the data will be provided to the IADOT Project Manager upon request. Within 60 days of the conclusion of the first field season, project data collected to date will be provided to the IA DOT Project Manager in electronic format. Upon project completion, all records will be submitted to the IADOT for records storage and management. The IADOT will retain records generated during investigation activities for 5 years following project completion.

<u>Project field notebooks</u>

Field notebooks dedicated to activities associated with this project will be recorded using permanent black or blue ink in bound notebooks with pre-numbered pages. Each page of the project field notebook will be dated and signed by the person making the entries. Changes or corrections to entries will be crossed out with a single line so that the original text remains legible as well as initialed and dated. Field notes will include the following information as appropriate for each study group: location date and time, personnel performing the activity, weather conditions at the site when samples are collected and field analyses are conducted, and any other pertinent observations/information (e.g., photographs, see below) or deviations from the procedures in this QAPP deemed noteworthy by any member of the field team. If sampling occurred in accordance with the QAPP, a note will be made as such in the field notebook. In addition, a list of the field data worksheets completed during that sample period will also be recorded. Project field notebooks will be labeled with the project name, the name of the individual to whom the notebook has been assigned and a sequential notebook number. Upon project completion, used field notebooks dedicated to this project will be archived with other project records.

<u>Data collection worksheets</u>

Data collection worksheets to be used to record all field measurements for this project will be developed by individual subcontractors to meet the data collection needs of each study group. Electronic copies of data collection worksheets will be provided to the Earth Tech Project Manager and forwarded to the IADOT Project Manager prior to any fieldwork for inclusion in

the QAPP (Appendix B). Data will be recorded on the worksheets using permanent black or blue ink. Each data worksheet will be dated and signed by the person making the entries. Changes or corrections to entries will be crossed out with a single line so that the original text remains legible as well as initialed and dated. All data worksheets will include a unique sequential number (for recording in the field notebooks) as well as the following information: project name, date and time, site id, sample location (point) id, sample number(s) and the name/signature of the person completing the worksheet. Upon project completion, field data worksheets will be archived with other project records.

Photographs

Photographs (digital) will be taken to document site conditions and field activities when necessary (e.g., observation of a protected species where a voucher specimen will not be collected). The following information will be recorded in the field notebook: name of photographer; date, time location, and direction the photograph was taken; description of the photograph; reason for taking the photograph; and sequential number of the photograph. Digital photograph files will be transferred from the camera to a dedicated project folder and backed up daily. A text file with the information listed above will be linked to each photograph and stored with the project folder.

Chain of Custody (COC)

COC forms will be used to track sample handling and custody. Information recorded on the COC form will be in permanent black or blue ink. The COC form will be dated and signed by the person making the entries. Changes or corrections to entries will be crossed out with a single line so that the original text remains legible as well as initialed and dated. An example of a COC form is included in Appendix B.

Field Activity Report

The Earth Tech Project Manager will generate a monthly field activity report. The report will be submitted to the IADOT Project Manager for inclusion in quarterly reports to the EPA Project Officer. This report will include a signed narrative about field activities, a summary of all field data collected, a written report of the audit of field activities (see Section C, *Assessment and Oversight*), and complete chain of custody forms for samples being transported (e.g., voucher specimens). The narrative report will also include any problems encountered and their solutions, any deviations from procedures described in this QAPP, and a discussion of the quality of all field data collected.

Analytical Data Reports

A laboratory analytical data report will be generated monthly for all samples received by the laboratory contracted to complete the water quality analysis and signed by the laboratory manager. The analytical data report will include an original signed report of the analytical results, a brief narrative report about the analysis, original complete chain of custody forms, and any other documentation received with the samples. A summary of the calibration data, and laboratory quality control data will also be included in the analytical data report. The raw analytical data (e.g., instrument printouts and manual records) will be available upon request.

Laboratory analytical reports will be submitted to the Earth Tech Project Manager who will then verify the completeness of the reports before forwarding to the IADOT Project Manager. The reports will be included in quarterly reports to the EPA Project Officer. The narrative report will describe at least:

- Dates of sample receipt, preparation, and analysis,
- Condition of the samples upon receipt,
- Sample preparation and analytical procedures,
- Problems encountered during sample handling, storage, preparation, or analysis, and their solutions,
- Deviations from approved standard operating procedures,
- Discussion of the resulting data quality in a case narrative.

Documents
The documents produced for this project include the QAPP, and quarterly and final reports. The EPA Project Officer will disseminate copies of the QAPP to the people listed in the distribution list once it is approved. Any revisions to the QAPP will be numbered sequentially. It will be the responsibility of the EPA Project Officer to see to it that each person on the distribution list receives copies of any revisions. It will be the responsibility of the Earth Tech Project Manager to distribute it to the subcontractors. Interim and final reports will include text describing field sampling methodologies, analytical results, conclusions, and recommendations as well as figures showing mitigation and reference wetland location, boundaries, and sample locations. All reports will be submitted to the EPA Project Officer according to the project schedule (Table 1).

B. MEASUREMENT DATA ACQUISITION

B1. Sampling Process Design

The over all study plan focuses on evaluating the ecological performance of wetland mitigation sites and expanding existing monitoring and assessment programs to be more comprehensive. A nested block design will be used to study 12 mitigation sites for the purpose of evaluating ecological condition. To reduce variability among sites in this study, selection of mitigation sites were restricted by age, size, and type (e.g., restoration and creation). Three reference sites were selected, one in each size category. Earth Tech and IA DOT project managers selected study sites and project researchers, in consultation from the Iowa Department of Natural Resources, selected reference sites (Appendix C).

The ecological condition of mitigation and reference wetlands will be evaluated through biological (WBA), chemical and physical assessments. The WBA of each site includes surveys of the following biological assemblages: amphibians, reptiles, birds, mammals, algae, protozoa, micro-invertebrates, Lepidoptera, and plants. Data collected for the biological assemblages will include species richness and composition, abundance, tolerance and intolerance to human disturbance, and population characteristics (US EPA 2002b). Sampling points for each biological assemblage will be randomly selected along or within a series of transects established

to traverse all habitats represented within the study wetland. Prior to data collection Earth Tech and IA DOT Project Managers will meet with subcontractors to review each study site and determine transect locations. The Earth Tech Project Manager will use GPS to mark transect location at all sites. The number of sample points along or within each transect varies by individual study group (see Section B2, *Sample Methods Requirements*). Data collected in the WBA includes species richness and abundance, and will be used to calculate species diversity as well as combined in an overall index to describe the ecological condition of each study site.

Water quality data and Geographic Information System (GIS) analysis will be used as an indicator of site disturbance. Water quality parameters to be studied include dissolved oxygen, temperature, pH, conductivity, turbidity, chloride, nitrite, nitrate, sulfate, ammonia, dissolved reactive phosphorus, total phosphorus, total nitrogen, and dissolved organic carbon. Water quality sample points will be recorded using GPS and generally located at the inlet and outlet of each wetland when identifiable; otherwise, a grab sample will be obtained from a representative location. GIS analyses of landscape characteristics of each site will include descriptions of land use, land cover, soil, bedrock, hydrography, and infrastructure as well as an explorations of relationships between biological communities and wetland characteristics (Whited et.al. 2000, US EPA 2002c, Semlitsch and DBodie 2003).

The data collected to assess the biological, chemical and physical condition of the mitigation and reference wetland are classified as critical. Subcontractors responsible for data collection will be required to use standard methods to assure that data may be comparable to other sources of data (see Section B2, Sa*mple Methods Requirements*). Equipment used in the execution of this work will be appropriate and approved for its intended use by the Earth Tech Project Manager, and will be operated, handled, maintained, and stored according to manufacturer's specifications.

B2. Sampling Methods Requirements

All data collection for this project will follow standard methods as described below (see also Section B4, *Analytical Methods Requirements*). Subcontractors collecting the data are responsible for maintaining data quality in accordance with the QAPP. If sample methods are changed or corrected in the field or laboratory, it is the responsibility of the subcontractor to document in the project field notebook the situation or circumstance necessitating the change or correction, the corrective action taken and justification for the corrective action taken and immediately notify the Earth Tech Project Manager. The Earth Tech Project Manager, in consultation with the Earth Tech QA Manager, IADOT Project Manager, and IADOT QA Manager, will make a determination regarding the potential impact of the change or correction made on the project. The Earth Tech Project Manager will also notify other project personnel affected by the change and document the change in the monthly activity reports. The IADOT QA Manager will notify the EPA QA Manager and update the QAPP with changes made to project methodology. In the event of a serious flaw (e.g., equipment failure resulting in a the loss of a complete data set), a determination will be made by the Earth Tech Project Manager, Earth Tech QA Manager, IADOT Project Manager, IADOT QA Manager and the EPA QA Manager as to whether replacement samples will be collected and integrated into the project data.

B2.1 Vertebrates

Amphibians will be surveyed from April through June to insure sampling of all species present (Heyer et al, 1994; US EPA 2002d). Salamanders will be trapped in April with wire screen funnel traps and hand collected during terrestrial and aquatic searches throughout the survey. Calling surveys and hand collecting of frogs and toads will be conducted primarily from April through June during the time that each species is know to breed and will continue throughout the survey.

Reptiles will be surveyed from May through mid-July when they are most active. Snakes and lizards will be documented through opportunistic searches of the study sites. Aquatic turtle trapping will be conducted in all permanent bodies of water possessing suitable turtle habitat using modified fyke nets as described by Legler (1960).

The most intensive surveys for amphibians, reptiles and small mammals will utilize drift fences as described by Christiansen and VanDeWalle (2000). Drift fence sampling will take place from May through September. Sherman live traps will be used in conjunction with the drift fence for small mammals. Voucher samples will be taken for difficult identifications. Voucher specimens collected for this project will be processed following standard methods (Heyer et. al. 1994; Wilson et. al. 1996; Deblase and Martin, 2000; Simmons 2002).

Migratory birds will be surveyed during March and November and breeding bird surveys will take place from May through July (Fairbairn and Dinsmore 2001; US EPA 2002e).

B2.2 Aquatic Micro-Organisms

Field collection of algae, protozoa, and micro-invertebrates will be done using benthic and surface grab sampling and net sampling for plankton (APHA 1998; US EPA 2002f). Each of the study sites will be sampled over a period of three days over five sampling periods between April and November. An average of four samples will be collected at each site on each sampling day and samples from similar habitats at any one site will be pooled. Sample analysis will include microscopic examination of fresh (or settled) samples and digestion and preservation of diatom samples (APHA 1998). Voucher samples will be prepared as follows: duplicate slides (both Naphrax mounts and Karo Mounts will be prepared) and preserved material from the field samples (split from well mixed samples) will be deposited in the diatom herbarium at The Academy of Natural Sciences of Philadelphia.

B2.3 Plants

Quantitative data will be collected systematically along transects in stratified random plots using standard methods developed for vegetation community sampling (Rosburg 2003; US EPA 2002g).

Quantitative data will be collected along transects that traverse all of the zones represented. These data will measure plant frequency and density and will be used to calculate richness, evenness, diversity, and several quality indices. Structural information will also be collected utilizing five classes; 1) herbs, 2) woody stems < 50 cm tall, 3) woody stems 50-200 cm tall, 4) woody stems >200 cm tall and < 5 cm dbh, and 5) woody stems > 5 cm dbh.

A qualitative floristic list for each study site will also be produced that identifies all species present and will be used to measure richness and quality at the scale of the entire wetland. Qualitative data will be collected by surveying each study site three times during the growing season.

B2.4 Lepidoptera

At each study site, data will be collected on the Lepidoptera species present every 10 days during the non-frost season. Methods will include walking surveys of all habitats and counts of all individuals of each species encountered (Pollard 1991; Pollard and Yates 1993). Voucher samples will be taken for difficult identifications. Collections made for this project will follow Winter (2000).

B2.5 Water Quality

The laboratory contracted to complete the water quality assessment for this project will have adequate facilities, staff and equipment to assess water quality parameters identified as important to this project (See Section B1 *Sampling Process Design*). The laboratory director (or assigned personnel) from the water chemistry laboratory will obtain water quality samples for laboratory analysis and make field measurements at each of the study sites on a monthly basis year-round, with biweekly sampling during the late-spring and early summer months. Water quality parameters for laboratory and field measurements, analysis methods, and equipment needs are summarized in Tables 2 and 3. Additional equipment needed for water sample collection (for each sampling site) includes 1- 500 mL pre-cleaned glass bottle, 1-500 mL pre-cleaned polyethylene bottle, 1-100 mL pre-cleaned glass bottle, 1 acid-rinsed 60 mL disposable syringe, 1 acid-rinsed 0.45 μm syringe tip filter. A large cooler with frozen cold packs (for maintaining/ preserving samples) and one five-gallon carboy of deionized water (for decontamination of equipment) is also required.

<u>Procedures and Methods for Collecting Water Quality Samples for Laboratory Analysis</u>

Sample Collection and Preservation

Grab samples will be collected from inlets and outlets when identifiable; otherwise, a grab sample will be obtained from a representative location (a near shore location in open water (non-vegetated), which will be documented using GPS (Lougheed et. al. 2001).

Samples will be collected just below the surface of the water using a hand-held open mouth bottle sampler. All bottles will be field-rinsed with the sample twice before collection. All samples for laboratory analysis will immediately be stored in a cooler with ice packs until they can be transferred to a refrigerator at 4 °C.

Samples to be analyzed for nitrate, chloride, sulfate, TSS, and ammonia will be collected in 500 mL polyethylene bottles. Samples to be analyzed for DRP, total phosphorus, total nitrogen, and chemical oxygen demand will be collected in 500 mL glass bottles. For DRP analysis, a 50 mL of sample will be filtered in the field through a 0.45 μm filter.

All bottles will be washed in a dishwasher with a phosphorus-free detergent and rinsed thoroughly with distilled water. Glass bottles will then be placed in a bath of 5% v/v reagent grade HCl in deionized water to soak. (All deionized water will come from a Barnstead Nanopure unit and have a minimum resistivity of 18 MΩ•cm.) After soaking for a minimum of one hour, the bottles will be rinsed three times with deionized water by filling half full, shaking vigorously with the cap, and then emptying. The same rinsing procedure will be used with the polyethylene bottles out of the dishwasher. 60 mL disposable syringes, syringe filters, and 100 mL glass bottles for DRP analysis will also be soaked in the HCl solution. The syringes, filters, and small bottles will also be rinsed three times with deionized water. Bottles will be allowed to dry and then labeled with weather-proof adhesive labels (Avery) designed for this project. Labels will include spaces for the site, sample code, date, name of collector, and time.

Samples collected each day will be returned to the lab, refrigerated, and analyzed on the following day. If the laboratory director determines that it is not feasible to complete all analyses within 48 hours of sampling, samples for ammonia and total phosphorus will be preserved for analysis within seven days (APHA 1998).

Laboratory Analysis
Ion chromatography (EPA Method 300.1) will be utilized to measure chloride, nitrite, nitrate, and sulfate concentrations. Spectroscopic methods will be used to measure ammonia (Reardon et.al. 1966) and dissolved reactive phosphorus (USEPA Method 365.2). Total phosphorus and total nitrogen will be measured using a persulfate digestion prior to analysis (Total P: Hach Method 8190 (USEPA accepted for reporting wastewater analyses); Total N: Hach Total Nitrogen Uni-Cell method). Dissolved organic carbon will be assessed using a manganese COD digestion with spectroscopic measurement (Hach Method 10067). Spectroscopic analyses will be performed on Perkin Elmer EZ150 spectrophotometers and ion chromatographic analyses will be carried out on a Dionex DX-80. Details regarding quality control for laboratory analyses are in Section B5 *Quality Control Requirements* and Section B7 *Instrument Calibration and Frequency*.

<u>Procedures and Methods for Collecting Water Quality Samples for Field Measurements</u>
Dissolved oxygen, temperature, pH, conductivity, and turbidity will be measured in the field (Table 3). Field measurements will be made prior to sample collection at the same location where samples are collected for laboratory analysis, with care being taken to minimize disturbance of sediments. A grab sample will be collected using a 500 mL wide mouth glass bottle for analysis of pH and conductivity and a turbidity sample will be collected directly into sample cell for the instrument. These samples will be returned to shore and analyzed. DO and temperature will be measured directly *in situ*. All field measurement equipment exposed to sample will be rinsed three times with deionized water as soon as possible after sampling. The glass bottle used for collecting a sample for pH and conductivity will also be rinsed three times with deionized water after sampling.

B2.6 Landscape Assessment
Geographic Information System (GIS) analysis will be used to classify and quantify land use and land cover within 2 km of each study site including details of other wetlands within 2 km of each

study site. In addition, specific data on each study site, including size, landscape position, age, wetland to upland ratio, and road density will be compiled. Potential nutrient and sediment inputs will be also be assessed using GIS analyses (US EPA 2002c) as part of the landscape assessment.

B3. Sample Handling and Custody Requirements

Samples collected during this project will be given a unique identification code consisting of the following:

- *Project Identification Code:* A one-digit designation will be used to identify the site from which the sample was collected.
- *Location Code:* Each sample will be identified by an alpha-numeric code representing the sample collection location (e.g., transect id or inlet/outlet).
- *Point Code:* Each sample will be identified by an alpha-numeric code representing the sample location along the transect.

If any sample is transferred from the original collection vessel (e.g., a plant specimen transferred from a plant press to a drying pan), a new label will be placed with the sample documenting the following: sample identification number, date/time of sample collection, sampler's initials, required analysis (or processing), and type of preservative (if applicable).

Field researchers and laboratory personnel will use a COC form to record transport and storage information for all samples collected for this project. The form will be forwarded to the Earth Tech Project Manager for inclusion in project reports.

The Earth Tech Project Manager will be responsible for the custody of all records relevant to sampling and analysis activities such as project field notebooks, data worksheets, photographs, subcontractor reports, laboratory data deliverables, COC forms, and data validation reports. All records will then be transferred to the IADOT for storage and maintenance upon completion of the project.

Voucher

Voucher specimens (amphibians, reptiles, small mammals, Lepidoptera, plants, algae, protozoa, and aquatic micro-organisms) collected as part of this project will be labeled by the field researcher making the collection and processed in the field or laboratory according to accepted methods by taxa. The label will include at a minimum:

- a sample identification code (described above),
- date and time of collection, and
- the initials of the person making the collection.

Prior to any fieldwork, field researchers will arrange for storage of voucher specimens at a credible institution in Iowa (if possible) and will provide this information to the Earth Tech Project Manager for inclusion in the final report. The COC for voucher samples is as follows: In the field the samples are the responsibility of the field researcher who will then transport the

samples to appropriate facility for preparation and long-term storage. The field researcher will use a COC form to record transport and storage information for all voucher samples and will record the date and time of the arrival of the specimen to the vouchering institution. The COC form will then be submitted to the Earth Tech Project Manager who will provide a summary of the voucher specimens to the IADOT Project Manager for the final project report.

Water Quality and Aquatic Micro-organisms
Samples of algae, protozoa, plankton and micro-invertebrates as well as water quality samples collected for this project are labeled and processed in the field by the field researcher making the collection and transported to the appropriate laboratory for analysis. Water quality samples will be analyzed at Coe College in Cedar Rapids, Iowa and aquatic micro-organisms will be analyzed at Wartburg College in Waverly, Iowa. All samples will be labeled and catalogued in the project field notebooks and on the COC form using the unique sample identification codes (described below). The labels will also include:

- a sample identification code (described above),
- date and time of collection,
- initials of the person making the collection,
- number of containers for each type of sample,
- method of preservation, and
- type of analysis required.

Samples will be stored at 4°C after collection until analysis. The COC for these samples is as follows: In the field the samples are the responsibility of the field researcher making the collection and transporting the samples to laboratory for analysis. The laboratory personnel will record the date and time of the arrival of the samples and arrange for proper storage until analysis. Each laboratory will employ laboratory custody procedures for sample receiving and login, sample storage, tracking during sample preparation and analysis, and storage of data in accordance with their standard operating procedures. The Earth Tech QA Manager will be responsible for ensuring the laboratory custody protocol is maintained.

B4. Analytical Methods Requirements
Biological and chemical samples requiring laboratory analysis will be collected, prepared, and analyzed in accordance with accepted standard methods (Tables 2 and 3; see also Section B2, *Sample Methods Requirements*). In general, laboratory turnaround time for analyses will be two weeks. Regular updates regarding analyses progress will be provided to the IA DOT Project Manager through the monthly activity reports. The WBA will also follow standard methods (US EPA 2002b). Landscape analyses will be based on standard methods described in Turner and Gardner (1991) and conducted using SAS (SAS Institute 1989) and ArcGIS 9.0 extensions, especially GeoStatistical Analyst and Spatial Analyst. Finally, data analysis associated with the development of the rapid assessment tool will follow standard methods as well (Galatowitsch et. al. 1999; US EPA 2002b,).

Analyses for this project will follow standard methods as described above. Personnel analyzing the data are responsible for maintaining data analyses in accordance with the QAPP. If analysis

methods are changed or corrected in the field or laboratory, it is the responsibility of the personnel making the change to document in the project field notebook the following information: the situation or circumstance necessitating the change or correction, the corrective action taken and justification for the corrective action taken. These project personnel will also immediately notify the Earth Tech Project Manager of the change or correction. The Earth Tech Project Manager, in consultation with the Earth Tech QA Manager, IADOT Project Manager, and IADOT QA Manager, will make a determination regarding the potential impact of the change or correction made on the project. The Earth Tech Project Manager will also notify other project personnel affected by the change and document the change in the monthly activity reports. The IADOT QA Manager will notify the EPA QA Manager and update the QAPP with changes made to data analyses for this project.

B5. Quality Control Requirements

During the project, field research personnel will strictly adhere to QC checks through the use of replicate measurements (if applicable), equipment calibration checks (if applicable), and data verification. Earth Tech and IADOT QA Managers will perform QA field audits a minimum of two times each field season. During the audits, if QC is not being maintained, the following steps will be taken:

1) evaluation of the extent of the problem,
2) determination of the source of non-compliance, and
3) assessment of the impact on the data usability.

Depending on the nature of the QC failure, corrective actions may include flagging the data for disposal, replacing the faulty materials (e.g., traps), and/or re-sample or re-analysis.

The Earth Tech QA Manager will be responsible for ensuring that the water quality field and laboratory's data precision and accuracy are maintained in accordance with specifications described below and in Tables 2 and 3.

<u>Laboratory Analyses</u>

Laboratory samples will be included in the preparation batch with the field samples. The analytical batch is defined as a number of samples (field and QC samples) that are similar in composition and that are extracted or digested at the same time and with the same lot of reagents. It extends also to cover samples that do not need separate extraction or digestion. The identity of the analytical batch will be unambiguously reposted with the analysis so that a reviewer can identify the QC samples associated with each sample.

Initial calibration

Each laboratory analysis (with the exception of total suspended solids) will be calibrated each day with a blank and four calibration standards of the analyte of interest. The range will be selected to bracket the expected values for the particular parameter. Linear curve fitting (using Microsoft Excel) will be utilized to analyze the concentration-instrument response relationship. Linear correlation coefficients (R^2) should be > 0.99; if not, the blank and calibration standards will be repeated.

Calibration verification
The second highest midpoint calibration standard will be analyzed after every set of ten samples to verify the calibration. If this standard is outside 80 to 120% of the expected concentration ((found value/true value) x 100%), sample analysis will be halted and the initial calibration will be repeated. Samples analyzed since the last successful calibration verification will also be reanalyzed once a successful calibration has been reinstituted.

Batch quality control
A method blank (deionized water treated in the same way as a sample or standard) will be run with every calibration. In addition, a method blank will be run after every 10 samples. If analytes appear at level above the detection limit given in the Tables 2 and 3, corrective action will be taken. Sample analysis will begin again only after the analyte concentration in the blank is below method detection limits. Duplicate samples, processed individually through the sample preparation and analytical process, will be run after every 10 samples. If the relative percent difference (difference between the two values divided by the mean times 100%) should 20% or less. If it is greater than 20%, sample analysis will be halted and corrective actions taken. Analysis will begin again only after the relative deviation of duplicate samples is less than 20%.

B6. Equipment Testing, Inspection, and Maintenance Requirements
No specialized field equipment requiring testing, inspection, and maintenance will be used for sampling vertebrates, aquatic micro-organisms, or Lepidoptera or as part of the landscape assessment for this project. Equipment used such as fyke nets, drift fences, sweep nets, and buckets which do not have testing, inspection, and maintenance requirements will be inspected for proper operation prior to each survey effort. Descriptions of equipment to be used in plant surveys and water quality sampling are below. Field and laboratory equipment used in the project will be appropriate and approved for intended use. Field and laboratory equipment (described below) will be uniquely identified by the manufacturer's serial number and records indicating testing, inspection and maintenance requirements as recommended by equipment manufacturers will be readily available for reference. It is the responsibility of the field personnel to check and fulfill any requirements prior to using the equipment.

Plants
A LICOR 191SA line quantum sensor will be used to measure light below and above the herb layer to get a measure of habitat structure/density. The line quantum sensor may be cleaned as necessary with a mild detergent and warm water. Replacement parts are available from LICOR.

Water Quality
Testing, inspection and maintenance of equipment used in field and laboratory analyses of water quality will follow manufacturers manuals. Equipment being used is listed in Tables 2 and 3.

B7. Instrument Calibration and Frequency
No field or laboratory equipment requiring calibration will be used for sampling vertebrates, aquatic micro-organisms, or Lepidoptera or as part of the landscape assessment for this project. Descriptions of instruments requiring calibration to be used in plant surveys and water quality

sampling are below. Calibration of equipment may be performed internally using in-house reference standards, or externally by agencies or manufacturers. Calibration procedures will be documented in the project field notebook and include the date and time of calibration, name of person performing the calibration, reference standard used (if applicable), reading taken and adjustments to attain proper reading, and any corrective action. Laboratory analysts will be responsible for calibration of laboratory equipment. Widely accepted procedures such as those published by the USEPA or procedures provided by manufacturers of equipment manuals will be used.

Plants
The LICOR 191SA line quantum sensor is returned to LICOR for recalibration every two years. Recalibration will be complete prior to the initiation of fieldwork. Absolute calibration is +/- 10%.

Water Quality
Field
The DO and pH meters will be calibrated, according to the procedures in the manufacturers manuals, at the beginning of each sampling day. The turbidimeter will be calibrated according to the procedure in the manual at the beginning of the field season, and will be checked at the beginning of each sampling day with a Gelex standard. If the value for the Gelex standard deviates by more than 5% from the value recorded immediately after standardization, the instrument will be recalibrated. The conductivity meter will be calibrated with a Hach standard conductivity solution, and checked regularly with the same solution. If the reading deviates by greater than 5% from the standard value, the instrument will be recalibrated.

Laboratory
The Perkin Elmer EZ150 spectrophotometers (spectroscopic analyses) and the Dionex DX-80 (ion chromatographic analyses) will be calibrated according to manufacturers manuals using a minimum of four standards prepared by dilution of a purchased stock solutions (Hach stock solutions for the spectroscopic analyses; Dionex seven-anion standard for the ion chromatographic analysis). Any other reagents used will be of reagent grade or higher. The range of standards will bracket the range of values expected for the samples; if samples exceed the standard range, the samples will be diluted to be within the standard range. Each batch of samples analysed will include the four standards and a method blank. After running ten samples, a duplicate sample and a duplicate mid-level standard will be analyzed. Precision should be ±10%. If not, the standard measurements will be repeated and compared to the duplicate standard. If there is agreement with the new standards, sample measurements will be repeated. In addition to normal standardization, the digestion efficiency of the total N and total P determinations will be assessed by running samples of glycine *p*-toluenesulfonate (for total N) and a mixture of PO_4^{3-}, sodium hexametaphosphate, and adenylic acid (for total P) (APHA 1998).

B8. Inspection/Acceptance Requirements for Supplies and Consumables
There are no inspection/acceptance requirements for supplies and consumables for the biological assessment groups. Materials used in the execution of this project will be appropriate and

approved for intended use. Supplies will be purchased from reputable vendors to ensure quality. Materials that do not meet performance standards will be labeled to preclude use.

Water Quality and Aquatic Micro-organisms
The laboratory personnel will inspect supplies (e.g., sample preservatives and disposable sampling supplies) used in the field collection and field and laboratory analysis of the water quality and aquatic micro-organism samples upon receipt in the laboratory and again, prior to use in the field. Field personnel will also inspect supplies prior to use in the field. Inspection elements include a review of physical condition, expiration dates, limitations of use, size and quantity, and quality grade (e.g., reagents). Chemical reagents, solvents and laboratory equipment will also be controlled to ensure initial and continued conformance with applicable technical requirements and acceptance criteria. This includes materials such as sample containers, sample preservatives, and quantitative transfer apparatus.

Landscape Assessment
The GIS analyst will inspect supplies (e.g., electronic data storage media) used in the GIS analysis upon receipt for visible signs of damage. All data will be backed up on removable storage media so that failure of primary storage media will not result in data loss.

B9. Data Acquisition Requirements
No ancillary or historical data will be used for sampling vertebrates, aquatic micro-organisms, or Lepidoptera or as part of the water quality assessment for this project. Descriptions of data acquisition requirements for the plant survey and GIS analysis are below.

Plants
Data from the following sources will be used to assess site quality and wetland affinity:

- Floristic Quality Assessment Technique: Iowa Database. This database provides Coefficients of Conservatism for all Iowa plants. The database was produced by a committee of Iowa botanists following accepted standard methods (Andreas and Lichvar 1995; Herman et.al. 1997; Taft et. al. 1997). The main limitation of this data is subjectivity. The database is valuable to this project in that it provides a system for evaluating wetland quality based on measuring the aggregate conservatism of the plants inhabiting a site, irrespective of the plant community.

- 1988 National List of Plant Species that Occur in Wetlands: North Central Region 3 (Reed 1988). This plant list is important for this project providing wetland indicator status for wetland flora. It is based on laboratory experiments and best professional judgment of numerous scientists. The main limitation of the work is that it is dated.

Landscape Assessment
The primary sources of spatial data used for the landscape assessment in this project will be two sets of digital orthophoto mosaics. The first of these comprise color infrared digital orthophoto quads (DOQs) that were derived from aerial photos captured on color infrared film. The images were taken in March-May of 2002 and cover the entire State of Iowa. The DOQs have a

resolution of one meter per pixel and are the product of collaboration between the Iowa State University Geographic Information Systems Support and Research Facility, the USDA Natural Resources Conservation Service, and the Massachusetts Institute of Technology. The second set includes digital orthophoto quarter quads produced by the National Agricultural Imagery Program (NAIP). The quads were derived from natural color imagery taken June-October 2004 and have a maximum resolution of two meters per pixel. The primary limitations of using the orthophotos are resolution and horizontal accuracy. The orthophoto sets are important for the classification of land use/land cover within 2 km of each wetland.

B10.Data Management

Below is a description of the process for collection, organization, evaluation, and reporting of technical data to support this project. Technical data refers to field observations, laboratory analytical results, and validation data generated to interpret site conditions and ecological performance of mitigation and reference wetlands.

Field researchers will manage raw data during field activities. The laboratory managers will be responsible for laboratory data management. Outlier values will be identified and retained in the raw data sets. Outlier values will be corrected only if the cause of the outlier can be documented. Responsibility of the reduction and review of data are as follows:

- Field researchers and laboratory analysts will document and review their own work and are responsible for the accuracy of the work.
- Calculations will receive a method and calculation check by peer review.
- Earth Tech and IADOT QA Managers will be responsible for ensuring that data reduction is performed according to protocols discussed in the QAPP.

Reduced data tables will be created using spreadsheet calculations. These files will be printed in both equation form and calculation form. All equations will be peer reviewed by a secondary reviewer of a professional level equal to or higher than that of the calculation originator. The calculation sheet will be signed by both the originator and the secondary reviewer and document the following:

- Project title
- Initials and date of originator
- Initials and date of secondary reviewer
- Basis for calculations
- Assumptions made or assumptions inherent in the calculations
- Complete reference for each source of input data
- Methods used for calculations
- Results of the calculations

All data will be maintained and stored in an electronic database by individual study groups. Data recorded in the field on data forms will be entered into excel spreadsheets, checked for accuracy by two people, and saved in two locations (one hard drive and one external drive). The Earth

Tech Project Manager will provide a template database to individual study groups once data collection forms have been approved (prior to data collection) and will maintain a project database of all data. The Earth Tech Project Manager will periodically collect field and laboratory data for inclusion in interim project reports. Prior to integrating individual databases, comparability of the data will be verified and documented. Comparability in this instance will be based on methods used to generate the data, the assessed quality of the data, and compatibility of electronic files. The Earth Tech Project Manager will submit appropriate water quality data to the STORET database. All data collected and analyzed for this project will become part of the project files and will be maintained and stored by the IADOT upon project completion. Earth Tech and IADOT Quality Managers will audit data stored in the project database periodically to verify record integrity and retrievability.

All maps and drawing produced using either the results of raw data exports or data reductions will include a title, scale, legend, and north-arrow. The primary tool to be used for creation of maps and drawings will be ArcView, an ESRI product. Other tools may include MicroStation (CAD) and GeoMedia (GIS).

C. ASSESSMENT/OVERSIGHT

C1. Assessments and Response Actions

Audits will be competed to ensure that the field sampling activities and laboratory analyses are performed following the procedures established in the QAPP. The audits may be either internally or externally led.

Field Audits

The IADOT and Earth Tech QA Managers will conduct two audits of field activities each field season. One will be completed for each study group at the beginning of the data collection activities and another during the peak of survey activities. The field audit will consist of a check list format developed from requirements of the QAPP and will address the following areas:

- Review of field notebook and data collection worksheets,
- Review of data collection procedures,
- Review of calibration records and procedures (if applicable),
- Review of sample handling and transport procedures, and
- Review of COC procedures.

Deficiencies observed during the audit will be verbally relayed to the field personnel and reported in writing to the Earth Tech and IADOT Project Managers as well as to EPA Project Manager and the EPA QA Manager. A stop work order may be issued upon finding of a significant condition that would adversely affect the quality and usability of the data. Corrective actions implemented will be documented in the field notebook. A follow-up audit may be completed if necessary to verify the corrective action was performed.

In addition, the EPA QA Manager may conduct an audit of the field activities for this project as requested by the EPA Project Officer according to R7 ENSV SOP 2152.2A, "Conducting On-

Site Reviews of Field Sampling Activities." The EPA QA Manager will have the authority to issue a stop work order upon finding a significant condition that would adversely affect the quality and usability of the data. The EPA Project Officer will have the responsibility for initiating and implementing response actions associated with findings identified during the on-site audit. Once the response actions have been implemented, the EPA QA Manager will perform a follow-up audit to verify and document that the response actions were implemented effectively.

Laboratory Audits

The laboratory manager will be responsible for ensuring that laboratory data are generated according to the QAPP specifications and standard methods. The laboratories will be externally audited prior to the start of analysis and three additional times during the course of the analysis by the Earth Tech QA Manager. In addition, laboratories may be independently audited at the discretion of the IADOT and EPA Project Managers. The laboratory audits will consist of a checklist format developed from QAPP requirements and address the following:

- Review of sample log-in, storage, and preparation records,
- Review of corrective action documentation and effectiveness,
- Compliance of analytical procedures used in standard methods,
- Review of calibration records and procedures,
- Calibration standards documentation and traceability,
- Traceability of reported electronic and hard copy results to raw data,
- Review of the data handling and reporting procedures, and
- Review of COC procedures.

Deficiencies observed during the audit will be verbally relayed to the laboratory personnel and reported in writing to the Earth Tech and IADOT Project Managers as well as to EPA Project and QA Managers. A stop work order may be issued upon finding of a significant condition that would adversely affect the quality and usability of the data. Corrective actions implemented will be documented in the field notebook. A follow-up audit may be completed if necessary to verify the corrective action was performed.

In addition, the laboratory manager will review all laboratory results assessing the following:

1) the completeness of both electronic and hard copy data package deliverables;
2) compliance with analyses parameters defined in the QAPP;
3) that QC for sample frequency and limits are met;
4) holding times met; and
5) the need for data qualifiers or additional narrative.

Deficiencies observed during this review will be verbally relayed to the laboratory personnel and reported in writing to the Earth Tech and IADOT Project Managers as well as any corrective actions implemented. A follow-up review may be completed if necessary to verify the corrective action was done.

Data Management and Validation
The IADOT Project Manager will audit Earth Tech procedures for data management and the need for data qualifiers or additional narrative validation annually. At a minimum, the audit will include:

1) an evaluation of data management systems and procedures;
2) data entry procedures;
3) data transfer procedures and controls;
4) data review and validation procedures; and
5) record keeping.

C2. Reports to Management
During the study, interim and final reports will be prepared summarizing project progress and any significant interim findings. The reports will streamline the process of addressing issues as they arise and modifying the program to better address the project objectives.

Monthly Reports
During the study, the Earth Tech Project Manager will prepare and submit monthly progress reports to the IADOT Project Manager summarizing the following:

- Project activities (field and laboratory) that have been completed over the invoiced time period
- Project activities (field and laboratory) that will occur over the next month
- A summary of all variances and QA/QC deficiencies
- Periodic data quality assessments
- A summary of the project schedule with a revised schedule (if necessary)
- A budget summary including billed-to-date, current invoices, and project budget remaining.

Quarterly Reports
Quarterly reports will be prepared by the IADOT Project Manager and submitted to the EPA Project Manager. The report will include information from the monthly reports and will inform the EPA of the project progress and any significant interim findings.

Final Report
Once the project is complete and the resulting data obtained, the IADOT Project Manager will prepare a final project report. The report will include a summary of the activities performed during the project and the resulting data (along with any statements about problems concerning data quality). The report will be forwarded to the EPA Project Officer.

D. Data Validation and Usability

D1. Data Review, Validation, and Verification Requirements
Data will be peer reviewed by a qualified analyst and the Earth Tech QA Manager and evaluated for the following:

- Standard methods compliance;
- Traceability of data is verified from raw data to custody documentation to reporting form;
- Calculations and transcriptions are checked;
- QC results are evaluated against QAPP and standard methods specifications; and
- Data are qualified as necessary to denote limitations on usability.

Data will be accepted if they meet the following criteria:

1) Field data sheets are complete.
2) Field data and laboratory data were validated
3) Actual sample locations and collection procedures match the proposed sample locations and collection procedures identified in Section B, *Measurement Data Acquisition*.
4) Sample handling procedures documented on COC forms, the field activity report, and case narrative match the proposed sample handling procedures identified in sections Section B, *Measurement Data Acquisition*.
5) Field QC was conducted as planned and meets the acceptance criteria in Section B, *Measurement Data Acquisition*.

Any deviations from the QAPP are to be reported in the field activity report or analytical data report described in section A9. The EPA Project Officer will verify the content of these reports.

If the data fails to meet the criteria it will be flagged by the EPA Project Officer as estimated. Any flagged data will be discussed with the project personnel to determine if the data point will be rejected and re-sampling done.

The EPA Project Officer will be responsible for overall validation and final approval of the data in accordance with project purpose and use of the data.

D2. Validation and Verification Methods

The EPA Project Manager will review and verify the field sheets, the field activity report, and the analytical data report. Any problems or deviations identified will be discussed with project personnel and reported to the EPA Project Officer.

The EPA Project Manager will perform the final review and approval of the data.

D3. Reconciliation with Data Quality Objective

The IADOT Project Manager will complete a preliminary reconciliation of the project data with the data quality objective. The data quality objective is to provide valid environmental data of known and documented quality for the purpose of assessing the ecological condition of mitigation wetlands. There is an assumption that if this project is executed in accordance with the QAPP, the data generated will be valid. Reconciliation of the project activities with the data quality objectives will be accomplished by comparing audit reports and field and laboratory reports, with the QAPP to verify that the project was completed as described in the QAPP. The

IADOT Project Manager will provide a narrative on the reconciliation performed to the EPA Project Manager who will make the final determination of success of the project.

LITERATURE CITED

Andreas, B. K., and Lichvar, R. W. 1995. Floristic index for establishing assessment standards: A case study for northern Ohio. Technical Report WRP-DE-8. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS, USA.

APHA (American Public Health Association, American Water Works Association, and Water Environmental Federation). 1998. Standard methods for the examination of water and wastewater. 20th edition. American Public Health Association, Washington, DC.

Christiansen, J. L. and T. J. VanDeWalle. 2000. Effectiveness of three trap types in drift fence surveys. Herpetol. Rev. 31(3):158-160.

DeBlase, A.F. and R.E. Martin, 2000. A Manual of Mammalogy with keys to families of the world, 3rd ed.

Fairbairn, S. E., and J. J. Dinsmore. 2001. Local and landscape-level influences on wetland bird communities of the prairie pothole region of Iowa, USA. Wetlands 21:41-47.

Fennessy, M.S., A.D. Jacobs, and M.E. Kentula. 2004. Review of Rapid Methods for Assessing Wetland Conditions. EPA/620/R-04-009. U.S. Environmental Protection Agency, Washington, D.C.

Galatowitsch, S.M., D.C. Whited, and J.R. Tester. 1999. Development of community metrics to evaluate recovery in Minnesota Wetlands. J. Aquatic Ecosystem Stress Recovery 6:213-234.

Herman, K. D., L. A. Masters, M. R. Penskar, A. A. Reznicek, G. S. Wilhelm, and W. W. Brodowicz. 1997. Floristic quality assessment: Development and application in the state of Michigan (USA). Natural Areas Journal 17:265-279.

Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L.C. Hayek, M.S. Foster (Eds.). 1994. Measuring and monitoring biological diversity: Standard methods for amphibians. Smithsonian Institution Press, Washington, D.C.

Legler, J. M. 1960b. A simple and inexpensive device for trapping aquatic turtles. Utah Acad. Proc. 37:63-66.

Lougheed, V.L.; Crosbie, B.; Chow-Fraser, P. 2001. "Primary determinants of macrophyte community structure in 62 marshes across the Great Lakes basin: latitude, land use, and water quality effects", Can. J. Fish Aquat. Sci. 58: 1603-1612.

Morgan, K.L. and T.H. Roberts. 2003. Characterization of wetland mitigation projects in Tennessee, USA, Wetlands, 23(1): 66-69.

National Research Council. 2001. Compensating for Wetland Losses Under the Clean Water Act, National Academy Press, Washington, DC, USA.

Pollard, Ernest, 1991. Monitoring Butterfly Numbers, Monitoring for Conservation and Ecology, Barrie Goldsmith Ed., Chapman and Hall, London.

Pollard, E. and T.J. Yates. 1993. Monitoring Butterflies for Ecology and Conservation. Chapman & Hall, London.

Reardon, J.; Foreman, J.A.; Searcy, R.L. 1966. New reactants for the colorimetric determination of ammonia. Clin. Chim. Acta. 14: 403-405.

Reed, P.B., Jr. 1988. National list of plant species that occur in wetlands: North Central (Region 3). U.S. Fish Wildl. Biol. Rep 88(26.3). 99pp.

Robb, J.T. 2002. Assessing wetland compensatory mitigation sites to aid in establishing mitigation ratios. Wetlands. 22(2): 435-440.

Rosburg, Tom, 2003. Effects of dredge material placement on floodplain plant communities of the Mississippi and Illinois Rivers, 1999 to 2001. Final Report to the U.S. Army Corps of Engineers, Rock Island, IL.

Semlitsch, R. D., and J. R. DBodie. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles.

Simmons, J.E. 2002. Herpetological Collecting and Collections Management. Society for the Study of Amphibians and Reptiles Herpetological Circular No. 31. pp. vi + 1-153.

Storm, L. and J. Stellini. 1994. Interagency follow-through investigation of compensatory wetland mitigation sites. Joint Agency Staff Report, U.S. Environmental Protection Agency, Region 10, Water Division, Wetlands Section, Seattle, WA, USA and U.S. Fish and Wildlife Service, Ecological Services. Washington, DC, USA. EPA 910-R-94-013.

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

Turner, M.G., and R.H. Gardner (eds). 1991. Quantitative Methods in Landscape Ecology. Springer-Verlag, New York.

U.S. EPA. 2002a. Methods for Evaluating Wetland Condition: Introduction to Wetland Biological Assessment. Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA-822-R-02-014.

--------2002b. Methods for Evaluating Wetland Condition: Developing Metrics and Indexes of Biological Integrity. Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA/822-R-02-016.

--------2002c. Methods for Evaluating Wetland Condition: Land-Use Characterization for Nurtrient and Sediment Risk Assessment. Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA-822-R-02-025.

--------2002d. Methods for Evaluating Wetland Condition: Using Amphibians in Bioassessments of Wetlands. Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA/822-R-02-022.

--------2002e. Methods for Evaluating Wetland Condition: Biological Assessment Methods for Birds. Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA/822-R-02-023.

--------2002f. Methods for Evaluating Wetland Condition: Using Algae to Assess Environmental Conditions in Wetlands. Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA/822-R-02-021.

--------2002g. Methods for Evaluating Wetland Condition: Using Vegetation to Assess Environmental Conditions in Wetlands. Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA/822-R-02-0120.

Whited, D., S. Galatowitsch, J. R. Tester, K. Schik, R. Lehtinen, and J. Husveth. 2000. The importance of local and regional factors in predicting effective conservation - Planning strategies for wetland bird communities in agricultural and urban landscapes. Landscape and Urban Planning 49:49-65.

Wilson, D.E., F.R. Cole, J.D., Nichols, R. Rudran, M.S. Foster (Eds.). 1996. Measuring and monitoring biological diversity: Standard methods for mammals. Smithsonian Institution Press, Washington, D.C.

Winter, William D. Jr. 2000. Basic Techniques for Observing and Studying Moths and Butterflies, The Lepidopterists Society, Natural History Museum, 900 Exposition Blvd., Los Angeles, CA.

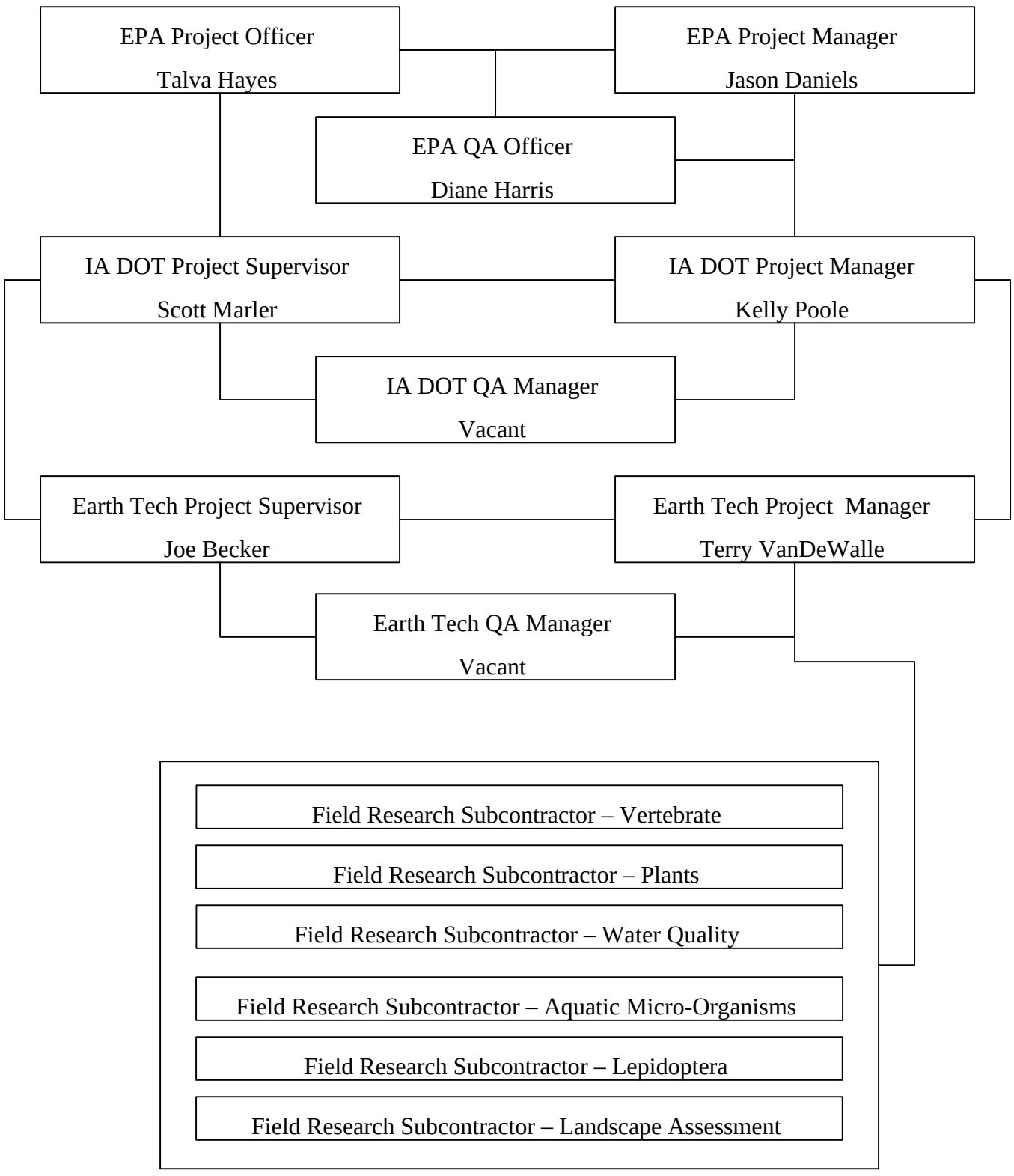

Figure 1. Project organization chart for Wetland Program Development Grant CD-98752301 including EPA, IA DOT and Contract personnel.

Table 1. Project schedule for Ecological Assessment of Compensatory Wetland Mitigation (Assistance Agreement Number CD-98752301-0).

	2004		2005												2006												2007											
PROJECT TASKS	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Mitigation and Reference Wetland Assessment																																						
Biological and Chemical Samples					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■												
Birds					■	■	■	■	■	■	■	■	■				■	■	■	■	■	■	■	■	■													
Mammals							■	■	■	■	■								■	■	■	■	■															
Amphibians						■	■	■										■	■	■																		
Reptiles							■	■	■										■	■	■																	
Aquatic Micro-organisms						■	■	■	■	■	■	■	■					■	■	■	■	■	■	■	■													
Lepidoptera							■	■	■	■	■								■	■	■	■	■															
Plants						■	■	■	■	■	■	■						■	■	■	■	■	■	■														
Water Quality						■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■												
Landscape Assessment							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■							
Wetland Biological Assessment (WBA)																																						
Literature Review for Wetland Biological Assessment Methods	■	■																																				
Calculate WBA (preliminary)													■																									
Partner review														■	■																							
Calculate WBA (final)																									■													
Summarize mitigation and reference WBA																										■												
Develop performance standards																																						
Prepare draft performance standards																											■											
Partner review																												■	■									
Finalize Performance Standards																														■								
Compare mitigation wetland condition																											■	■	■									
Assessment Tool																																						
Review Existing Tools			■	■	■	■	■																															
Prepare conceptual framework								■	■	■	■	■	■	■																								
Define IA DOT and partner needs								■																														
Design/modify existing tools; test and refine; and finalize															■																							
Design/modify assessment tool															■	■	■																					
Field test assessment tool																		■	■	■	■																	
Refine tool																						■	■															
Field test assessment tool																														■	■							
Partner review																																■	■					
Finalize assessment tool																																	■	■				
Quality Assurance																																						
Field Audits																																						
Birds					■						■						■						■															
Mammals							■		■										■		■																	
Amphibians						■	■											■	■																			
Reptiles							■	■											■	■																		
Aquatic Micro-organisms						■				■								■				■																
Lepidoptera							■		■										■		■																	
Plants						■			■									■			■																	
Water Quality						■					■							■					■															
Landscape Assessment							■												■																			
Laboratory Audits																																						
Aquatic Micro-organisms						■				■				■				■																				
Water Quality						■				■				■				■																				
Data Management Audit (IADOT of Earth Tech)													■												■													
Data Validation and Usuability																																						
Data review and validation (Earth Tech)													■	■											■	■												
Data review and validation (USEPA)																											■	■										
Data reconciliation with Data Quality Objectives																																■	■					

Table 1. (continued) Project schedule for Ecological Assessment of Compensatory Wetland Mitigation (Assistance Agreement Number CD-98752301-0).

	2004		2005												2006												2007											
PRODUCTS/DELIVERABLES	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Quality Assurance Program Plan																																						
Prepare draft QAAP																																						
Peer review QAPP																																						
Prepare Final QAPP																																						
Submit Final QAPP																																						
Monthly Reports (From Earth Tech to IADOT)																																						
Prepare and submit Monthly Report																																						
Prepare and submit Monthly Report																																						
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Prepare and submit Monthly Report																																						
Quarterly Reports (from IADOT to USEPA)																																						
Prepare and submit 1st Quarterly Report																																						
Prepare and submit 2nd Quarterly Report																																						
Prepare and submit 3rd Quarterly Report																																						
Prepare and submit 4th Quarterly Report																																						
Prepare and submit 5th Quarterly Report																																						
Prepare and submit 6th Quarterly Report																																						
Prepare and submit 7th Quarterly Report																																						
Prepare and submit 8th Quarterly Report																																						
Prepare and submit 9th Quarterly Report																																						
Prepare and submit 10th Quarterly Report																																						
Prepare and submit 11th Quarterly Report																																						
Final Report (from IADOT to USEPA)																																						
Prepare Draft Final Report																																						
Peer review Draft Final Report																																						
Prepare Final Report																																						
Submit Final Report																																						

Table 2. Study parameters, methods/equipment, quality control and calibration information used for laboratory analysis of water quality samples collected for assessing mitigation and reference wetlands, IADOT (Assistance Agreement Number CD-98752301-0).

Parameter	**Method/Equipment**	**Units**	**Detection Limit**	**Range**	**Precision**	**Accuracy**	**Calibration**
Total suspended solids	APHA (1998) 2540D	mg/L	2	0-1000	±10%	±10%	NA
Chloride	APHA (1998) 4110B; Dionex DX-80 (ion chromatography)	mg/L Cl-	0.1	0-50	±10%	±10%	4 point standard
Nitrate	APHA (1998) 4110B; Dionex DX-80 (ion chromatography)	mg/L NO3—N	0.1	0-50	±10%	±10%	4 point standard
Sulfate	APHA (1998) 4110B; Dionex DX-80 (ion chromatography)	mg/L SO42-	0.1	0-50	±10%	±10%	4 point standard
Ammonia	Hach Method 8155; Perkin Elmer EZ150 spectrophotometer	mg/L NH3-N	0.09	0-0.80	±10%	±10%	4 point standard
Dissolved reactive phosphorus	Hach Method 8048 (equivalent to USEPA 365.2); Perkin Elmer EZ150 spectrophotometer	mg/L PO43-	0.045	0-2.50	±10%	±10%	4 point standard
Total phosphorus	Hach Method 8190 (EPA accepted for reporting wastewater analyses); Perkin Elmer EZ150 spectrophotometer	mg/L PO43-	0.06	0-1.10	±20%	±20%	4 point standard
Total nitrogen	Hach Method 10071; Perkin Elmer EZ150 spectrophotometer	mg/L N	2	0-25	±20%	±20%	4 point standard
Chemical oxygen demand	Hach Method 10067 (COD II); Perkin Elmer EZ150 spectrophotometer	mg/L COD	4	0-1500	±20%	±20%	4 point standard

Table 3. Study parameters, methods/equipment, quality control and calibration information used for field analysis of water quality samples collected for assessing mitigation and reference wetlands, IADOT (Assistance Agreement Number CD-98752301-0)

Parameter	**Method/ Equipment**	**Detection Limit**	**Units**	**Range**	**Precision**	**Accuracy**	**Calibration**
Dissolved Oxygen	YSI Model 55 DO Meter	0.1	mg/L O_2	0-20	±0.2	±0.3	Procedure in YSI Manual
Temperature	YSI Model 55 DO Meter	NA	°C	-5 to 45	±0.1	±0.2	Procedure in YSI Manual
Conductivity	Hach PocketPal Conductivity Meter	10	mS/cm	mS/cm	±2% of reading	±2% of reading	Procedure in Hach manual
pH	Accumet AP61 pH meter	NA	pH units	0-14	0.1	0.05	3 buffer calibration
Turbidity	Hach 2100P Turbidimeter	0.01	NTU	0-1000	±1% of reading	±2% of reading from 0-500; ±3% of reading from 500-1000	Procedure in Hach manual

APPENDIX A.

Iowa DOT GPS Data, Electronic Submittal Standards and Formats

Iowa Department of Transportation, Office of Environmental Services

GPS Data, Electronic Submittal Standards & Formats

Please use the following guidelines when submitting POINT, LINE or POLYGON data in electronic format related to a GPS field data collection project.

The following general guidelines apply to all GPS field data.

1. Write the data file using ASCII comma delimited format
2. Do *not* place a HEADER at beginning of the data file.
3. Complete metadata, adhering to FGDC standards (FGDC-STD-001-1998), must accompany each data submittal
4. A hardcopy of all data should accompany each submittal.

Iowa Department of Transportation GPS field data collection projects are typically associated with a project. The project number (PN) will be supplied by the IDOT for each data collection activity. The PN will also become a part of the data (see table below). The use of ProjectName and PN are equivalent. There are three types of data.

POINT data

POINT data includes *each and every* GPS survey point collected for a project. This ASCII formatted file should be named '*ProjectName*_GPS_POINTS'. The following items relate to the '*ProjectName*_GPS_POINTS:

Table 1 Point Record

RECORD FIELD	DESCRIPTION OF CONTENTS
Blank	Blank record number one (1) indicates POINT objects

Table 2 Attribute Record

RECORD FIELD	DESCRIPTION OF CONTENTS
Attributes	Characterize the POINT objects briefly. Distinguish these POINTS from all other POINTS. Details should be placed in metadata.

Table 3 Contents of a POINT data record

DATA RECORD FIELD[1]	DESCRIPTION OF CONTENTS
Latitude	Characterize in decimal degrees use WGS-84 geoid.
Longitude	Characterize in decimal degrees use WGS-84 geoid. Include the proper sign for north America locations.
Elevation	Units are feet above mean sea level.
Project Name (PN)	The Project Name is identical for each record of each project. The PN is also **unique** 22-character name for each data collection project and is supplied by IDOT. The PN should be identified in all metadata for the GPS data. If a site is revisited to collect additional data the same PN should be used.
Feature Code (FC)	A string of up to 10 characters describing feature or point. Example: HILLTOP, PROFILE3, WELL, or SPRING. Duplicates are OK.
Name	A **unique** alphanumeric designation for each POINT of each project (PN). Up to ten (10) characters. Examples: G00013, 5891, 034, 10023DD, or R012SS
Description	A brief [less than 50 characters] but useful and meaningful description of each POINT.

[1] These data always begin with record number three (3) and the sequence of the data should be strictly followed.

	Examples: start of profile Y23, near abandoned building, or at southern limit of Wilson property. Duplicates are OK.
Class Association	Select class from IDOT supplied list. Example: LINE, POINT or POLYGON. At the moment all data should be designated as POINT.
State Plane Zone	Provide the State Plane Zone Number used. Example; 1401 or 1402
Northing	(units feet)
Easting	(units feet)
Empty Record	Blank line denotes the end of the current group of POINT data.

LINE data

LINE data includes groups of GPS point data describing a line. LINE data requires three types of data records. The first type of record is the LINE Vertex record. This is a single record indicating the total number of vertices contained in the LINE. The second type of record is the Attribute record. There will be a single attribute records to describe the object type. Use the associated metadata for complicated descriptions. The third type of record is the POINT record. There are as many POINT records as the number on the LINE Vertex record. Note the format of all POINT records are identical regardless of the object being located. If describing multiple LINE data place each line in a separate file. Example, the third line might be '*ProjectName*_GPS_LINE_03'

Table 4 LINE Vertex Record

RECORD FIELD	DESCRIPTION OF CONTENTS
Number of Vertices	The first record is a single number counting the total number of vertices in the LINE object.

Table 5 Attribute Record

RECORD FIELD	DESCRIPTION OF CONTENTS
Attributes	Characterize the LINE object briefly. Distinguish this LINE from all other lines. Details should be placed in metadata.

Table 6 POINT Records

RECORD FIELD[2]	DESCRIPTION OF CONTENTS
Latitude	Characterize in decimal degrees use WGS-84 geoid.
Longitude	Characterize in decimal degrees use WGS-84 geoid. Include the proper sign for north America locations.
Elevation	Units are feet above mean sea level.
Project Name (PN)	The Project Name is identical for each record of each project. The PN is also **unique** 22-character name for each data collection project and is supplied by IDOT. The PN should be identified in all metadata for the GPS data. If a site is revisited to collect additional data the same PN should be used.
Feature Code (FC)	A string of up to 10 characters describing feature or point. Example: HILLTOP, PROFILE3, WELL, or SPRING. Duplicates are OK.
Name	A **unique** alphanumeric designation for each POINT of each project (PN). Up to ten (10) characters. Examples: G00013, 5891, 034, 10023DD, or R012SS

[2] These data always start on the third record.

Description	A brief [less than 50 characters] but useful and meaningful description of each POINT. Examples: start of profile Y23, near abandoned building, or at southern limit of Wilson property. Duplicates are OK.
Class Association	Select class from IDOT supplied list. Example: LINE, POINT or POLYGON. At the moment all data should be designated as POINT.
State Plane Zone	Provide the State Plane Zone Number used. Example; 1401 or 1402
Northing	(units feet)
Easting	(units feet)
Empty Record	Blank line denotes the end of the current group of POINT data.

POLYGON data

POLYGON data are groups of GPS point data describing closed areas. POLYGON data requires three types of data records. The first type of record is the Line Vertex record. This is a single record indicating the total number of vertices contained in the POLYGON. When describing the number of POLYGON vertices remember this number is one more than the actual number of unique physical locations describing the POLYGON. The second type of record is the Attribute record. There will be a single Attribute record to describe the object type. Use the associated metadata for extensive descriptions. The third type of record is the POINT record. There are as many POINT records as the number on the POLYGON Vertex record. Each POLYGON must be a closed area. The first and last POINTS describing the POLYGON must be identical! Note the format of all POINT records are identical regardless of the object being located. If describing multiple POLYGON data place each polygon in a separate file. Example, the third polygon might be '*ProjectName*_GPS_POLYGON_03'

Table 7 POLYGON Vertex Record

RECORD FIELD	DESCRIPTION OF CONTENTS
Number of Vertices	Record number one is always a single number counting the total number of vertices in the POLYGON object plus one. Two of the point locations must be identical to create a closed area!

Table 8 Attribute Record

RECORD FIELD	DESCRIPTION OF CONTENTS
Attributes	Characterize the POLYGON object briefly. Distinguish this POLYGON from all other POLYGONs. Details should be placed in metadata.

Table 9 POINT Records

RECORD FIELD[3]	DESCRIPTION OF CONTENTS
Latitude	Characterize in decimal degrees use WGS-84 geoid.
Longitude	Characterize in decimal degrees use WGS-84 geoid. Include the proper sign for north America locations.
Elevation	Units are feet above mean sea level.
Project Name (PN)	The Project Name is identical for each record of each project. The PN is also **unique** 22-character name for each data collection project and is supplied by IDOT. The PN should be identified in all metadata for the GPS data. If a site is revisited to collect additional data the same PN should be used.
Feature Code (FC)	A string of up to 10 characters describing feature or point. Example: HILLTOP, PROFILE3, WELL, or SPRING. Duplicates are OK.

[3] These data always start on the third record.

Name	A **unique** alphanumeric designation for each POINT of each project (PN). Up to ten (10) characters. Examples: G00013, 5891, 034, 10023DD, or R012SS
Description	A brief [less than 50 characters] but useful and meaningful description of each POINT. Examples: start of profile Y23, near abandoned building, or at southern limit of Wilson property. Duplicates are OK.
Class Association	Select class from IDOT supplied list. Example: LINE, POINT or POLYGON. At the moment all data should be designated as POINT.
State Plane Zone	Provide the State Plane Zone Number used. Example; 1401 or 1402
Northing	(units feet)
Easting	(units feet)
Empty Record	Blank line denotes the end of the current group of POINT data.

Metadata [a complete description of data]

These data should adequately describe the contents of the file and how it relates to projects, roadways, and other activities. We intend to follow the FGDC standard.

Example of deliverable Objects

If the Object is a LINE then the first record is a **Line Vertex Record** that contains the number of vertices present in the line.

Number of vertices contained in the LINE	blank	blank	blank	blank
12				

If the Object is a POLYGON then the first record is a **Polygon Vertex Record** that contains the number of vertices present in the POLYGON plus 1.

Number of vertices contained in the POLYGON plus one	blank	blank	blank
34			

If the Objects are POINTs then the first record is a **Blank Record.**

blank	blank	blank	blank

Regardless of the Object type (LINE, POLYGON or POINTs) the second record is an **Attribute Record.**

Attributes	
These data are from the upper middle lower quarter …	

Starting with the third record (row three) the individual points collected in the field are recorded as **Point Records**.

Lat	Long	Elev	PN	FeatureCode	Name	Description	Class	Spzone	Nrthng	Estng	Empty/EOF
					p1						
					p2						
					p3						
					p4						
					p5						
					p6						
Intermidiate point data											
					p-last						
			Blank Record designates End of Record (no additional points)								

APPENDIX B.

Sample Forms <subcontractors to provide>

APPENDIX C.

Study Sites

Note: Determination of reference sites is pending final peer review of recommended reference sites. Details regarding reference sites will be added when selection process is complete.

Appendix B

Results of Sampling and Analysis of Aquatic Microorganisms from Iowa Wetland Mitigation Sites

Results of sampling and analysis of aquatic microorganisms from Iowa wetland mitigation sites

June 2007

Submitted by:

Stephen Main

Wartburg College
Waverly, Iowa

Results of sampling and analysis of aquatic microorganisms from Iowa wetland mitigation sites

Review of procedure

All sites were visited at least once. Those sites having open water or having damp soil from which standing water had evaporated were sampled four times each year (Table 1). Seepage was observed at one natural location at Wickiup and at two created sites, Palisades and Mink Creek. The seepage areas at Wickiup and Palisades were sampled once each; the fen at Wickiup was about 100 m from the transect. The seepage area at Mink Creek was not sampled due to its great distance from the transect. Jarvis did not have open water in 2005 and was not visited in 2006. Grooms had open water prior to August 2005, but none was evident then or subsequently. The potholes in Doolittle had a few decimeters of water early in 2006 and then dried up. Several wetland sites along a West to East line through the middle of the study region were noticeably drier in 2006 than in 2005.

When several samples collected together were observed to be taxonomically similar, only one of these was reported. Plankton grab samples from these typically shallow and often heavily vegetated sites often unavoidably included sediment, vegetation, or metaphyton; to avoid this redundancy, only plankton net samples were included in this analysis.

Table 1. Summary of samples collected during the 2005-2006 survey of Iowa wetland mitigation sites including the three reference sites (*).

		Number of Samples Reported (Collected) from Each Habitat							
Site	Date	Plank	Epilith	Epiphyt	Epipel	Epipsam	Metaphy	Compos	Total [by yr]
1. Grooms	4-25-05	1			1		1		3
	6-24-05			2	2				4
	8-29-05				1				1 [8]
2. South Point	4-28-05	(1)			2	1	2		5
	6-22-05	1(2)		1	1		1	1	5
	8-29-05	(1)		2	1	1			4
	10-29-05	1(2)		1	1				3 [17]
	4-25-06			1					1
	6-12-06	(1)		1			1	1	3
	8-15-06				2			1	3
	10-31-06			1	1		1		3 [10]
3. Pleasantville	4-28-05				2		1		3
	6-22-05	(1)		1	1			1	3
	8-29-05			1	2				3
	10-29-05			2	1				3 [12]
	4-25-06			1	1				2
	6-12-06			2	1		1		4
	8-15-06				1				1
	10-31-06	(1)		1	1		1		3 [10]
4. New Hampton	4-23-05	(1)			1		1		2
	6-20-05	(1)		1	1		1		3
	8-27-05	(1)		1	2				3
	10-27-05	(1)		1	1			1	3 [11]
	4-24-06	(1)		1	1		1		3
	6-8-06	(1)		1	1	1	2		5

	8-11-06	(1)		2	1		1		4
	10-24-06	(1)		2	1		1		4 [16]
5. Jarvis									
6. Palisades	4-25-05	(1)			1		1		2
	6-24-05	(1)		3			1		4
	8-27-05	(1)		2					2
	10-27-05			1	1		1		3 [11]
	4-24-06	(1)		1	1	1	1		4
	6-7-06	(1)					1	1	2
	8-9-06			1	1		1		3
	10-25-06			1	1				2 [11]
7. Wickiup Hill	4-25-05	(1)			2		1		3
	6-24-05	(1)			2	1			3
	8-27-05	(1)			1			1	2
	10-27-05	(1)			1				1 [9]
	4-24-06			1	1				2
	8-9-06				1				1
	10-25-06				1				1 [4]
8. Boevers	4-24-06	1			1		1		3
	6-8-06							1	1
	8-10-06				1				1
	10-24-06				1				1 [6]
9. Badger Creek	4-25-06	(1)		1			1		2
	6-12-06	1		1		1	3		6
	8-15-06				1		1		2
	10-31-06			1	1		1		3 [13]
10. Mink Creek	4-24-06	1(2)		1			1		3
	6-8-06	(1)		1	1		1		3
	8-10-06	(1)		1	1		1		3
	10-24-06	(1)		2	1		1		4 [13]
11. Brush Creek	4-25-06	1(2)			1		1		3
	6-12-06	(1)		1	1		1		3
	8-15-06	(1)		1			1		2
	10-31-06	(1)		1	1		1		3 [11]
12. Dike	4-24-06	1(2)				1	1		3
	6-7-06	(1)					2		2
	8-15-06	(1)			1		1		2
	10-25-06	(1)		1	1		1		3 [10]
13. Engeldinger Marsh*	6-22-05	(1)		2	1				3
	8-29-05			1	2		1		4
	10-29-05	(1)		1	1		1		3 [10]
	4-25-06	(1)			1		1		2
	6-12-06	(1)		1	1		1		3
	8-15-06	(1)					1		1
	10-31-06	(1)		2			2		4 [10]
14. Hay-Buhr Access*	4-23-05	(1)		1		1	1		3
	6-20-05	(1)		1			1		2
	8-27-05			1	1		1		3
	10-27-05	(1)		2	1				3 [11]
	4-24-06	(1)		1			2		3
	6-8-06	1		1	1		2		5
	8-11-06				1		1		2
	10-24-06	(1)			1		1		2 [12]

15. Doolittle Prairie*	4-25-06			1	1			1	3
	6-12-06			1	1				2
	8-15-06			1	1				2 [7]
Total		9(53)	0	65	72	8	59	9	222 [89 + 133]

All of the proposed sampling techniques were used:
1. Benthic grabs from substrata in the photic zone were categorized as epiphyton, epipelon, epilithon, epipsammon. Benthic grab sampling means hand sampling or use of a suction device.
2. Suspended algae and floating "scum" grab samples were categorized as metaphyton.
3. Plankton: Net samples (100µm or finer mesh) collected infrequently were used for qualitative analysis; 3 liter plankton grab samples for possible quantitative analysis were collected where depth permitted (settled with IKI, Lugol's), but often included sediment or vegetation as noted above.

In additional a dip net was used to sample water with macrophytes. This was instituted after an expression of concern about gammarid loss was reported by the Iowa Department of Natural Resources (DNR). These samples occasionally included microinvertebrates reported here.

Sample handling and analysis adhered to the proposed protocols as follow with two exceptions (time of preservation & diatom analysis) which are described in the following.

Live samples were placed in 4 oz. Whirlpak bags, stored in an ice chest, placed in refrigeration in the lab, and examined microscopically sometimes after being refrigerated six days, not two days, after collection. After examination, samples were preserved in 5% formaldehyde for further processing.

1. Microscopic examination of fresh (or settled) samples noted presence of algae (including cyanobacteria), protozoa, and microinvertebrates. Abundance was categorized as abundant (seen in most fields), common (seen in several fields), rare (seen once). Examination generally included one, not two, wet mounts per sample, scanned at 100X and 400X until no new taxa were seen in an entire scan across the 22mm cover slip. This often took one to two hours per sample; samples with little living in them were finished in 15-20 minutes. In 2005 initial observation averaged 1.5 samples per hour, and 1.6 samples were examined per hour in 2006.
2. Samples with taxa requiring further study had Karo mounts prepared from preserved subsamples.
3. Preserved subsamples having diatoms were digested in 30% hydrogen peroxide, rinsed, and permanently mounted in Naphrax on museum quality slides. Qualitative estimation of diatom presence and abundance categories (see above) will require one hour per sample. Quantitative estimation of relative abundance by counts of 500 valves per sample/slide, requires an average of four hours per sample/slide. The diatom counts have not been completed due to lack of time. But, where numerous taxa or abundant specimens were observed during analysis of live samples, the overall abundance of diatoms is reported.

The time required for sampling and live examination plus data tabulation consumed more than the contracted for amount of time. Diatom slide preparation was done by student technicians paid from the funds allocated to the researcher. While diatom slides were prepared from plankton grab samples and all periphyton samples, these slides have not been completely analyzed.

Data Analysis

Relative abundance was coded as follows: abundant taxa observed in multiple fields or having large biomass were reported as 20; for common taxa with more than two-five observations, the relative abundance was 5; rare taxa, only observed once, were scored as 1. Taxa were sorted by trophic level and size (algae & plants; protozoa; invertebrates) and relative abundance was used to calculate diversity statistics (Shannon-Weaver and Simpson's) for each level at each site. Patterns of distribution have been correlated with site descriptors, including water parameters, site age and size, and habitat.

Results

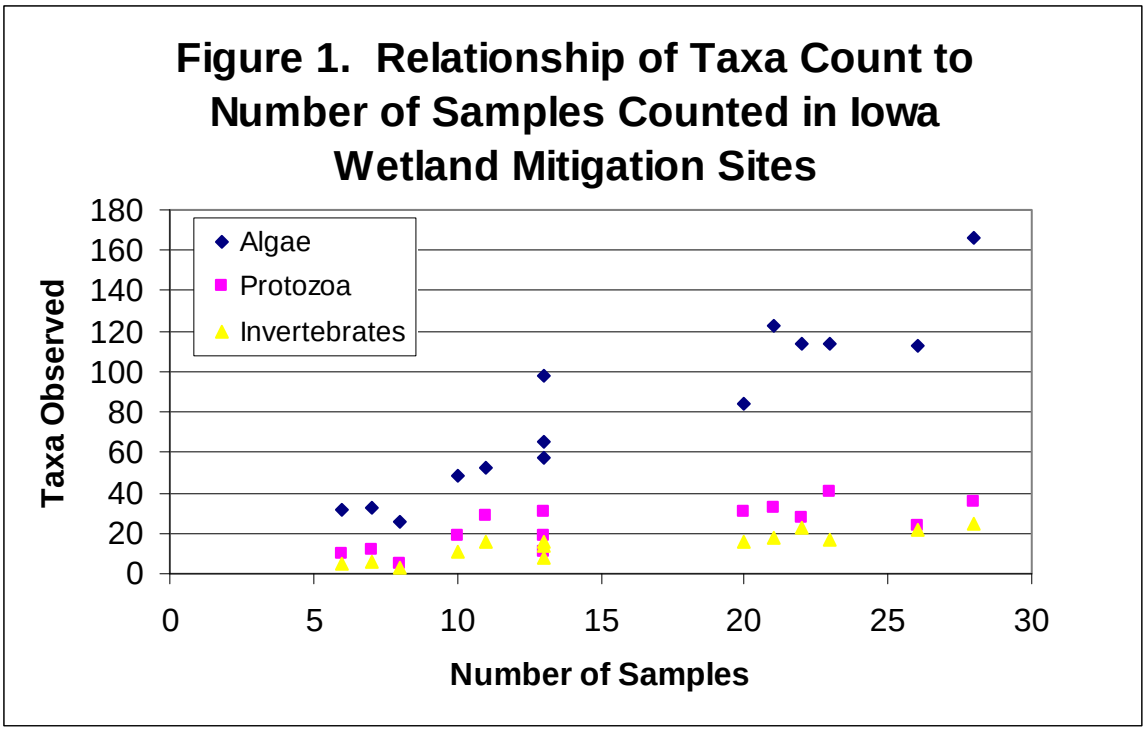
More taxa were found per sample in 2006 (15.2) than in 2005 (8.6). In spite of any learning curve phenomenon, the same time was spent per sample in 2006 examining live collections and yet more taxa were probably missed.

The majority of samples analyzed (88%) came about equally from three types of habitats: epipelon, epiphyton, and metaphyton (Table 2). No epilithon samples were examined (there is not much wood or rock in these marshlands); plankton, composite, and epipsammon samples were about 4% each (Table 2).

Table 2. Numbers of taxa observed in habitats sampled in Iowa wetland mitigation site survey 2005 and 2006. Note: many taxa were observed in more than one habitat.

Habitat Type	Samples Observed	Proportion of Samples	Taxa Observed
Epipelon	72	32 %	382
Epiphyton	65	29 %	422
Metaphyton	59	27 %	431
Composite	8	4 %	103
Plankton	9	4 %	38
Epipsammon	9	4 %	61
Total	222	100 %	847

As would be expected, more taxa were observed from sites where more samples were observed (Figure 1). This may be a flaw in the sampling protocol, but due to time limitations in both field and laboratory, no attempt was made to replicate field collections to increase the number of collections from sites with low habitat diversity and thus balance the sampling effort.



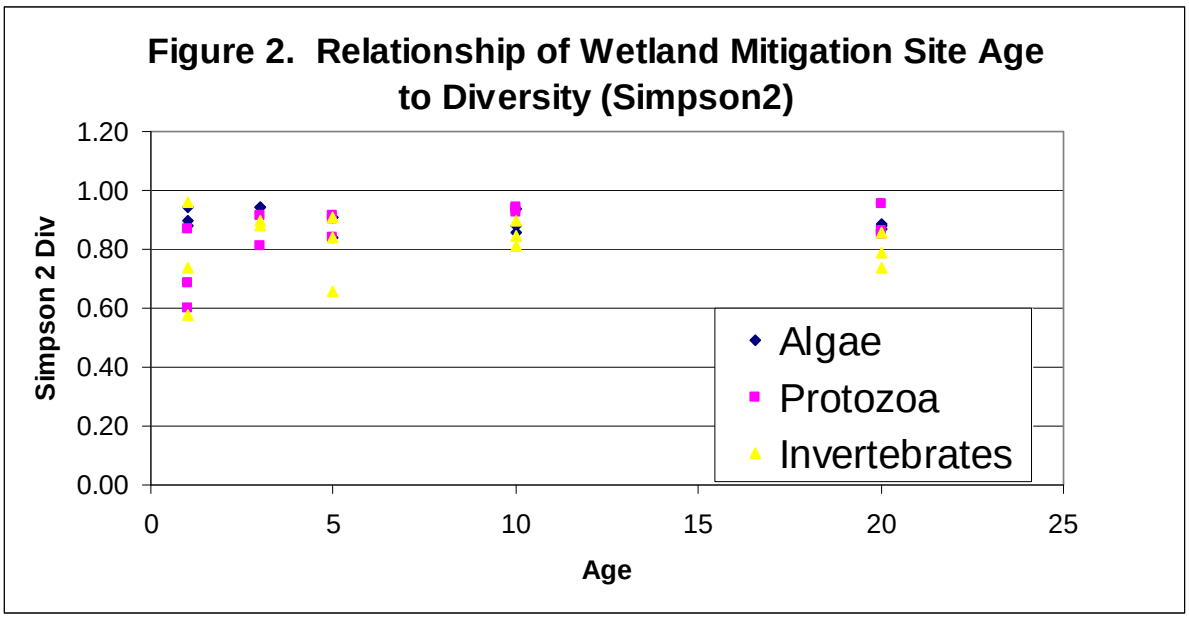
Diversity of aquatic microflora and microfauna

The 847 taxa of aquatic microorganisms observed in this study were grouped into algae, protozoa, and invertebrates to approximate trophic distinctions. (Since most higher order taxa included either unknown genera or unknown species [see the Appendix Table] which were grouped during statistical analysis, the actual number of taxa is certainly greater than 850. In addition, diatom taxa were not specifically enumerated, as noted above.) Those taxa listed in the Appendix Table from each site represent two years of observations for those sites included in the overall survey for 2005 and all sites for 2006; therefore 8 samplings are combined for the 2005 sites, but only 4 samplings for 2006. Where more than one sample came from a habitat, only the highest relative abundance is reported in the Appendix Table.

Diversities of the three groups were then calculated for each site by combining all observations for all samples using the Shannon-Weaver index and two versions of Simpson's index. The numbers of taxa observed, of individuals counted, and the resulting diversity indices all declined at successively higher trophic levels as would be expected based on trophic dynamics.

The age of the mitigation site during the first year of study was related to diversity to assess successional status. Because the oldest sites were 10 years old, the three natural wetlands were arbitrarily given ages of 20 years to permit graphical analysis (all are presumed to be over 100 and possibly over 1000 years of age.) The resulting comparison of site age to diversity was consistent using all three indices: diversity peaked at three years and then gradually declined (Figure 2). The only one year old site to have a higher diversity than all others (South Point) was also a site with several older wet meadows which were also

sampled during the study. South Point had the greatest aquatic habitat diversity of any of these wetlands. High diversity here in comparison to other sites presumably reflects this greater variety of habitats. Older sites with higher diversities on one or more indices include Pleasantville (3), Palisades (5 years), and Mink Creek (10). These sites were also characterized by having wet meadows (the first two) or flowing water (the last) which increase the habitat diversity.



Systematic Analysis

Of the over 850 unique taxa observed in this study, 266 were identified at least to species and 544 to genus level only. Of the 458 observations not identified even to genus, almost half (198) were identified as Bacillariophyta and these observations each include many diatom taxa, which remain to be identified from prepared slides. Thus this analysis will discuss roughly half of the algae present in the wetland mitigation sites sampled.

The most abundant and widespread aquatic organism observed was *Trachelomonas volvocina* Ehrenberg. Found in 76 samples in which it was usually common in abundance, *T. volvocina* was observed at all but two sites in the live sample observations. The genus Trachelomonas is considered typical of shallow soft-bottomed lacustrine habitats (Wehr and Sheath 2003). Because of the high diversity and abundance of trachelomonads observed during the live sample inspections, a student, Rachel Shellabarger, was able to receive Wartburg College undergraduate research funding to do a more in-depth analysis of the 29 distinct Trachelomonas taxa in these samples. By examining Karo mounts, and SEM preparations, 43 distinct Trachelomonas taxa were observed. These observations include the two sites (Boevers and Engeldinger) from which they were initially absent. The greatest variety of trachelomonads occurred at South Point (15 taxa) and Pleasantville (13). The fewest occurred at two of the natural wetlands, Engeldinger Marsh (2) and Doolittle Prairie (3).

Other euglenoids were also prominent in these samples, but were less widespread than Trachelomonas. Euglena accounted for 38 taxa, and 21 taxa of Phacus were observed. Each taxon occurred at fewer than 5 sites except for two species of Euglena (*E. polymorpha* Dangeard at 9 sites and *E. rostrifera* Johnson at 10 sites) and one species of Phacus, *P. swirenkoi* Skvortzow (8 sites). These euglenophytes were usually rare in abundance; the most notable exception was *P. helikoides* found in "pea soup" conditions during June 2005 at Wickiup Hill when the pond water level was reduced to 20-30 cm. Wehr and Sheath (2003) comment that euglenoids are "particularly abundant in the plankton of standing waters rich in nutrients and organic matter" where they may be associated with sediments, plants, and leaf litter. Waters in agricultural landscapes and productive grasslands often have abundant euglenoids.

The flagellated green algae were most often represented by Chlamydomonas which was identified at 13 sites (all but Grooms) and other unicellular monads (found at 10 sites). Sometimes very numerous, these tiny organisms are easily confused with swarming reproductive cells from larger green algae, which were also observed a few times. *Pandorina morum* Bory was the most frequently observed colonial green flagellate; it was usually common and occasionally abundant at 10 sites. Other colonial green flagellates observed less frequently include *Eudorina elegans* Ehrenberg, and a few Volvox and Gonium taxa.

Some coenocytic green algae were also widespread. At least 34 distinct Scenedesmus taxa and 15 Pediastrum taxa were observed, but no single one of these taxa was found at more than 6 sites.

Desmids, which often appear in peatlands in great abundance, were widespread but mostly rare when found in this survey. About 35 taxa of Closterium and 20 of Cosmarium were found. These occurred in samples from most sites, but no single taxon was widespread. A few observations were made of taxa in the genera Staurastrum, Pleurotaenium, Penium, Micrasterias, and Euastrum.

In contrast to the fore-going genera which are usually less than 50 um in the greatest dimension, larger algae, notably filamentous forms, were less taxonomically diverse, though often widespread and very abundant when seen. Oedogonium with over 30 taxa observed was both the most diverse and the most widespread filamentous green alga, occurring at all sites but Brush Creek. About 18 species of Spirogyra were found in 84 samples from all sites but Boevers and Brush Creek. Spirogyra and other conjugating filamentous charophytes (including Mougeotia, about 12 taxa observed at 9 sites, and Zygnema, 7 taxa observed at 6 sites) are typical of standing waters (Wehr & Sheath 2003). Cladophora was usually common to abundant when found; about 8 taxa were identified in samples from 10 sites. *Hydrodictyon reticulatum* (L.) Lagerheim occurred in 16 samples from 8 sites. At least 8 species of Tribonema, a Chrysophyte, appeared in samples from 11 sites.

Most surprising was the relative low diversity and abundance of Cyanobacteria, which are commonly understood to be typical wetland taxa especially in metaphyton and periphyton and on wet soils (Wehr and Sheath 2003). Filamentous cyanobacteria were observed more often than coccoid forms. Oscillatoria was often common and occurred at all sites with

possibly 32 species observed. Over 20 species of Anabaena were observed at 11 sites. At least 8 species of Lyngbya and 6 species of Phormidium were observed at 10 sites each. Gelatinous masses or small colonies of several Nostoc species were found at 7 sites, but almost half the observations were at Pleasantville. Several other filamentous and coccoid cyanobacterial genera were observed, but infrequently with little specific diversity. Most notably, *Woronichinia klingae* Komárek et Komárková-Legnerová and *Merismopedia convoluta* de Brebisson in Kuetzing occurred at four sites and were abundant when found.

Compared to Sarcodinians, ciliate protozoans were barely more widespread and numerous, but generically more diverse; very few Mastigophora were observed and then only in low abundance. Genera of ciliates found at more than 10 to 12 sites include: Paramecium, Stylonychia, Tachysoma, and Vorticella. Those observed at 5 to 9 sites include: Aspidisca, Coleps, Cyclidium, Frontonia, and Spirostomum. Over 40 ciliate genera occurred at fewer than 5 sites each. Several species of Amoeba were observed in samples from 11 sites. Nuclearia was found at 8 sites; Hartmanella at 7 sites and Mayorella at 5 sites. The most diverse and widespread testate sarcodinian genus was Difflugia with over 6 species found at 12 sites. A few species of Arcella were found at 8 sites; Centropyxis was at 6 sites; Euglypha and Nebela were at 3 sites. Another six genera of sarcodinians were observed once or twice at fewer than 3 sites.

Invertebrates were observed in limited numbers and were fairly widespread as a group, but individual genera had narrow distributions. Over 15 genera of rotifers were observed usually with only one or two specimens in a wet mount. The most widespread rotifers were Philodina (10 sites), Cephalodella and Monostyla (9 sites each). The remaining genera occurred at from fewer than 7 sites. At least two genera of gastrotrichs were observed but were not widespread. A tardigrade was observed once. Oligochaete worms were observed at six sites. Ten genera of Cladocerans were observed but each was restricted to 6 sites or less. Both adults and nauplii of cyclopoid copepods were frequently observed, and a harpacticoid copepod was observed once at Doolittle Prairie. Ostracods were collected at only 8 sites. Sphaeriid clams were abundant at Doolittle Prairie but were not collected. Gammerids were never abundant and found in only a few sites. Flatworms were observed once each year at New Hampton but in different habitats each time.

Conclusions

1. The wetlands formed in mitigation construction most resemble upper floodplain river marshes (Hay-Buhr in this study) rather than peat wetlands (Engeldinger Marsh) or prairie potholes (Doolittle Prairie). It would be interesting to know what type of Iowa wetland each mitigation site was replacing.

2. The wetland mitigation sites studied support reasonably structured food chains. Environmental nutrient inputs seem to be typical of midwestern agricultural land. It is possible that nitrate concentrations are high enough to make cyanobacteria less competitive. The low occurrence of harpacticoids, ostracods, gammerids, and flatworms in these sites was unexpected, although insufficient sampling may be the explanation. The report from the

Iowa DNR concerning low numbers of gammerids available in Iowa wetlands for migratory waterfowl food suggests a recent environmental change.

3. Taxonomic diversity during aquatic succession in these sites follows the classic pattern of an initial rapid increase in diversity followed by a slight gradual decline. There is no evidence of unusual impediments to colonization and community development.

4. Taxonomic diversity rises when aquatic habitat is diversified through constructing wet meadows in addition to impoundments or by taking advantage of water flows from natural seepage and run-off. Presumably terrestrial food chains would also benefit. The best examples of diversely structured wetlands from the aquatic perspective were South Point, Mink Creek, and Badger Creek. Palisades exhibits considerable diversity considering its small size. New Hampton could develop successionally though it still lacks much aquatic vegetation.

5. Drought may be becoming a problem for the aquatic component of many of these sites. In particular, recently developed ponds at South Point, Wickiup Hill, Grooms, and Boevers had abundant water in 2005 and then essentially dried up over the winter and remained so during 2006. It would be interesting to find out if this is a short term cycle or symptomatic of a longer term change.

6. Given the first point above and the lack of time to complete both microscopic analysis of live samples and analysis of processed diatom samples, several issues remain for future study. A more geographically diverse group of mitigation sites needs to be evaluated now that procedures have been tested. A large prairie marshland with adjacent upland should be added to the comparison sites, especially if more western mitigation sites are examined. Mitigation sites in SE or NE Iowa will potentially require local natural wetland comparison sites as well, such as are found along some of the rivers there. Unless the aquatic analysis becomes a full time job, it takes too much time for one person to analyze the diverse groups of aquatic microorganisms intended in this study. Examination of live samples is an important part of aquatic surveying, but it may not be useful to classify and count the protists and invertebrates beyond noting the presence of genera for protists and of broader taxa for the invertebrates.

7. Since completion of the analysis of data submitted in this report, the diatoms collected during this study continue to be analyzed. These results will provide a comparison with the findings reported herein.

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Literature Cited and Used for Taxonomy

Bourrelly, P. 1966. Les Algues D'eau Douce Initiation a la systematique Tome I: Les Algues Vertes. Editions N. Boubee & Cie, Paris.

Bourrelly, P. 1968. Les Algues D'eau Douce Initiation a la systematique Tome II: Les Algues jaunes et brunes Chrysophycees, Pheophycees, Xanthophycees et Diatomees. Editions N. Boubee & Cie, Paris.

Bourrelly, P. 1970. Les Algues D'eau Douce Initiation a la systematique Tome III: Les Algues bleues et rouges Les Eugleniens, Peridiniens, et Cryptomonadines. Editions N. Boubee & Cie, Paris

Conforti, V. & G.-J. Joo. 1994. Taxonomic and Ultrastructural Study of *Trachelomonas* Ehr. and *Strombomona*s Defl. (Euglenophyta) from Oxbow Lakes in Alabama and Indiana (U.S.A.) Cryptogamie Algologie 15: 267-286.

Croasdale, H. T., Bicudo, C. & G.W. Prescott. 1983. A Synopsis of North American Desmids. Part II. Desmidiaceae: Placodermae. Section 5. University of Nebraska Press, Lincoln.

Daily, W. A. 1942. The Chroococcaceae of Ohio, Kentucky, and Indiana. The American Midland Naturalist 27: 636-661.

Dillard, G. F. 2000. Freshwater of the United States. Part 7. Pigmented Euglenophyceae. J. Cramer, Berlin. [Bibliotheca Phycologica. Band 106]

Eddy, S. & A. C. Hodson. 1961. Taxonomic Keys to the common animals of the north central states exclusive of the parasitic worms, insects and birds. Burgess Publishing Company, Minneapolis.

Edmondson, W. T., Ed. 1959. Freshwater Biology, 2nd Ed. John Wiley & Sons, Inc. New York.

Hegewald, E. & P. C. Silva. 1988. Annotated Catalogue of *Scenedesmus* and Nomenclaturally Related Genera, Including Original Descriptions and Figures. J. Cramer, Berlin. [Bibliotheca Phycologica Band 80]

Komárek J. & Hauer T. (2004): CyanoDB.cz - On-line database of cyanobacterial genera. - http://www.cyanodb.cz

Komarek, J., & V. Jankovska. 2001. Review of the green algal genus Pediastrum: Implications for Pollenanalytical Research. J. Cramer, Berlin. [Bibliotheca Phycologica Band 108]

Komarkova-Legnerova, J. & G. Cronberg. 1994. Planktic blue-green algae from lakes in South Scania, Sweden. Part I. Chroococcales. Algological Studies 72: 13-51.

Lee, J. J., S. H. Hutner, & E. C. Bovee. 1985. An Illustrated Guide to the Protozoa. Society of Protozoologists, Lawrence, Kansas.

Needham, J. G. and P. R. Needham. 1962. A Guide to the Study of Fresh-water Biology, 5th Ed. Holden-Day, Inc., San Francisco.

Patterson, D. J. 1996. Free-Living Freshwater Protozoa A Colour Guide. John Wiley & Sons, Inc. New York.

Pennak, R. W. 1989. Fresh-Water Invertebrates of the United States, 3rd Ed. John Wiley & Sons, Inc. New York.

Prescott, G. W. 1931. Iowa Algae. University of Iowa Studies Studies in Natural History Vol. XIII Number 6. University of Iowa, Iowa City.

Prescott, G. W. 1962. Algae of the Western Great Lakes Area. Wm. C. Brown Company, Dubuque.

Prescott, G. W., H. T. Croasdale, & W. C. Vinyard. 1972. Desmidiales, Part I. Saccodermae, Mesotaeniaceae. North American Flora, Vol. II, chap. 6. University of Nebraska Press, Lincoln.

Prescott, G. W., H. T. Croasdale, & W. C. Vinyard. 1975. A Synopsis of North American Desmids. Part II. Desmidiaceae: Placodermae. Section 1. University of Nebraska Press, Lincoln.

Prescott, G. W., H. T. Croasdale, & W. C. Vinyard. 1977. A Synopsis of North American Desmids. Part II. Desmidiaceae: Placodermae. Section 2. University of Nebraska Press, Lincoln.

Prescott, G. W., H. T. Croasdale, & W. C. Vinyard. 1981. A Synopsis of North American Desmids. Part II. Desmidiaceae: Placodermae. Section 3. University of Nebraska Press, Lincoln.

Prescott, G. W., H. T. Croasdale, & W. C. Vinyard. 1982. A Synopsis of North American Desmids. Part II. Desmidiaceae: Placodermae. Section 4. University of Nebraska Press, Lincoln.

Sheffer, M. 2004. Ecology of Shallow Lakes. Kluwer Academic Publishers, Dordrecht, The Netherlands.

Thorp, J. H. & A. P. Covich, Eds. 1991. Ecology and Classification of North American Freshwater Invertebrates. Academic Press, San Diego.

Tiffany, L. H. & M. E. Britton. 1952. The Algae of Illinois. The University of Chicago Press, Chicago.

Tilden, J. 1910. Minnesota Algae I. Myxophyceae of North America. Minneapolis.

Wehr, J. D. and R.G. Sheath, Eds. 2003. Freshwater Algae of North America Ecology and Classification. Academic Press, San Diego.

Whitford, L. A. & G. J. Schumacher. 1969. A Manual of the Fresh-Water Algae in North Carolina. Technical Bulletin No, 188, North Carolina Agricultural Experiment Station.

Wolowski, K., & P. L. Walne. 1997. Euglenophytes from the Southeastern United States I. Colorless species. Algological Studies 86: 109-135. [=Arch. Hydrobiol. Suppl. 120]

Appendix C

An Evaluation of Vegetation and Plant Communities At Reconstructed and Natural Wetlands

AN EVALUATION OF VEGETATION AND PLANT COMMUNITIES AT RECONSTRUCTED AND NATURAL WETLANDS

September 2007

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PLANT METHODS

Field surveys

Vegetation on the 15 study sites was sampled during the 2005 and 2006 growing seasons. Eight sites (Grooms, Jarvis, New Hampton, Palisades, Pleasantville, South Point, Engeldinger Marsh, and Hay Buhr) were sampled in 2005, and seven sites (Badger Creek, Boevers, Brush Creek, Dike, Mink Creek, Wickiup Hill, and Doolittle Prairie) were sampled in 2006. At each site, two plant survey methods were employed. One was a floristic inventory that encompassed the entire study site. The extant plant communities were identified and delineated and a qualitative plant species list was compiled for each. Floristic data was collected over the entire growing season during at least three visits to each site. Community maps and species lists were refined during repeated field surveys. The goal of the floristic method was to produce an extensive survey of the site's vegetation, identify its landscape components and community diversity, and generate a plant list for the entire site.

The second plant survey method employed quantitative methods to measure species abundance along transects. Here the goal was to accurately measure abundance of plant species in the plant communities that represented the reconstructed or primary wetland habitat at the site. A survey zone was initially established at each site that encompassed portions of the principal wetland and adjacent upland communities. The survey zones were 50 m wide and anywhere from 100 to 300 m long. They designated an area of research focus for several taxonomic groups including plants. Three parallel transects were established within the survey zone beginning at the 10, 25

and 40 m positions (along one of the 50 m ends). Transect lengths were variable from site to site; sufficient length was established to encompass examples of wetland and adjacent upland communities. Along each transect, two 1x1 m quadrats were randomly located within each 10 m segment, one on each side of the transect and with one side contiguous with the transect. The 1x1 m quadrats were used to measure abundance of all herbaceous species and woody stems less than 50 cm tall. Within each 1x1 m quadrat, four 25x25 cm subquadrats were established, one in each corner of the 1x1 m quadrat. Density of ramets was determined for each species present in the subquadrats. Ramets were graminoid tillers, plant shoots, or caudices of acaulescent species. In addition to the density measurements, frequency of plant species was also determined. Frequency was measured at two scales – species presence within the 25x25 cm subquadrats and species presence within the 1x1 m quadrats. A few species, most notably submergent and floating species, could not be assessed with density of ramets. For these species (e.g., *Lemna*, *Potamogeton*, *Ceratophyllum*, *Najas*, *Elodea*, Bryophyta), the percentage area of plant coverage in the quadrat was recorded. The plant community (consistent with the floristic study) at each 1x1 m quadrat was recorded. If standing water was present, its depth (cm) was also recorded.

Shrubs were defined as woody stems greater than 50 cm tall and less than 2 m tall. The density of shrubs was measured along each of the three transects by using a series of 2x10 m plots. The plots were centered over the transect and placed end to end for the length of the transect. Saplings were defined as woody stems greater than 2 m tall and less than 5 cm DBH, and trees were defined as woody stems greater than or equal to 5 cm DBH. The density of both saplings and trees was measured in a series of 10x30 m plots established between two outside transects (i.e., at the 10 and 40 m positions). These plots were placed side by side (contiguous) for the

length of the transect. The DBH of trees was also recorded. A tree was considered to be multiple-stemmed if there was more than one trunk (or low branch) present at breast height. All the stems of multiple-stemmed individuals were measured.

Plant specimens were collected whenever necessary to ensure correct identification (in both the qualitative and quantitative surveys). Approximately 710 plant vouchers were collected and identified using the Ada Hayden Herbarium at Iowa State University. The majority of these plant specimens were suitable for preservation and were deposited in the Drake University Herbarium, Des Moines, Iowa. Nomenclature follows Eilers and Roosa (1994), with the following exceptions:

1) Taxonomy of *Viola* (violets) follows McKinney (1992); the most important implication being that there are fewer species than listed in Eilers and Roosa (1994) because *Viola sororia* is synonymous with *V. pratincola*, *V. papilionacea*, and *V. nephrophylla*.
2) *Physalis longifolia* was recognized as a distinct species rather than as a synonym of *P. virginiana* (Gleason and Cronquist 1991).

Data analysis

Community delineation. Habitat diversity was calculated for each site using indices commonly used to measure species diversity. A habitat diversity index (HDI) was calculated as the product of the Simpson diversity index and the Shannon diversity index, where p_i is the proportion of area occupied by a community within a site. HDI increases as the number of communities at a site increases and as the proportion of their areas becomes more equivalent.

$$HDI = \left(\frac{1}{\sum p_i^{\,2}} \right) \times \left(\sum (p_i)(\ln p_i) \right) \qquad \text{where } p_i = \text{proportion of area of habitat i}$$

Both the Simpson and Shannon were used because each tends to emphasize different components. Simpson emphasizes common species (or communities with high p_i) and Shannon emphasizes rare species (or communities with low p_i). Since there is no a priori reason for either approach to be more acceptable as a measure of community diversity, the combination was used. The HDI is based only on the number and total area of community types. It does not factor in spatial configuration. A site with 3 communities with p_i equal to 0.4, 0.3 and 0.3 could have one or more of the communities broken up into numerous smaller parcels, or it could just have 3 parcels, one for each of the communities. The spatial configuration in each of these is quite different, and the amount of edge is much more if the communities are broken into smaller parcels.

Floristic data. The floristic data were compiled for each study site and tabulated to present species presence in each community. Several variables were utilized to reflect wetland quality. These included:

1) Total species richness = Total number of plant taxa present in a community or site
2) Native richness = Total number of native plant taxa present in a community or site
3) Non-native richness = Total number of non-native plant taxa present in a community or site
4) Native richness index = $\frac{\text{Native Richness} + 1}{\text{Non} - \text{native Richness} + 1}$; calculated for communities and the entire site
5) Mean native conservatism = Average Iowa coefficient of conservatism for the native species present in a community
6) Mean wetland status = Average wetland status of all species present in a community

Both the mean native conservatism and mean wetland status utilize a floristic assessment that is based on a numerical scale that has been assigned to plant species. The Iowa Coefficients of Conservatism (ICC) are intended to reflect Iowa plant species' requirements for pristine, natural environments, and range between 0 and 10 for native species (Drobney et al. 2000; Swink and Wilheim 1979). Coefficients with higher values indicate more conservatism in habitat requirements. In this study non-native species were assigned a coefficient of 0. A simple conservatism index (ICC index) was determined for each community within a site by calculating the native mean CC based only on the native species present. Since non-native species are an indication of habitat degradation, another approach could use the total species richness to calculate a mean, thereby decreasing the mean ICC incrementally as non-native species richness increases. Still another approach would assign exotic species a negative coefficient. Neither of these methods was used because although exotic species potentially decrease the natural quality of an area, the degree that is so depends a lot on which exotic species are present and more importantly how abundant they are. Since the floristic data is qualitative, information on abundance within the communities was not available. The method advocated by Swink and Wilheim (1979) was not used in this study either. It weights the average CC by the species richness (or more specifically the square root of the species richness). Since species richness is a function of sampling area and effort, differences in the conservatism index partially become a function of area sampled using this method. That becomes a problem in this study since wetland size was one of the factors used to identify wetland sites. The approach used in this study avoided that problem

The wetland status provides a rough measure of how wet the site is, or more precisely the predominance of plant species with high affinity for wetlands. The wetland status for each species as designated by the Fish and Wildlife Service for Region 3 was converted to a numeric value ranging between −5 (for obligate wetland species) to +5 (for obligate upland species). The full range of possible status levels and their corresponding numerical values are given in Table 1. A plant is on the national wetland list if it occurs in wetlands in any of the Fish and Wildlife Service Regions. Every region where the species occurs assigns a wetland status to the species based on its habitat patterns in that region. The index of wetland status used in this study was the mean of the numeric values for each species present, both native and non-native.

Coefficients of conservatism and wetland status values are assigned to species, thus identification of plants to only the generic level were problematic. For this study, ICC and wetland status values were assigned to generic-level taxa in order to include them in the assessment. The values for all the species in the genus, and particularly those species that were the most likely candidates, were reviewed to help formulate generic level coefficients. There were about 30 plants that needed generic level coefficients.

A measure of site quality that integrated both conservatism and wetland affinity was determined by calculating the product of the conservatism index and a re-scaled wetland index. The wetland index was converted to a value between 0 and 10 that corresponded to 5 and -5 respectively. The product of these indices is referred to as the Quality Index (QI) and potentially ranged from 0 to 100. Sites with a QI greater than 25 were assigned an A, scores in the range of 20-25 were a B, 15-20 were a C, 10-15 were a D, and sites with a score less than 10 were given an F.

Statistical comparison of the floristic data was made using the sites as replicates of either reconstructed wetlands (n=12) or natural wetlands (n=3). Three variables examined included:

1) native richness index for the site
2) mean native conservatism for the site
3) mean wetland status for the site

Variables 2 and 3 were calculated with a weighted average of the values obtained for only the wetland communities at each site. The native conservatism and wetland status for each wetland community was weighted by its species richness. Restricting these variables to the wetland communities was important because there was a large amount of variation in size and community diversity among the sites, and some sites had a large component of upland habitat. Use of only the wetland communities focused the analyses more directly on wetland function and removed variation introduced by the upland communities.

These three variables were also examined within the 12 reconstructed wetlands. One-way ANOVA (and Kruskal-Wallis) was used to compare the variables among three wetland size classes, and linear regression was used to ascertain the effect of wetland age on the variables.

Detrended Correspondence Analysis (DCA) was used to ordinate the floristic data to examine patterns of variation in species composition. Each site was ordinated in the same species space with two samples, one that reflected the total vegetation of the site (all communities) and one that reflected the species composition of only the wetland communities. In both cases, the number of communities a species was present in (community constancy) was utilized as a

measure of species abundance. Species abundance ranged from 0 to 10 and had a negative exponential distribution. Ambiguity in species identification was minimized by assigning generic level records to the most likely species. This prevented generic identifications from inflating the species richness and allowed more representative community similarities to be calculated. The total number of species included in the ordination was 578.

Transect data. Quantitative measurements of species abundance in the sample plots along the transects was compiled to provide a measure of plant species abundance for all species occurring in the plant communities that were present. Each 1x1 m quadrat was assigned to a plant community and all quadrats representing the same plant community were combined to determine each species' abundance. The abundance of herbaceous species and woody species less than 50 cm tall was reflected by density of ramets (number/m^2) and frequency of individuals in quadrats, or in the case of a few submergent species, percentage cover in the subquadrat. Absolute density and percentage cover are reported for each species in a community, and were treated as a single measurement to obtain its relative density/cover. Absolute frequency at the 25x25 cm scale and the 1x1 m scale were averaged to obtain measures of percent absolute frequency and relative frequency. The species' importance value (IV) was calculated as an average of relative density/cover and relative frequency and expressed as a percentage.

For shrubs and saplings, the absolute density of the species (stems/are) was determined and used as its measure of abundance. Absolute density (stems/ha) and absolute basal area (m^2/ha from the DBH) were both reported for the species present as trees. The species' importance value, calculated with an average of relative density and relative basal area, is reported for each tree

species in a community. Woody species can potentially occur in the data set in all four layers – as sprouts in the herbaceous layer, or as shrubs, saplings, or trees.

Several descriptive measures of the wetland and its quality were determined for each community at a site using the quantitative data collected in the herbaceous layer. These included:

1) total ramet density (number/m^2) of herbaceous layer
2) total combined frequency (%) of herbaceous layer
3) Shannon diversity index for herbaceous layer; using the IV of species
4) total richness of herbaceous layer
5) Shannon evenness for herbaceous layer
6) relative importance of natives/exotics in the herbaceous layer; using the IV of species
7) relative importance of wetland indicator species; using the IV of species with a wetland status of -3 or lower (facultative wetland to obligatory wetland)
8) relative importance of *Carex* species; using the IV of species

These variables were compared between reconstructed sites and native sites using the data from the temporary/seasonally flooded wetlands. Paired t-tests were used to allow the size of the wetlands to function as a block. The t temporary/seasonally flooded wetland was the only wetland community represented by transect data that was present at all wetlands, and therefore provides a level of uniformity in community type. Other community types (both wetland and upland) were present and sampled with the transects, but differences in wetland community types (sedge meadow to semi-permanently flooded/aquatic, to wet cool-season grass and forb, to temporary flooded reed canary grass) complicates meaningful comparison. Another reason to

focus comparison of these variables between reconstructed and natural sites with the temporary/seasonally flooded community is that it is the community in the wetland vegetation most representative of reconstruction efforts. The effect of wetland age and size on these variables was examined with linear regression and one-way ANOVA (and Kruskal-Wallis), respectively, using the temporary/seasonally flooded communities in the reconstructed sites.

Detrended Correspondence Analysis (DCA) was used to ordinate the transect data to examine patterns of variation in species composition of the core communities. All community types encountered along the transects (a total of 51) were included in the ordination. Absolute data were used to reflect species abundance. Woody species that occurred in the shrub/sapling layers and in the tree layer were treated as pseudospecies, or in other words as new species, so that the structural difference these individuals impart to the community was recognized. Since each of three layers utilized different methods of measurement, mathematical formulae were developed for each that would reflect their abundance on a uniform numerical scale. These formulae were:

$$\text{Herbaceous layer - abundance} = \sqrt{\text{density(stem/m}^2)} + \sqrt{\text{combined_frequency(\%)}}$$

$$\text{Shrub/sapling layer - abundance} = \sqrt{(\text{shrub_density} + \text{sapling_density}) \times (10)}$$

$$\text{Tree layer - abundance} = \sqrt{\text{density(stem/ha)}} + \sqrt{\text{basal_area (m}^2\text{/ha)} \times 100)}$$

The total number of species and pseudospecies included in the ordination and comprising the species space was 394.

RESULTS AND DISCUSSION

Community delineation

There were 35 plant communities identified and mapped on the 15 study sites. Aerial photos with the plant communities delineated are presented in Figures (1-15). About half of those communities were considered to be wetland communities, and only about a third of the wetland communities are likely to be a product of reconstruction efforts. The other wetland communities were most likely already present at the sites as variously degraded remnants. Plant communities with the highest occurrence (by percentage presence at sites and by acreage) include the temporary/seasonally flooded wetland, semi-permanently flooded wetland/aquatic, temporary flooded reed canary grass, tallgrass prairie reconstruction and wet-mesic cool-season grass and forb (Table 2).

The habitat diversity index ranged from 1.6 to 17.3 among the study sites; both of these indices were at reconstructed sites. There was no correlation between size of the site and it's HDI (Pearson correlation, $n=15$, $r = 0.35$, $p = 0.21$). The total area for New Hampton is 40 acres and it had one of the lowest HDI (2.4), while Wickiup Hill was just a bit larger at 42 acres and it had the largest HDI (17.3). HDI should be greater at sites with greater environmental heterogeneity, and this appeared to be true. Sites with greater topographic variation tended to have a higher HDI. A paired t-test was used to examine the effect of wetland type on HDI and on the percentage of area occupied by wetland communities using the size classes as blocks. There were no significant differences in HDI between reconstructed and natural sites (recon=6.3, natural=7.0; $n=12$ and 3 respectively; $p=0.62$), nor were there significant differences in the percentage of wetland (recon=40.5%, natural=40.7%; $p=0.99$).

Floristics

The total umber of plant taxa observed over all sites was approximately 578 species. This is necessarily an approximation due to vegetative plant conditions in some species preventing identification beyond the genus level and therefore causing ambiguity in knowing if the plant represented a new species or was one already observed. The estimate of 578 accounts for this and represents the minimum number species observed. Genera that are most represented in the vegetation at these sites are *Carex* (46 species), *Aster* (12 species), *Polygonum* (11 species), and *Sagittaria*, *Lysimachia*, *Quercus*, *Bidens*, and *Plantago* (6 species each).

Three species were observed that represent state records for Iowa (i.e., not included in Eilers and Roosa 1992). *Phlox drummondii* Hook. is native to Texas and introduced to southeastern United States, from Louisiana to Florida and the Carolinas. It occurred in the planting at Boevers. *Machaeranthera tanacetifolia* (Kunth) Nees is a Great Plains and Great Basin species that was present in the prairie planting at South Point. *Lemna minuta* Kunth occurs in states south, east and west of Iowa; it was observed at Pleasantville. The first two clearly represent seed introduced by the reconstruction process. Either this was a result of poor seed mix design (if the species were purposefully included) or contamination of a seed mix obtained from a distant seed source (which can be avoided by using local seed sources). Poor seed mix design was evident at several reconstructed sites with the presence of *Echinacea purpurea* (L.) Moench, a southern Iowa savanna/woodland species, *Penstemon grandiflorus* Nutt., a showy species with a native range limited to western Iowa and scattered sand prairies in eastern Iowa, and *Coreopsis tinctoria* Nutt., a Great Plains species not native to Iowa.

The floristic species composition of the communities at each site is presented in Tables 3-17. These tables provide scientific and common names, the Iowa coefficients of conservatism, and the numerical wetland status for each species observed. Two sample t-tests were used to compare native richness index, weighted mean native conservatism, and weighted mean wetland status between reconstructed and natural sites (Table 18). For all three variables, the natural sites exhibited significantly higher quality. They had higher native richness index, meaning proportionately less exotic species in the flora. They had higher native conservatism, or species with dependence on more pristine environments. They also had a more negative wetland status, or species with a tendency toward a greater affinity for wetlands (Table 18, Chart 1).

Further analysis was completed among just the reconstructed sites to determine if floristic quality was affected by size and age of reconstructions. There was no effect of size on native richness index or native conservatism, however small sites had significantly lower wetland status(greater wetland fidelity) than did large sites (Table 19). Linear regression indicated no relationship occurred between age of reconstructed sites and native richness index, native conservatism, or wetland status (Chart 1). These results suggest that small sites provide better ability to achieve higher quality wetland restoration. This is intuitive in that small sites are more compatible with higher quality seed mixes and higher seed rates (more affordable). It may also be easier to restore an appropriate and stable hydrology at smaller sites, which could foster higher success in establishing species with higher wetland affinity.

The DCA ordination of the floristic data (Chart 2) provides useful insight in the variation among species composition of these landscapes (in this ordination most of the points represent multiple communities). Because of the method used there is a strong site effect shown. Nearly all sites show a high similarity between the wetland composition and the total vegetation. Because the species composition of the wetland communities is a subset of the total species composition, there is a considerable amount of automatic similarity. Nevertheless each site differs in the amount of similarity in its wetland and total vegetation. If the wetland and total vegetation were the same (i.e., the entire site was wetland) they would have the same point in the ordination. Thus the amount of dissimilarity (or distance) between points reflects the amount of species turnover between the wetland and upland vegetation (a crude measure of β diversity). Sites with especially similar wetland and total species compositions (points close together, low turnover) include Jarvis, Wickiup, South Point, Doolittle, and Hay Buhr. Although Doolittle and Hay Buhr have low species turnover between wetland and upland, they are much different from Jarvis, Wickiup and South Point, the reconstructed sites (Chart 2, axis 1). Doolittle's low turnover is due to low habitat diversity and very gradual environmental gradients. The single wetland community (temporary/seasonally flooded wetland) occurs in a mosaic with high quality wet-mesic prairie allowing considerable species overlap. Hay Buhr on the other hand, has low turnover between upland and wetland because it has a high percentage of wetland area combined with high wetland diversity. Because much of the area is diverse types of wetland, most of the species present at the site occur in at least one of the wetlands (nearly all of the species comprise the wetland vegetation). Jarvis and Wickiup have significant amounts of woody vegetation and high habitat diversity, which provides potential for high species turnover, but the wetland habitats are poorly developed and share many species with the upland vegetation, thus wetland

and total vegetation are similar. The low species turnover at South Point may be due to its young age, and the likelihood that seeding occurred homogenously across much of the site. This would tend to produce wetland and upland areas of similar species composition.

Two sites exhibit a conspicuous amount of dissimilarity between wetland vegetation and total vegetation and therefore represent high species turnover between wetland and upland (Chart 2). Wetland and total site composition at Grooms and Engeldinger Marsh exhibit the maximum amount of dissimilarity observed in the data set. The communities at each site are quite different. The percentage of wetland at Engeldinger is low and primarily occupied by sedge meadow and semi-permanently flooded wetland. The upland habitat consists of native wet-mesic prairie, reconstructed prairie, tall forb meadow and cool-season grassland. Together these are relatively diverse and different from the wetlands; the wetland vegetation is a subset of the total vegetation. Engeldinger exhibits a diverse landscape. Like Engeldinger, Grooms has a small percentage of wetland area, but unlike Engeldinger it has relatively low community diversity. The high turnover must be a product of the combination of low wetland acreage and its small but distinctive flora with a relatively diverse riparian woodland.

The native sites, and specifically the wetland component, appear to increase in quality and naturalness in the lower right corner of the ordination (where all three native sites are located). This suggests that the reconstructed wetland sites near this area are faring better than those further away (e.g., New Hampton, Boevers). However, there are many kinds of wetlands with potential for quite different species composition (this is verified by the widely scattered wetland points). Although the ordination depicts gradients in species composition, there is not

necessarily a corresponding gradient in quality. The left center portion of the ordination space seems to hold most of the lowest quality reconstructions. Sites that radiate from this area in different directions exhibit different species compositions that all could represent higher quality.

Transect

The species compositions of the communities sampled with the transects are presented in Tables 20-34. The descriptive variables calculated for each community are presented near the bottom of the tables. Analysis of these variables in the temporary/seasonally flooded community demonstrated fairly consistent differences between reconstructed and natural sites (Table 35). Reconstructed sites had significantly higher total herbaceous ramet density. The presence of *Eleocharis* species, perhaps from the seed mix, and ruderal species such as *Setaria*, *Echinchloa*, and *Panicum* from the seedbank, was a principal factor that increased the total ramet density in reconstructed sites. *Eleocharis* was present at natural sites, but at much lower densities, and none of the aforementioned annual grasses were present. In general, the more early successional status of the reconstructed sites would promote the higher ramet densities observed.

No differences in total frequency or Shannon diversity were observed between reconstructed and natural sites (Table 35). The equitability in Shannon diversity can be explained by offsetting components. Reconstructed sites tended to be more species rich (significantly with a two sample test) and natural sites tended to have higher evenness (marginally with a two sample test). These patterns could likewise be related to successional status. High richness in reconstructed sites could arise from the seeding and from the more open, less competitive habitat. The intermediate disturbance theory predicts highest richness in mid-successional habitats. The more closed and

mature natural sites might exhibit lower richness and greater evenness as a consequence of higher competitive pressure.

The following three variables all exhibited strongly significant differences, and elucidate important missing features of reconstructed sites. Natural sites had much greater relative importance of native species (and concurrently less relative importance of exotics), they had much greater relative importance of wetland indicators, and they had much greater relative importance of *Carex* species (Table 35). These characteristics focus on the species composition and how well certain species are doing. Not surprisingly, natural sites function much better than reconstructed sites when it comes to supporting diverse, healthy populations of important wetland plant species. Reconstructed sites do have higher richness, but the species are less likely to be wetland-defining species and more likely to be exotics or a mixture of upland and wetland species. Most illuminating is the difference in relative importance of *Carex*. Only one reconstructed site had a temporary/seasonally flooded wetland that was over 10%, while natural sites ranged from 30 to 40%. Better use and establishment of *Carex* species needs to be accomplished in wetland restoration.

There were no detectable patterns among the reconstructed temporary flooded wetlands that could be attributed to wetland size or wetland age (Table 35). Variation in descriptive characteristics within size and age is high and probably reflects true ecological variation (rather than sampling or measurement variation). Many factors could contribute to this variation – for example differences in environmental conditions at the time of reconstruction, differences in

management post reconstruction, differences in hydrology, and differences in reconstruction methods.

The great variety in structure and composition (leading to variation in these descriptive variables) among wetlands can be seen in Table 36. Of note are these observations:

1) Temporary flooded reed canary grass wetlands are poor quality.

2) Semi-permanently flooded/aquatic communities typically have high relative importance of natives and wetland indicators, but low richness

3) Only one community at one site (wet cool-season grassland at Brush Creek) has a *Carex* composition that approaches natural sites (attains at least 50% of their *Carex* importance).

The DCA ordination of all communities sampled along transects provides a good summary of many of the patterns already presented. The most evident pattern is the separation of the natural sites from the reconstructed sites (Chart 3). None of the reconstructed sites are intermingled with the natural sites. The three natural sites collectively encompass about 20% of the ordination space, while most of the reconstruction communities, excluding the semi-permanently flooded/aquatic communities, occur in a different area of the ordination that comprises about 10% of the ordination space (with essentially all 12 sites). This suggests that not only are they different from the natural sites, but also that they are as a whole much more homogenous. The importance in this pattern is that restorations should not all be the same, even if the same is actually a fairly good mix of native species, because natural sites are characterized by

individuality. An approach that uses a standard mix for all restorations does not do a good job representing nature.

The reconstructed sites that most closely approach the ordination space occupied by natural sites are the temporary flooded wetland at New Hampton (medium size, 3 years old), the temporary flooded wetland at Dike (large size, 7 years old), and the temporary flooded wetland and wet cool-season grassland and forb community at Mink Creek (small size, 8 years old). It might be that these all have a modicum of "remnant" in them that increases their naturalness. Information on the condition of the sites at the time of reconstruction is not available, so this possibility is difficult to clarify.

The ordination also suggests that temporary/seasonal flooded wetlands are more likely to better represent natural sites than are semi-permanently/aquatic wetlands. Semi-permanent wetlands at reconstructions tended to diverge more from the natural sites, perhaps due to their low richness and composition of only *Lemna* and a few other submergent species. Natural semi-permanent wetlands have a greater diversity of both submergent and emergent species.

The gradient in species composition reflected by DCA 1 encompasses upland cool-season grassland at the low axis scores and fairly pristine shallow marsh and sedge meadow at the high axis scores. Most of the upland tallgrass prairie reconstructions fall into the lower half of the axis, and appear to be more associated with cool-season grassland. The exception is the tall grass reconstruction at Hay Buhr, which is fairly close to the wet mesic prairie sample from Doolittle (Chart 3). DCA axis 2 variation encompasses terrestrial species at the low scores and

submergent species at high scores. Woody wetland species, for example *Salix*, show up most strongly just below the midpoint of axis 2 (coordinates150 to 250) and on the lower portion of axis 1.

In some cases, community types have a strong similarity, as for example in the tallgrass prairie reconstructions (Q) from many sites bunched together in the lower left portion of the ordination. As pointed out earlier, similarity in seed mixes undoubtedly helps to homogenize these communities. In other cases, site has a strong unifying effect, as in the prairie, sedge meadow, and temporary flooded communities from Engeldinger that are grouped together. This is a natural consequence of gentle environmental gradients and close proximity producing a common species pool. The two other natural sites, Doolittle and Hay-Buhr, exhibited more uniqueness among their communities.

Brief Summary

The fundamental question in this study is – how well does the vegetation in reconstructed wetlands perform, especially when evaluated against natural wetlands. The importance of the vegetation in ecosystems is well understood. It comprises the primary producers and the base of the food web, it provides structural configuration to habitats, and it has pronounced effects on the soil and nutrient cycles. Three salient conclusions can be made from this study.

1) Vegetation at the reconstructed wetlands in this study did not attain the quality inherent in natural wetlands, even in sites up to 8 years old. Abundant exotic species combined with the lack of *Carex* and other important wetland species seems to be a central area of difference.

2) Reconstructed wetlands exhibited very few discernible patterns in vegetation characteristics that could be attributed to size or age effects. For the most part, they are too homogenous. The only effect observed was that small sites have species compositions with greater wetland affinity than do large sites. The implication is that better restorations can be achieved if their size is kept relatively small.

3) Inclusion of species not native to Iowa, or not native to a region within Iowa, or not native to the habitat is a problem and contributes to the overall lack of ecological performance. A more knowledgeable design of seed mixes is needed.

LITERATURE CITED

Drobney. P., D. Lewis, D. Horton, D. Roosa, D. Smith, J. Pearson, M. Leoschke, and G. Wilhelm. 2000. Floristic quality technique: Iowa database; draft version. Unpublished data.

Eilers, L., and D. Roosa. 1994. The vascular plants of Iowa: an annotated checklist and natural history. University of Iowa Press, Iowa City, IA.

Gleason, H.A., and A. Cronquist. 1991. Manual of the vascular plants of northeastern United States and adjacent Canada. New York Botanical Garden, Bronx, NY.

McKinney, L. 1992. A taxonomic revision of the acaulescent blue violets (Viola) of North America. Sida, Botanical Miscellany, no. 7: 1-60.

Swink, F, and G. Wilheim. 1979. Plants of the Chicago Region. The Morton Arboretum, Lisle, IL.

Table 1. Wetland status levels utilized for developing a wetland index.

Status	Wetlands occurrence in FWS Region 3	Numeric Value
Obligate wetland	more than 99% of the time	-5
Facultative wetland +	89-99% of the time	-4
Facultative wetland	78-88% of the time	-3
Facultative wetland −	67-77% of the time	-2
Facultative +	56-66% of the time	-1
Facultative	45-55% of the time	0
Facultative −	34-44% of the time	1
Facultative upland +	23-33% of the time	2
Facultative upland	12-22% of the time	3
Facultative upland −	1-11% of the time	4
Obligate Upland	less than 1% of the time	5

Table 2. Study site characteristics and acreages of plant communities mapped at all study sites. Habitats considered to be wetlands are indicated with (*), those indicated by a (^) are most likely the product of wetland reconstruction. Size class and age of the wetland at the time of sampling (years) is given. Habitat diversity index (HDI) is described in the text.

* ^	SF	Semi-permanently flooded wetland/aquatic
* ^	TF	Temporary/seasonally flooded wetland
*	SW	Temporary flooded bulrush wetland
*	CT	Temporary flooded cattail wetland
*	SM	Sedge meadow
*	SMS	Sedge meadow/shrubland
* ^	RCG	Temporary flooded reed canary grass
* ^	RCGS	Temporary flooded reed canary grass pseudosavanna
*	WP	Wet prairie
* ^	WPP	Wet prairie reconstruction
* ^	WC3F	Wet cool-season grass & forb
*	WC3	Wet cool-season grassland
*	WS	Wet shrubland
*	WS/M	Wet shrubland-maple
*	WS/W	Wet shrubland-willow
*	TFW	Temporary flooded woodland
*	TFDF	Temporary flooded deciduous forest
	WMP	Wet-mesic prairie
	NC3F	Wet-mesic cool-season grass & forb
	TGP	Tallgrass prairie reconstruction
	TFM	Tall forb meadow
	C3	Cool-season grassland
	C3/L	Cool-season grasses & legumes
	ESOF	Early successional old-field
	ESS	Early succesional shrubland
	LSW	Lowland shrubland/woodland
	LW/C3	Lowland woodland & cool-season grass
	LW/F	Lowland woodland & forest
	SOW	Sand oak woodland
	C3W	Upland woodland and cool-season grass
	PSS	Pseudosavanna/shrubland
	UWS	Upland woodland/shrubland
	UMF	Upland mixed forest
	RC	Row crop
	Rock	Rock

Site	Size	Age	SF	TF	SW	CT	SM	SMS	RCG	RCGS	WP	WPP	WC3F	WC3	WS	WS/M	WS/W
Boevers	S	1	0.4	3.0	0.5	--	--	--	0.5	--	--	0.7	--	--	--	--	0.3
Mink Creek	S	8	6.4	7.6	--	--	--	--	--	--	--	2.0	3.7	--	--	--	0.9
Palisades	S	5	2.0	3.6	--	--	--	--	--	--	--	--	0.3	--	0.3	--	--
Pleasantville	S	3	3.5	1.1	--	--	--	--	2.2	--	--	--	--	--	--	--	--
Brush Creek	M	8	9.8	0.7	--	0.2	--	--	12.2	--	--	--	--	4.8	0.2	--	--
Grooms	M	1	--	3.6	--	--	--	--	--	--	--	--	--	--	--	--	--
New Hampton	M	3	4.8	2.6	--	--	--	0.8	3.6	--	0.1	--	--	--	0.2	--	--
Wickiup Hill	M	6	--	4.4	--	--	0.7	--	6.9	--	--	--	--	--	--	--	6.1
Badger Creek	L	6	1.5	11.3	--	--	--	--	5.8	--	--	--	11.7	--	--	--	0.3
Dike	L	7	5.7	6.0	--	--	--	--	20.2	2.3	--	--	--	--	0.2	--	--
Jarvis	L	2	--	17.2	--	--	--	--	3.6	--	--	--	--	--	3.8	1.0	0.3
South Point	L	1	9.0	8.8	--	--	--	--	0.5	--	--	--	--	--	--	--	--
Doolittle	S	na	--	3.8	--	--	--	--	--	--	--	--	--	--	--	--	--
Engledinger	M	na	3.6	1.9	--	0.2	4.5	--	--	--	--	--	--	--	--	--	--
Hay-Buhr	L	na	11.5	4.9	--	--	9.6	54.1	6.3	--	--	--	--	--	--	2.6	--

	SF	TF	SW	CT	SM	SMS	RCG	RCGS	WP	WPP	WC3F	WC3	WS	WS/M	WS/W
Site Freq (%)	73	100	7	13	20	13	67	7	7	13	20	7	33	13	33
Total Acres	58.4	80.7	0.5	0.4	14.8	54.9	61.8	2.3	0.1	2.8	15.7	4.8	4.7	3.6	7.9

Site	TFW	TFDF	WMP	NC3F	TGP	TFM	C3	C3/L	ESOF	ESS	LSW	LW/C3	LW/F	SOW	C3W	PSS	UWS	UMF	RC	Rock
Boevers	--	--	--	6.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mink Creek	--	--	--	--	65.3	--	--	--	--	--	--	--	0.7	--	--	--	--	--	--	--
Palisades	--	--	--	--	10.5	--	--	--	--	--	--	--	--	--	--	1.8	--	--	--	--
Pleasantville	--	--	--	--	6.1	--	--	--	--	--	--	--	1.1	--	--	--	--	--	--	--
Brush Creek	--	2.6	--	--	17.2	--	29.0	--	--	--	--	--	--	--	3.0	--	4.6	--	--	--
Grooms	--	--	--	7.6	--	--	--	--	--	--	--	--	2.5	--	--	--	--	--	--	--
New Hampton	--	--	--	0.6	--	--	27.0	--	0.3	--	--	--	--	--	--	--	--	--	--	0.2
Wickiup Hill	7.9	2.0	--	1.4	6.5	--	--	--	0.5	--	--	1.5	--	1.4	--	--	--	2.7	--	--
Badger Creek	2.9	13.1	--	50.8	26.5	--	10.0	--	--	--	3.2	--	--	--	--	--	0.5	--	--	--
Dike	0.2	--	--	12.2	--	--	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--
Jarvis	--	--	--	--	--	0.4	13.9	--	22.7	--	--	7.1	18.1	--	--	--	--	--	2.2	--
South Point	--	--	--	--	19.3	--	2.9	1.0	0.2	--	--	--	1.3	--	--	--	--	--	1.9	0.4
Doolittle	--	--	10.4	8.7	--	--	--	--	--	1.0	--	--	--	--	--	--	--	--	--	--
Engledinger	--	--	4.0	3.2	5.4	0.9	15.1	--	--	--	--	--	--	--	--	--	--	--	8.8	--
Hay-Buhr	1.8	6.5	--	--	7.7	--	--	--	--	--	--	--	--	--	--	--	--	--	9.9	--

	TFW	TFDF	WMP	NC3F	TGP	TFM	C3	C3/L	ESOF	ESS	LSW	LW/C3	LW/F	SOW	C3W	PSS	UWS	UMF	RC	Rock
Site Freq (%)	27	27	13	53	60	13	47	7	27	7	7	13	33	7	7	7	13	7	27	13
Total Acres	12.8	24.2	14.4	91.4	164.6	1.3	98.2	1.0	23.8	1.0	3.2	8.6	23.7	1.4	3.0	1.8	5.1	2.7	22.9	0.6

Site	Total Acres	Percent Wetland	HDI
Boevers	12.5	44.5	3.5
Mink Creek	86.7	23.8	1.6
Palisades	18.5	33.3	3.2
Pleasantville	14.1	48.6	4.9
Brush Creek	84.5	36.2	9.1
Grooms	13.7	26.3	2.4
New Hampton	40.3	30.1	2.4
Wickiup Hill	42.2	66.5	17.3
Badger Creek	137.4	33.9	9.3
Dike	47.3	73.3	5.2
Jarvis	90.2	28.6	11.0
South Point	45.3	40.3	6.1
Doolittle	24.0	16.0	3.3
Engledinger	47.6	21.4	10.9
Hay-Buhr	115.0	84.7	6.9

Table 3. Boevers floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

NC3F – Wet-mesic cool-season grass & forb
TF – Temporary/seasonally flooded wetland
SF – Semi-permanently flooded wetland/aquatic
SW – Temporary flooded bulrush wetland
WPP – Wet prairie reconstruction
WS/W – Wet shrubland-willow
RCG – Temporary flooded reed canary grass

Scientific Name	Common Name	ICC	WS	NC3F	TF*	SF*	SW*	WPP*	WS/W*	RCG*	CC%
Graminoids											
Agrostis hyemalis	Ticklegrass	4	1	p	--	--	--	--	--	--	14
Carex annectans	Large yellow fox sedge	6	-3	p	--	--	--	--	--	--	14
Carex laeviconica	Long-toothed lake sedge	6	-5	--	--	p	--	--	--	--	14
Carex leavenworthii	Dwarf bracted sedge	3	5	p	--	--	--	--	--	--	14
Carex lupulina	Common hop sedge	6	-5	--	--	--	--	--	p	--	14
Carex molesta	Field oval sedge	2	0	p	--	--	--	--	--	--	14
Carex scoparia	Lance-fruited oval sedge	5	-3	--	p	--	--	--	--	--	14
Carex tribuloides	Awl-fruited oval sedge	3	-4	p	--	--	--	--	--	--	14
Carex vesicaria	Tufted lake sedge	7	-5	p	--	p	p	--	p	--	57
Carex vulpinoidea	Brown fox sedge	3	-5	p	p	--	--	--	--	--	29
Cyperus strigosus	Long-scaled nut sedge	2	-3	--	p	--	--	--	--	--	14
Echinochloa muricata	Spiny barnyard grass	3	-5	--	p	--	--	--	--	--	14
Eleocharis sp.	Spikerush	5	-4	--	p	--	p	--	--	--	29
Elymus canadensis	Canada wild rye	5	1	p	--	--	--	--	--	--	14
Elymus virginicus	Virginia wild rye	3	-2	p	--	--	--	--	p	--	29
Eragrostis pectinacea	Small love grass	0	0	--	p	--	--	--	--	--	14
Eragrostis spectabilis	Purple lovegrass	2	5	--	p	--	--	--	--	--	14
Hordeum jubatum	Squirrel-tail barley	0	-1	p	--	--	--	--	--	--	14
Juncus dudleyii	Dudley's rush	2	0	--	p	--	--	--	--	--	14
Juncus tenuis	Path rush	0	0	p	--	--	--	--	--	--	14
Leersia oryzoides	Rice cut-grass	2	-5	--	--	p	p	--	--	--	29
Muhlenbergia frondosa	Wirestem muhly	3	-3	p	--	--	--	--	--	--	14
Muhlenbergia schreberi	Nimblewill	1	0	p	--	--	--	--	--	--	14
Panicum capillare	Witchgrass	0	0	--	p	--	--	--	--	--	14
Panicum dichotomoflorum	Fall panicum	0	-2	p	p	--	--	--	--	--	29
Panicum virgatum	Switchgrass	5	-1	p	--	--	--	p	--	p	43

Scientific Name	Common Name	ICC	WS	NC3F	TF*	SF*	SW*	WPP*	WS/W*	RCG*	CC%
Scirpus fluviatilis	River bulrush	5	-5	--	--	--	p	--	p	--	29
Scirpus validus	Soft-stemmed bulrush	3	-5	--	--	p	--	--	--	--	14
Spartina pectinata	Prairie cord grass	4	-4	--	--	--	--	p	--	--	14
Forbs											
Acalyphya rhomboidea	Three-seeded mercury	6	3	p	--	--	--	--	--	--	14
Acalyphya virginica	Three-seeded mercury	0	3	p	--	--	--	--	--	--	14
Achillea millefolium	Western yarrow	0	3	p	--	--	--	--	--	--	14
Alisma triviale	Water plantain	3	-5	--	p	p	--	--	--	--	29
Amaranthus tuberculatus	Water pigweed	0	-5	p	p	--	--	--	--	--	29
Ambrosia artemisiifolia	Common ragweed	0	3	--	p	--	--	--	--	p	29
Ambrosia trifida	Giant ragweed	0	-1	p	p	--	p	p	p	p	86
Ammania coccinea	Toothcup	4	-5	--	p	--	--	--	--	--	14
Anemone canadensis	Canada anemone	2	-3	p	p	--	--	p	--	--	43
Apocynum cannabinum	Indian hemp	1	0	--	--	--	--	--	p	--	14
Apocynum sibiricum	Dogbane	1	-1	p	p	--	--	p	p	p	71
Arabis hirsuta	Hairy rock cress	8	5	p	--	--	--	--	--	--	14
Asclepias incarnata	Swamp milkweed	4	-5	p	p	--	--	--	--	--	29
Asclepias syriaca	Common milkweed	0	5	--	p	--	--	--	--	--	14
Aster lanceolatus	Panicled aster	4	-3	p	p	--	p	p	--	--	57
Aster ontarionsis	Ontario aster	3	0	--	--	--	--	--	p	--	14
Aster pilosus	Hairy aster	0	4	p	--	--	--	--	--	--	14
Bidens cernua	Nodding bur marigold	2	-5	--	--	p	--	--	--	--	14
Bidens frondosa	Beggar-ticks	3	-3	p	p	--	--	--	--	--	29
Bidens tripartita	Swamp tickseed	3	-5	--	p	--	--	--	--	--	14
Bidens vulgata	Tall beggar-ticks	1	-3	p	p	--	--	--	--	--	29
Calystegia sepium	American bindweed	0	0	p	--	--	--	--	--	--	14
Cardamine parviflora	Small-flowered bitter cress	4	0	p	p	--	--	--	--	--	29
Cirsium discolor	Field thistle	1	5	p	--	--	--	--	--	--	14
Conyza canadensis	Horseweed	0	1	p	--	--	--	--	--	--	14
Erigernon annuus	Annual fleabane	0	1	p	--	--	--	--	--	--	14
Eupatorium perfoliatum	Boneset	6	-4	--	p	--	--	--	--	--	14
Euthamia graminifolia	Grass-leaved goldenrod	5	-2	p	p	--	--	--	--	--	29
Galium obtusum	Wild madder	7	-4	p	--	--	--	--	--	--	14
Geum laciniatum	Rough avens	4	-3	p	--	--	--	p	--	--	29
Gratiola neglecta	Hedge hyssop	6	-5	--	p	--	--	--	--	--	14
Helenium autumnale	Sneezeweed	4	-4	--	p	--	--	--	--	--	14

Scientific Name	Common Name	ICC	WS	NC3F	TF*	SF*	SW*	WPP*	WS/W*	RCG*	CC%
Helianthus grosseserratus	Saw-tooth sunflower	4	-2	p	--	--	--	--	--	--	14
Hypericum majus	Sand St. John's wort	7	-3	--	p	--	--	--	--	--	14
Lactuca canadensis	Wild lettuce	1	2	p	--	--	--	--	--	--	14
Lepidium densiflorum	Peppergrass	0	0	p	--	--	--	--	--	--	14
Lespedeza capitata	Round-headed bush clover	3	3	p	--	--	--	--	--	--	14
Lindernia dubia	False pimpernel	4	-5	--	p	--	--	--	--	--	14
Lobelia cardinalis	Cardinal flower	5	-5	--	p	--	--	--	--	--	14
Ludwigia polycarpa	False loosestrife	7	-5	--	p	--	--	--	--	--	14
Lycopus americanus	Water horehound	4	-5	--	p	--	--	--	--	--	14
Oenothera biennis	Common evening primrose	0	3	p	--	--	--	--	--	--	14
Oxalis stricta	Yellow wood sorrel	0	3	p	p	--	--	--	--	--	29
Physostegia (virginiana)	False dragonhead	6	-3	--	p	--	--	--	--	--	14
Pilea pumila	Clearweed	3	-3	--	--	--	--	--	p	--	14
Polygonum amphibium	Water smartweed	3	-5	p	p	p	p	p	p	p	100
Polygonum lapathifolium	Curttop lady's thumb	0	-4	--	p	--	--	--	--	--	14
Polygonum pennsylvanicum	Pinkweed	0	-4	p	p	--	--	p	--	p	57
Polygonum punctatum	Dotted smartweed	4	-5	--	--	--	--	--	p	--	14
Polygonum ramosissimum	Bushy knotweed	3	1	p	--	--	--	--	--	--	14
Potentilla norvegica	Norwegian cinquefoil	2	0	p	--	--	--	--	--	--	14
Potentilla simplex	Common cinquefoil	3	4	p	p	--	--	--	--	--	29
Rorippa palustris	Marsh cress	7	-5	p	p	--	--	--	--	--	29
Rudbeckia hirta	Black-eyed Susan	2	3	p	--	--	--	--	--	p	29
Rumex altissimus	Pale dock	0	4	p	p	--	--	--	--	--	29
Rumex verticillatus	Swamp dock	4	-5	--	--	p	p	--	--	--	29
Sagitaria latifolia	Common arrowhead	4	-5	--	p	p	p	--	p	--	57
Sagittaria rigida	Stiff arrowhead	5	-5	--	--	p	--	--	--	--	14
Senecio pauperculus	Meadow ragwort	5	-1	p	--	--	--	p	--	--	29
Senecio plattensis	Prairie ragwort	3	4	p	--	--	--	--	--	--	14
Silene antirrhina	Sleepy catchfly	1	5	p	--	--	--	--	--	--	14
Smilax herbacea	Carrion flower	5	0	p	--	--	--	--	--	--	14
Solidago canadensis	Canada goldenrod	0	3	p	--	--	--	--	--	--	14
Solidago gigantea	Giant goldenrod	3	-3	p	--	--	--	p	--	p	43
Stachys tenuiflora	Smooth hedge nettle	5	-5	--	p	--	--	--	--	--	14
Verbena hastata	Blue vervain	3	-4	p	--	--	--	--	--	--	14
Verbena stricta	Hoary vervain	1	5	p	p	--	--	--	--	--	29
Vernonia fasciculata	Prairie ironweed	1	-3	p	--	--	--	p	p	--	43
Veronica peregrina	Purslane speedwell	0	-4	--	p	--	--	--	--	--	14

Scientific Name	Common Name	ICC	WS	NC3F	TF*	SF*	SW*	WPP*	WS/W*	RCG*	CC%
Viola sororia	Common blue violet	1	1	--	--	--	--	p	--	--	14
Trees and Shrubs											
Betula nigra	River birch	6	-3	p	--	--	--	p	--	--	29
Fraxinus pennsylvanicus	Green ash	1	-3	p	--	--	--	--	--	--	14
Populus tremuloides	Cottonwood	1	-1	--	p	--	--	--	--	--	14
Rosa blanda	Meadow rose	4	3	p	--	--	--	--	--	--	14
Salix amygdaloides	Peach-leaved willow	1	-3	--	--	--	--	--	p	--	14
Salix exigua	Sandbar willow	0	-5	p	--	p	p	p	p	--	71
Salix nigra	Black willow	3	-5	--	--	--	p	--	p	--	29
Smilax hispida	Greenbrier	4	0	p	--	--	--	--	--	--	14
Vitis riparia	Riverbank grape	1	-2	p	--	--	--	--	--	--	14
Non-native											
Agropyron repens	Quack grass	*	3	p	--	--	--	--	--	--	14
Agrostis gigantea	Redtop	*	-3	--	p	--	--	--	--	--	14
Avena sativa	Cult oats	*	5	p	--	--	--	--	--	--	14
Barbarea vulgaris	Yellow rocket	*	0	p	p	--	--	--	--	--	29
Chenopodium album	Lamb's quarters	*	1	p	--	--	--	--	--	--	14
Cirsium arvense	Canada thistle	*	3	p	--	--	--	--	--	--	14
Dactylis glomerata	Orchard grass	*	3	p	--	--	--	--	--	--	14
Digitaria ischaemum	Smooth crabgrass	*	3	--	p	--	--	--	--	--	14
Festuca arundinacea	Tall fescue	*	2	p	--	--	--	--	--	--	14
Lysimachia nummularia	Moneywort	*	-4	--	--	--	--	--	p	--	14
Melilotus sp.	Sweetclover	*	3	p	--	--	--	--	--	--	14
Mollugo verticillata	Carpetweed	*	0	p	p	--	--	--	--	--	29
Phalaris arundinacea	Reed canary grass	*	-4	p	p	--	p	p	p	p	86
Phleum pratense	Timothy	*	3	p	--	--	--	--	--	--	14
Phlox drummondii	Annual phlox	*	nr	p	--	--	--	--	--	--	14
Plantago lanceolata	Buckhorn plantain	*	0	--	p	--	--	--	--	--	14
Plantago major	Common plantain	*	-1	--	p	--	--	--	--	--	14
Poa pratensis	Kentucky bluegrass	*	1	p	--	--	--	--	--	--	14
Polygonum persicaria	Lady's thumb	*	-3	--	p	--	--	--	--	--	14
Rumex crispus	Curly dock	*	-1	p	p	--	--	p	--	--	43
Setaria faberii	Giant foxtail	*	2	p	p	--	--	--	--	--	29
Setaria glauca	Yellow foxtail	*	0	p	--	--	--	--	--	--	14
Setaria viridis	Green foxtail	*	5	p	--	--	--	--	--	--	14

Scientific Name	Common Name	ICC	WS	NC3F	TF*	SF*	SW*	WPP*	WS/W*	RCG*	CC%
Taraxacum officinale	Common dandelion	*	3	p	p	--	--	--	--	--	29
Trifolium hybridum	Alsike clover	*	1	p	--	--	--	--	--	--	14
Trifolium repens	White clover	*	2	p	--	--	--	--	--	--	14
Vicia cracca	Cow vetch	*	5	p	--	--	--	--	--	--	14
Total Species Richness				86	57	11	12	17	18	9	135
Native Richness				65	46	11	11	15	16	8	108
Non-native Richness				21	11	0	1	2	2	1	27
Native Richness Index				3.0	3.9	12.0	6.0	5.3	5.7	4.5	3.9
Mean Native Conservatism				2.5	2.8	3.5	3.4	2.6	2.8	1.8	
Mean Wetland Status				0.2	-1.9	-5.0	-4.3	-2.6	-3.4	-1.4	

Table 4. Mink Creek floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

WC3F – Wet cool-season grass & forb
TF – Temporary/seasonally flooded wetland
SF – Semi-permanently flooded wetland/aquatic
WS/W – Wet shrubland -willow
WPP – Wet prairie reconstruction
TGP – Tallgrass prairie reconstruction
LW/F – Lowland woodland & forest

Scientific Name	Common Name	ICC	WS	WC3F*	TF*	SF*	WS/W*	WPP*	TGP	LW/F	CC%
Seedless Plants											
Equisetum arvense	Common horsetail	0	0	--	--	--	p	--	--	--	14
Equisetum hymale	Common scouring-rush	1	-2	--	p	--	p	--	p	--	43
Onoclea sensibilis	Sensitive fern	6	-3	--	--	--	--	--	--	p	14
Graminoids											
Andropogon gerardii	Big bluestem	4	1	--	--	--	--	--	p	--	14
Carex brevior	Plains oval sedge	4	0	--	(p)	--	--	p	p	--	43
Carex conjuncta	Green-headed fox sedge	7	-3	p	--	--	--	--	--	--	14
Carex cristatella	Crested oval sedge	5	-4	p	--	--	--	p	--	--	29
Carex lanuginosa	Wooly sedge	4	-5	p	--	--	--	p	--	--	29
Carex molesta	Field oval sedge	2	0	p	--	--	--	--	--	--	14
Carex stipata	Common fox sedge	5	-5	--	p	--	--	--	--	--	14
Carex stricta	Common tussock sedge	6	-5	p	--	--	--	--	--	--	14
Carex vulpinoidea	Brown fox sedge	3	-5	p	--	--	--	p	--	--	29
Cyperus odoratus	Nut sedge	2	-3	p	--	--	--	--	--	--	14
Echinochloa muricata	Spiny barnyard grass	3	-5	--	p	--	--	--	--	--	14
Eleocharis acicularis	Needle spike rush	3	-5	--	p	--	--	--	--	--	14
Eleocharis sp.	Spikerush	5	-4	p	p	--	--	p	--	--	43
Elymus canadensis	Canada wild rye	5	1	--	--	--	--	--	p	--	14
Festuca arundinacea	Tall fescue	*	2	--	--	--	--	--	p	--	14
Glyceria grandis	American manna grass	6	-5	p	--	--	--	--	--	--	14
Glyceria striata	Fowl manna grass	5	-5	p	--	--	--	p	--	--	29
Hordeum jubatum	Squirrel-tail barley	0	-1	--	--	--	--	--	p	--	14
Juncus dudleyii	Dudley's rush	2	0	p	p	--	--	--	--	--	29
Juncus nodosus	Joint rush	4	-5	p	p	--	--	--	--	--	29

Scientific Name	Common Name	ICC	WS	WC3F*	TF*	SF*	WS/W*	WPP*	TGP	LW/F	CC%
Juncus tenuis	Path rush	0	0	p	--	--	--	--	--	--	14
Juncus torreyii	Torrey's rush	3	-3	p	--	--	--	--	--	--	14
Leersia oryzoides	Rice cut-grass	2	-5	p	p	--	p	--	--	--	43
Panicum virgatum	Switchgrass	5	-1	--	--	--	--	p	p	--	29
Schizachyrium scoparium	Little bluestem	5	4	--	--	--	--	--	p	--	14
Scirpus atrovirens	Dark green bulrush	1	-5	p	p	--	p	--	p	--	57
Scirpus fluviatilis	River bulrush	5	-5	--	p	--	--	--	--	--	14
Scirpus validus	Soft-stemmed bulrush	3	-5	--	p	--	--	--	--	--	14
Sorghastrum nutans	Indian grass	4	2	--	--	--	--	--	p	--	14
Typha angustifolia	Narrow-leaved cattail	1	-5	--	p	--	p	--	--	--	29
Typha latifolia	Common cattail	1	-5	--	p	--	--	--	--	--	14
Aquatic											
Certophyllum demersum	Coontail	0	-5	--	p	--	--	--	--	--	14
Elodea nuttallii	Slender waterweed	10	-5	--	p	p	--	--	--	--	29
Lemna minor	Duckweed	3	-5	--	p	--	--	--	--	p	29
Najas flexilis	Common naiad	5	-5	--	--	p	--	--	--	--	14
Najas guadalupensis	Southern naiad	5	-5	--	p	--	--	--	--	--	14
Potamogeton nodosus	American pondweed	7	-5	--	p	p	--	--	--	--	29
Spirodela polyrhiza	Greater duckweed	6	-5	--	p	--	--	--	--	--	14
Forbs											
Acalyphya virginica	Three-seeded mercury	0	3	p	--	--	--	--	--	--	14
Agastache sp.	Giant-hyssop	4.5	4	--	--	--	--	--	--	p	14
Alisma trivale	Water plantain	3	-5	--	p	--	--	--	--	--	14
Ambrosia artemisiifolia	Common ragweed	0	3	p	--	--	--	--	p	--	29
Ambrosia trifida	Giant ragweed	0	-1	--	--	--	p	--	p	--	29
Anemone canadensis	Canada anemone	2	-3	p	p	--	--	p	p	--	57
Apocynum sibiricum	Indian hemp	1	-1	p	--	--	--	--	p	--	29
Artemisia ludoviciana	White sage	2	5	--	--	--	--	--	p	--	14
Asclepias incarnata	Swamp milkweed	4	-5	p	p	--	p	p	--	--	57
Asclepias syriaca	Common milkweed	0	5	p	--	--	--	p	p	--	43
Aster lanceolatus	Panicled aster	4	-3	p	--	--	p	p	p	--	57
Aster novae-angliae	New England aster	3	-3	p	--	--	--	--	p	--	29
Aster pilosus	Hairy aster	0	4	--	--	--	--	p	p	--	29
Bidens cernua	Nodding bur marigold	2	-5	p	p	--	--	--	--	--	29
Bidens frondosa	Beggar-ticks	3	-3	--	p	--	--	p	--	--	29

Scientific Name	Common Name	ICC	WS	WC3F*	TF*	SF*	WS/W*	WPP*	TGP	LW/F	CC%
Boltonia asteroides	False aster	5	-3	p	--	--	--	--	--	--	14
Calystegia sepium	American bindweed	0	0	--	--	--	--	p	p	--	29
Cicuta maculata	Water hemlock	7	-5	p	--	--	--	p	--	--	29
Circaea lutetiana	Enchanter's nightshade	5	3	--	--	--	--	--	--	p	14
Cirsium altissimum	Tall thistle	4	5	--	--	--	--	--	p	--	14
Conyza canadensis	Horseweed	0	1	p	--	--	--	--	p	--	29
Cryptotaenia canadensis	Honewort	4	0	--	--	--	--	--	--	p	14
Dalea purpurea	Purple prairie clover	8	5	--	--	--	--	--	p	--	14
Echinacea purpurea	Purple coneflower	9	5	--	--	--	--	--	p	--	14
Epilobium coloratum	Cinnamon willowherb	3	-5	p	--	--	--	--	--	--	14
Erigernon annuus	Annual fleabane	0	1	p	--	--	--	--	p	--	29
Galium aparine	Cleavers	1	3	--	--	--	--	--	--	p	14
Geranium maculatum	Wild geranium	6	3	--	--	--	--	--	--	p	14
Geum canadense	White avens	2	0	--	--	--	--	--	p	p	29
Geum laciniatum	Rough avens	4	-3	p	--	--	--	--	p	--	29
Helianthus grosseserratus	Saw-tooth sunflower	4	-2	p	--	--	--	p	p	--	43
Helianthus tuberosus	Jerusalem artichoke	0	0	--	--	--	p	p	p	p	57
Heliopsis helianthoides	Ox-eye	4	5	--	--	--	--	p	p	--	29
Impatiens sp.	Touch-me-not	4	-3	--	--	--	--	--	--	p	14
Laportea canadensis	Wood nettle	3	-3	--	--	--	--	--	--	p	14
Lindernia dubia	False pimpernel	4	-5	p	p	--	--	--	--	--	29
Lobelia silphilitica	Great lobelia	3	-4	p	--	--	--	--	--	--	14
Lycopus americanus	Water horehound	4	-5	p	--	--	--	p	--	--	29
Lycopus asper	Rough water horehound	4	-5	p	p	--	--	--	--	--	29
Lythrum alatum	Winged loosestrife	3	-5	p	--	--	--	--	--	--	14
Mentha arvensis	Marsh mint	4	-3	p	--	--	--	--	--	--	14
Mimulus ringens	Monkey flower	3	-5	p	p	--	--	--	--	--	29
Oenothera biennis	Common evening primrose	0	3	p	--	--	--	--	p	--	29
Osmorhiza longistylis	Anise root	5	4	--	--	--	--	--	--	p	14
Oxalis stricta	Yellow wood sorrel	0	3	p	--	--	--	--	--	--	14
Physostegia sp.	False dragonhead	6	-3	p	--	--	--	--	--	--	14
Plantago rugelli	Rugel's plantain	0	0	--	--	--	--	--	p	--	14
Polygonatum biflorum	Solomon's seal	4	3	--	--	--	--	--	--	p	14
Polygonum amphibium	Water smartweed	3	-5	--	p	--	p	p	p	--	57
Polygonum hydropiper	Water pepper	3	-5	p	p	--	--	p	--	--	43
Polygonum lapathifolium	Curttop lady's thumb	0	-4	--	(p)	--	--	--	--	--	14
Polygonum pennsylvanicum	Pinkweed	0	-4	--	--	--	--	p	--	--	14

Scientific Name	Common Name	ICC	WS	WC3F*	TF*	SF*	WS/W*	WPP*	TGP	LW/F	CC%
Polygonum punctatum	Dotted smartweed	4	-5	p	p	--	--	--	--	--	29
Polygonum scandens	Climbing false buckwheat	2	0	--	--	--	--	--	--	p	14
Potentilla norvegica	Norwegian cinquefoil	2	0	p	--	--	--	--	--	--	14
Prunella vulgaris	Self heal	0	0	p	--	--	--	--	--	--	14
Ratibida pinnata	Gray-headed coneflower	4	5	--	--	--	--	--	p	--	14
Rorippa palustris	Marsh cress	7	-5	--	p	--	--	--	--	--	14
Rudbeckia hirta	Black-eyed Susan	2	3	--	--	--	--	--	p	--	14
Rudbeckia laciniata	Tall coneflower	4	-4	--	--	--	--	--	--	p	14
Rumex altissimus	Pale dock	0	4	p	--	--	--	p	p	--	43
Sagittaria cuneata	Arum-leaved arrowhead	8	-5	p	p	--	--	--	--	--	29
Sanicula gregaria	Common snakeroot	5	-1	--	--	--	--	--	--	p	14
Scutellaria lateriflora	Mad-dog skullcap	6	-5	p	p	--	--	--	--	--	29
Solidago canadensis	Canada goldenrod	0	3	--	--	--	--	p	p	p	43
Solidago gigantea	Giant goldenrod	3	-3	--	--	--	p	p	p	--	43
Stachys palustris	Woundwort	4	-5	--	--	--	--	p	--	--	14
Stachys tenuiflora	Smooth hedge nettle	5	-5	--	--	--	--	--	--	p	14
Teucrium canadense	American germander	4	-2	--	--	--	--	p	p	--	29
Thalictrum dasycarpum	Purple meadow-rue	4	-2	--	--	--	--	--	--	p	14
Urtica dioica	Stinging nettle	0	-1	--	--	--	--	--	--	p	14
Verbena hastata	Blue vervain	3	-4	p	p	--	--	--	--	--	29
Verbena stricta	Hoary vervain	1	5	p	--	--	--	--	--	--	14
Viola sororia	Common blue violet	1	1	p	--	--	--	--	p	--	29
Trees and Shrubs											
Acer negundo	Box elder	0	-2	p	--	--	--	--	--	p	29
Cornus drummondii	Rough-leaved dogwood	6	0	--	--	--	--	--	p	--	14
Juglans nigra	Black walnut	4	3	--	--	--	--	--	--	p	14
Juniperus virginia	Red cedar	1	3	--	--	--	--	--	p	--	14
Parthenocissus quinquefolia	Virginia creeper	2	1	--	--	--	--	--	p	--	14
Parthenocissus vitacea	Woodbine	1	3	--	--	--	--	--	--	p	14
Physocarpus opulufolius	Ninebark	8	-2	--	--	--	--	--	p	--	14
Populus deltoides	Cottonwood	1	-1	--	p	--	p	--	p	--	43
Prunus mexicana	Big-tree plum	2	5	--	--	--	--	--	--	p	14
Prunus serotina	Wild black cherry	3	3	--	--	--	--	--	p	p	29
Prunus virginiana	Choke cherry	2	1	--	--	--	--	--	--	p	14
Quercus ellipsoidalis	Hill's oak	4	5	--	--	--	--	--	--	p	14
Quercus macrocarpa	Bur oak	4	1	--	--	--	--	--	p	p	29

Scientific Name	Common Name	ICC	WS	WC3F*	TF*	SF*	WS/W*	WPP*	TGP	LW/F	CC%
Ribes missouriensis	Wild gooseberry	3	5	--	--	--	--	--	--	p	14
Rosa arkansana	Prairie rose	4	5	--	--	--	--	p	p	--	29
Rubus occidentalis	Black raspberry	1	5	--	--	--	--	--	--	p	14
Salix amygdaloides	Peach-leaved willow	1	-3	--	p	--	p	--	--	--	29
Salix exigua	Sandbar willow	0	-5	p	p	--	p	--	--	--	43
Salix nigra	Black willow	3	-5	p	p	--	--	--	--	p	43
Sambuccus canadensis	Elderberry	1	4	--	--	--	--	--	--	p	14
Ulmus pumila	Siberian elm	*	5	--	--	--	--	--	p	--	14
Ulmus rubra	Red elm	2	0	--	--	--	--	--	--	p	14
Ulmus sp.	Elm	2	-1	--	--	--	--	--	p	--	14
Viburnum opulus	Guelder-rose	*	0	--	--	--	--	--	p	--	14
Vitis riparia	Riverbank grape	1	-2	p	--	--	--	--	p	p	43
Non-native											
Abutilon theophrastii	Buttonweed	*	4	--	p	--	--	--	--	--	14
Agropyron repens	Quack grass	*	3	--	--	--	--	--	p	--	14
Agrostis gigantea	Redtop	*	-3	p	--	--	--	p	p	--	43
Amaranthus sp.	Pigweed	*	0	--	p	--	--	--	--	--	14
Arctium minus	Common burdock	*	5	--	--	--	--	--	--	p	14
Asparagus officinales	Garden asparagus	*	3	--	--	--	--	--	p	--	14
Barbarea vulgaris	Yellow rocket	*	0	p	--	--	--	p	p	--	43
Bromus inermis	Smooth brome	*	5	--	--	--	--	--	p	p	29
Cirsium arvense	Canada thistle	*	3	p	--	--	p	p	p	--	57
Cirsium vulgare	Bull thistle	*	4	p	--	--	--	p	p	--	43
Dactylis glomerata	Orchard grass	*	3	p	--	--	--	--	p	--	29
Daucus carota	Queen Anne's lace	*	5	--	--	--	--	--	p	--	14
Glechoma hederacea	Creeping Charlie	*	4	--	--	--	--	--	--	p	14
Hesperis matronalis	Dame's rocket	*	5	--	--	--	--	--	p	--	14
Lactuca seriola	Prickly lettuce	*	0	--	--	--	--	--	p	--	14
Leucanthemum vulgare	Ox-eye daisy	*	5	--	--	--	--	--	p	--	14
Lonicera tartarica	Tartarian honeysuckle	*	3	--	--	--	--	--	--	p	14
Lotus corniculatus	Bird's-foot trefoil	*	1	--	--	--	--	--	p	--	14
Malus sylvestris	Apple	*	nr	--	--	--	--	--	p	--	14
Medicago lupulina	Black medic	*	1	p	p	--	--	--	--	--	29
Melilotus alba	White sweet clover	*	3	p	--	--	--	--	--	--	14
Melilotus officinales	Yellow sweet clover	*	3	--	--	--	--	--	p	--	14
Pastinaca sativa	Wild parsnip	*	5	p	--	--	--	--	p	--	29

Scientific Name	Common Name	ICC	WS	WC3F*	TF*	SF*	WS/W*	WPP*	TGP	LW/F	CC%
Phalaris arundinacea	Reed canary grass	*	-4	p	p	--	p	p	p	p	86
Phleum pratense	Timothy	*	3	--	--	--	--	--	p	--	14
Picea sp.	Spruce	*	nr	--	--	--	--	--	p	--	14
Poa pratensis	Kentucky bluegrass	*	1	p	--	--	--	p	p	--	43
Polygonum persicaria	Lady's thumb	*	-3	--	p	--	--	--	--	--	14
Rumex acetosella	Red sorrel	*	0	--	--	--	--	--	p	--	14
Rumex crispus	Curly dock	*	-1	p	--	--	--	p	p	--	43
Setaria faberii	Giant foxtail	*	2	--	--	--	--	--	p	--	14
Setaria glauca	Yellow foxtail	*	0	p	--	--	--	p	--	--	29
Taraxacum officinale	Common dandelion	*	3	--	--	--	--	--	p	--	14
Trifolium pratense	Red clover	*	2	--	--	--	--	--	p	--	14
Trifolium repens	White clover	*	2	p	p	--	--	--	p	--	43
Xanthium strumarium	Cocklebur	*	0	p	--	--	--	--	--	--	14
Total Species Richness				70	46	3	16	36	78	39	176
Native Richness				56	40	3	14	28	52	34	140
Non-native Richness				14	6	0	2	8	26	5	36
Native Richness Index				3.8	5.9	4.0	5.0	3.2	2.0	5.8	3.8
Mean Native Conservatism				2.8	3.4	7.3	1.5	3.0	2.4	2.9	
Mean Wetland Status				-1.8	-3.8	-5.0	-2.8	-1.3	1.2	0.9	

Table 5. Palisades floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

PSS—Pseudosavanna/Shrubland
TGP – Tallgrass prairie reconstruction
TF – Temporary/seasonally flooded wetland
SF – Semi-permanently flooded wetland/aquatic
WS – Wet shrubland-mixed
WC3F – Wet cool-season grass & forb

Scientific Name	Common Name	ICC	WS	PSS	TGP	TF*	SF*	WS*	WC3F*	CC%
Seedless Plants										
Equisetum arvense	Common horsetail	0	0	--	--	--	--	--	p	17
Equisetum hymale	Common scouring-rush	1	-2	--	--	--	--	p	p	33
Graminoids										
Andropogon gerardii	Big bluestem	4	1	p	p	p	--	p	--	67
Carex vulpinoidea	Brown fox sedge	3	-5	--	p	p	--	--	--	33
Cyperus strigosus	Long-scaled nut sedge	2	-3	--	p	p	--	--	--	33
Echinochloa muricata	Spiny barnyard grass	3	-5	--	--	p	--	--	--	17
Elecoharis engelmannii	Engelmann's spike rush	7	-3	--	--	p	--	--	--	17
Eleocharis obtusa	Blunt spike rush	3	-5	--	--	p	--	--	--	17
Elymus canadensis	Canada wild rye	5	1	--	p	--	--	--	--	17
Juncus dudleyii	Dudley's rush	2	0	--	p	p	--	p	p	67
Juncus tenuis	Path rush	0	0	--	--	p	--	--	--	17
Panicum dichotomoflorum	Fall panicum	0	-2	--	--	p	--	--	--	17
Panicum virgatum	Switchgrass	5	-1	--	p	--	--	--	--	17
Schizachyrium scoparium	Little bluestem	5	4	p	p	--	--	--	--	33
Scirpus atrovirens	Dark green bulrush	1	-5	--	p	--	--	p	--	33
Scirpus fluviatilis	River bulrush	5	-5	--	--	p	--	--	--	17
Scirpus validus	Soft-stemmed bulrush	3	-5	--	--	p	--	--	--	17
Sorghastrum nutans	Indian grass	4	2	--	p	--	--	--	--	17
Typha angustifolia	Narrow-leaved cattail	1	-5	--	p	p	--	p	--	50
Typha latifolia	Common cattail	1	-5	--	--	p	--	--	--	17
Aquatic										

Scientific Name	Common Name	ICC	WS	PSS	TGP	TF*	SF*	WS*	WC3F*	CC%
Lemna minor	Duckweed	3	-5	--	--	p	p	--	--	33
Potamogeton nodosus	American pondweed	7	-5	--	--	--	p	--	--	17
Potamogeton foliosus	Leafy pondweed	7	-5	--	--	--	p	--	--	17
Forbs										
Alisma subcordatum	Water plantain	3	-5	--	--	p	--	--	--	17
Amaranthus sp.	Pigweed	0	0	--	--	p	--	--	--	17
Ambrosia artemisiifolia	Common ragweed	0	3	--	p	p	--	p	--	50
Ambrosia trifida	Giant ragweed	0	-1	--	p	--	--	p	--	33
Apocynum sibiricum	Indian hemp	1	-1	--	p	--	--	--	--	17
Aster laevis	Smooth blue aster	7	5	--	p	--	--	p	p	50
Aster lanceolatus	Panicled aster	4	-3	--	p	p	--	--	p	50
Aster lateriflorus	Side-flowered aster	4	-2	--	(p)	--	--	--	--	17
Aster nova-angliae	New England aster	3	-3	p	p	p	--	p	p	83
Aster pilosus	Hairy aster	0	4	--	p	p	--	p	--	50
Bidens cernua	Nodding bur marigold	2	-5	--	p	p	--	--	--	33
Bidens con/tri	Tickseed	3	-5	--	--	p	--	--	--	17
Bidens frondosa	Beggar-ticks	3	-3	--	p	p	--	--	p	50
Boltonia asteroides	False aster	5	-3	--	--	p	--	--	--	17
Calystegia sepium	American bindweed	0	0	--	p	--	--	--	--	17
Cirsium discolor	Field thistle	1	5	--	p	--	--	--	--	17
Dalea purpurea	Purple prairie clover	8	5	--	p	--	--	--	--	17
Echinacea purpurea	Purple coneflower	9	5	p	p	--	--	--	--	33
Epilobium coloratum	Cinnamon willowherb	3	-5	--	--	p	--	--	p	33
Erigernon annuus	Annual fleabane	0	1	--	p	--	--	p	--	33
Eupatorium perfoliatum	Boneset	6	-4	--	--	p	--	--	--	17
Eupatorium rugosum	White snakeroot	2	3	--	p	--	--	--	--	17
Geum canadense	White avens	2	0	--	--	p	--	p	--	33
Helianthus tuberosus	Jerusalem artichoke	0	0	--	p	--	--	--	--	17
Hordeum jubatum	Squirrel-tail barley	0	-1	--	p	p	--	--	--	33
Lactuca canadensis	Yellow lettuce	1	2	--	p	--	--	--	--	17
Lepidium densiflorum	Peppergrass	0	0	--	p	--	--	--	--	17
Liatris pycnostachya	Prairie blazing star	6	1	--	p	p	--	--	--	33
Lindernia dubia	False pimpernel	4	-5	--	--	p	--	--	--	17
Mimulus ringens	Monkey flower	3	-5	--	--	--	--	--	(p)	17
Oenothera biennis	Common evening primrose	0	3	--	p	--	--	--	--	17
Penthorum sedoides	Ditch stonecrop	3	-5	--	--	p	--	--	--	17

Scientific Name	Common Name	ICC	WS	PSS	TGP	TF*	SF*	WS*	WC3F*	CC%
Plantago rugelli	Rugel's plantain	0	0	--	p	--	--	--	--	17
Polygonum pennsylvanicum	Pinkweed	0	-4	--	--	p	--	--	--	17
Polygonum puctatum	Dotted smartweed	4	-5	--	--	p	--	--	--	17
Polygonum sp.	Smartweed	2	-4	--	p	--	--	--	--	17
Pontedaria cordata	Pickerel-weed	7	-5	--	--	p	--	--	--	17
Potentilla norvegica	Norwegian cinquefoil	2	0	--	p	--	--	--	--	17
Ranunculus abortivus	Small-flowered crowfoot	0	-4	--	p	--	--	--	--	17
Ratibida pinnata	Gray-headed coneflower	4	5	p	p	--	--	--	--	33
Rorippa palustris	Marsh cress	7	-5	--	p	--	--	p	--	33
Rudbeckia hirta	Black-eyed Susan	2	3	p	p	p	--	p	p	83
Rumex altissimus	Pale dock	0	4	--	p	--	--	--	--	17
Senecio pauperculus	Meadow ragwort	5	-1	--	p	--	--	--	--	17
Solidago canadensis	Canada goldenrod	0	3	p	p	p	--	p	--	67
Solidago gigantea	Giant goldenrod	3	-3	--	--	--	--	--	p	17
Solidago rigida	Stiff goldenrod	4	4	--	p	--	--	--	--	17
Verbena hastata	Blue vervain	3	-4	--	p	--	--	--	--	17
Veronica peregrina	Purslane speedwell	0	-4	--	p	p	--	--	--	33
Trees and Shrubs										
Acer negundo	Box elder	0	-2	--	p	--	--	--	p	33
Acer saccharinum	Silver maple	1	-3	p	--	--	--	p	--	33
Fraxinus pennsylvanicus	Green ash	1	-3	p	p	--	--	p	--	50
Parthenocissus quinquefolia	Virginia creeper	2	1	--	--	p	--	--	--	17
Populus deltoides	Cottonwood	1	-1	p	p	p	--	p	--	67
Quercus bicolor	Swamp white oak	8	-4	p	--	--	--	--	--	17
Quercus macrocarpa	Bur oak	4	1	p	--	--	--	p	--	33
Ribes sp.	Gooseberry	3.5	5	--	--	p	--	--	--	17
Salix amygdaloides	Peach-leaved willow	1	-3	--	p	p	--	p	--	50
Salix exigua	Sandbar willow	0	-5	--	p	p	--	p	p	67
Salix nigra	Black willow	3	-5	--	--	p	--	--	--	17
Ulmus sp.	Elm	2	-1	--	--	--	--	p	--	17
Non-native										
Abutilon theophrastii	Buttonweed	*	4	--	--	p	--	--	--	17
Agropyron repens	Quack grass	*	3	--	p	--	--	--	--	17
Agrostis gigantea	Redtop	*	-3	--	p	p	--	p	--	50
Bromus inermis	Smooth brome	*	5	--	p	--	--	--	--	17

Scientific Name	Common Name	ICC	WS	PSS	TGP	TF*	SF*	WS*	WC3F*	CC%
Cirsium arvense	Canada thistle	*	3	--	p	--	--	p	--	33
Coreopsis tinctoria	Golden coreopsis	*	1	--	p	p	--	--	--	33
Coronilla varia	Crown vetch	*	5	p	p	--	--	p	--	50
Dactylis glomerata	Orchard grass	*	3	--	p	--	--	--	--	17
Daucus carota	Queen Anne's lace	*	5	--	p	--	--	--	--	17
Echinochloa crusgalli	Barnyard grass	*	-3	--	--	p	--	--	--	17
Festuca arundinacea	Tall fescue	*	2	--	p	--	--	p	--	33
Lactuca seriola	Prickly lettuce	*	0	--	p	--	--	--	--	17
Lepidium campestre	Field cress	*	5	--	p	--	--	--	--	17
Leucanthemum vulgare	Ox-eye daisy	*	5	--	p	--	--	--	--	17
Lotus corniculatus	Bird's-foot trefoil	*	1	--	p	--	--	--	--	17
Medicago lupulina	Black medic	*	1	p	p	--	--	--	--	33
Medicago sativa	Alfalfa	*	5	--	p	--	--	--	--	17
Melilotus alba	White sweet clover	*	3	--	p	--	--	--	--	17
Melilotus officinalis	Yellow sweet clover	*	3	--	p	p	--	--	--	33
Pastinaca sativa	Wild parsnip	*	5	--	p	--	--	--	--	17
Phalaris arundinacea	Reed canary grass	*	-4	--	p	p	--	p	p	67
Phleum pratense	Timothy	*	3	--	p	p	--	p	--	50
Poa pratensis	Kentucky bluegrass	*	1	--	p	--	--	p	--	33
Polygonum persicaria	Lady's thumb	*	-3	--	p	--	--	--	--	17
Rosa multiflora	Multiflora rose	*	3	--	p	--	--	--	--	17
Rumex crispus	Curly dock	*	-1	--	p	p	--	p	--	50
Setaria faberi	Giant foxtail	*	2	--	--	p	--	--	--	17
Setaria viridis	Green foxtail	*	5	--	--	p	--	--	--	17
Sisymbrium loeselii	Tall hedge mustard	*	5	--	p	--	--	--	--	17
Taraxacum officinale	Common dandelion	*	3	p	p	--	--	p	--	50
Thlaspi arvense	Penny cress	*	5	--	p	--	--	--	--	17
Trifolium hybridum	Alsike clover	*	1	p	p	p	--	p	--	67
Trifolium pratense	Red clover	*	2	--	p	p	--	p	--	50
Trifolium repens	White clover	*	2	--	p	--	--	--	--	17
Verbascum thapsis	Common mullein	*	5	--	p	--	--	--	--	17
Total Species Richness				16	81	55	3	33	14	119
Native Richness				12	50	43	3	22	13	84
Non-native Richness				4	31	12	0	11	1	35
Native Richness Index				2.6	1.6	3.4	4.0	1.9	7.0	2.4

Scientific Name	Common Name	ICC	WS	PSS	TGP	TF*	SF*	WS*	WC3F*	CC%
Mean Native Conservatism				3.5	2.3	2.5	5.7	1.8	2.4	
Mean Wetland Status				1.1	0.8	-1.7	-5.0	-0.1	-1.9	

Table 6. Pleasantville floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

RCG – Temporary flooded reed canary grass
TF – Temporary/seasonally flooded wetland
SF – Semi-permanently flooded wetland/aquatic
TGP – Tallgrass prairie reconstruction
LW/F – Lowland woodland & forest

Scientific Name	Common Name	ICC	WS	RCG*	TF*	SF*	TGP	LW/F	CC%
Graminoids									
Alopecurus carolinianus	Common foxtail	0	-3	--	--	--	p	--	20
Andropogon gerardii	Big bluestem	4	1	--	--	--	p	--	20
Bouteloua curtipendula	Side-oats grama	6	5	--	--	--	p	--	20
Carex annectans	Large yellow fox sedge	6	-3	--	p	--	--	--	20
Carex blanda	Common wood sedge	2	0	--	--	--	p	--	20
Carex comosa	Bristly sedge	6	-5	--	p	--	p	--	40
Carex hystericina	Porcupine sedge	5	-5	--	p	--	--	--	20
Carex lupulina	Common hop sedge	6	-5	--	p	--	--	--	20
Carex retrorsa	Deflexed bottlebrush sedge	8	-5	--	p	--	--	--	20
Carex shortiana	Short's sedge	8	-4	p	--	--	--	--	20
Carex tribuloides	Awl-fruited oval sedge	3	-4	--	p	--	--	--	20
Carex vulpinoidea	Brown fox sedge	3	-5	p	p	--	p	--	60
Echinochloa muricata	Spiny barnyard grass	3	-5	--	p	--	--	--	20
Eleocharis engelmannii	Engelmann's spike rush	7	-3	--	p	p	--	--	40
Eleocharis obtusa	Blunt spike rush	3	-5	--	p	--	p	--	40
Elymus canadensis	Canada wild rye	5	1	--	--	--	p	--	20
Glyceria striata	Fowl manna grass	5	-5	--	p	--	--	--	20
Juncus dudleyii	Dudley's rush	2	0	--	p	--	--	--	20
Juncus effusus	Common rush	4	-5	--	p	--	--	--	20
Juncus tenuis	Path rush	0	0	p	--	--	p	--	40
Panicum virgatum	Switchgrass	5	-1	--	--	--	p	--	20
Schizochyrium scoparium	Little bluestem	5	4	--	--	--	p	--	20
Scirpus (acutis)	Hard-stemmed bulrush	4	-5	--	p	--	--	--	20
Scirpus atrovirens	Dark green bulrush	1	-5	p	p	--	p	--	60
Scirpus validus	Soft-stemmed bulrush	3	-5	--	p	--	--	--	20

Scientific Name	Common Name	ICC	WS	RCG*	TF*	SF*	TGP	LW/F	CC%
Sorghastrum nutans	Indian grass	4	2	p	--	--	p	--	40
Sporobolus asper	Dropseed	3	5	--	--	--	p	--	20
Typha angustifolia	Narrow-leaved cattail	1	-5	--	p	--	--	--	20
Aquatic									
Ceratophyllum demersum	Coontail	0	-5	--	--	p	--	--	20
Lemna minor	Duckweed	3	-5	--	--	p	--	--	20
Lemna minuta		3	-5	--	p	p	--	--	40
Najas guadalupensis	Southern naiad	5	-5	--	--	p	--	--	20
Potomogeton nodosus	American pondweed	7	-5	--	p	p	--	--	40
Forbs									
Alisma subcordatum	Water plantain	3	-5	--	p	--	--	--	20
Alisma trivale	Water plantain	3	-5	--	p	--	--	--	20
Ambrosia artemisiifolia	Common ragweed	0	3	--	p	--	--	--	20
Ammania coccinea	Toothcup	4	-5	--	p	p	--	--	40
Apocynum sibiricum	Indian hemp	1	-1	p	--	--	p	--	40
Asclepias incarnata	Swamp milkweed	4	-5	p	p	--	p	--	60
Asclepias syriaca	Common milkweed	0	5	--	--	--	p	--	20
Aster ericoides	Heath aster	3	4	--	--	--	p	--	20
Aster laneceolatus	Panicled aster	4	-3	--	--	--	p	--	20
Aster nova-angliae	New England aster	3	-3	--	--	--	p	--	20
Aster pilosus	Hairy aster	0	4	p	--	--	p	--	40
Bacopa rotundifolia	Water hyssop	6	-5	--	p	p	--	--	40
Bidens cernua	Nodding bur marigold	2	-5	--	p	--	--	--	20
Boltonia asteroides	False aster	5	-3	p	p	--	p	--	60
Calystegia sepium	American bindweed	0	0	p	p	--	--	--	40
Ceratium nutans	Nodding chickweed	0	2	p	--	--	p	--	40
Chamaecrista fasciculata	Partridge pea	1	4	--	p	--	p	--	40
Cirsium discolor	Field thistle	1	5	--	--	--	p	--	20
Conyza canadensis	Horseweed	0	1	--	p	--	p	--	40
Erigernon annuus	Annual fleabane	0	1	p	p	--	p	--	60
Eupatorium altissimum	Tall thoroughwort	2	3	p	--	--	p	--	40
Eupatorium perfoliatum	Boneset	6	-4	--	p	--	--	--	20
Galium aparine	Cleavers	1	3	p	--	--	--	p	40
Helenium autumnale	Sneezeweed	4	-4	p	p	--	p	--	60
Helianthus tuberosus	Jerusalem artichoke	0	0	--	--	--	p	--	20

Scientific Name	Common Name	ICC	WS	RCG*	TF*	SF*	TGP	LW/F	CC%
Heracleum lanatum	Cow parsnip	4	-3	p	--	--	--	--	20
Hordeum jubatum	Squirrel-tail barley	0	-1	--	--	--	p	--	20
Hypericum punctatum	Spotted St. John's wort	5	-1	--	p	--	--	--	20
Lactuca canadensis	Yellow lettuce	1	2	--	--	--	p	--	20
Lobelia silphilitica	Great lobelia	3	-4	p	--	--	p	--	40
Ludwigia alternifolia	Seedbox	4	-5	--	p	--	--	--	20
Ludwigia polycarpa	False loosestrife	7	-5	--	p	--	--	--	20
Lythrum alatum	Winged loosestrife	3	-5	p	p	--	--	--	40
Mimulus ringens	Monkey flower	3	-5	--	p	--	--	--	20
Monarda fistulosa	Wild bergamot	2	3	--	--	--	p	--	20
Oenothera biennis	Common evening primrose	0	3	--	p	--	--	--	20
Oxalis stricta	Yellow wood sorrel	0	3	--	p	--	--	--	20
Penstemon digitalis	Foxglove penstemon	4	1	p	p	--	--	--	40
Physalis longifolia	Common ground cherry	3	3	--	--	--	p	--	20
Polygonum amphibium	Water smartweed	3	-5	p	p	--	p	--	60
Polygonum pennsylvanicum	Pinkweed	0	-4	p	--	--	--	--	20
Potentilla norvegica	Norwegian cinquefoil	2	0	p	p	--	--	--	40
Ranunculus sceleratus	Cursed crowfoot	4	-5	--	p	--	--	--	20
Ratibida pinnata	Gray-headed coneflower	4	5	--	--	--	p	--	20
Rorippa sessiliflora	Sessile-flowered cress	4	-5	--	p	--	p	--	40
Rudbeckia hirta	Black-eyed Susan	2	3	p	p	--	p	--	60
Rudbeckia subtomentosa	Fragrant coneflower	4	-3	p	p	--	p	--	60
Rumex altissimus	Pale dock	0	4	p	p	--	p	--	60
Sagittaria brevirostra	Short-beaked arrowleaf	4	-5	--	p	p	--	--	40
Sagittaria calycina	Thick-stalked arrowhead	8	-5	--	p	--	--	--	20
Scutellaria lateriflora	Mad-dog skullcap	6	-5	--	p	--	--	--	20
Silphium perfoliatum	Cup plant	1	-2	p	--	--	p	--	40
Solidago canadensis	Canada goldenrod	0	3	p	--	--	p	--	40
Solidago gigantea	Giant goldenrod	3	-3	--	--	--	--	p	20
Stachys tenuiflora	Smooth hedge nettle	5	-5	--	--	--	--	p	20
Urtica dioica	Stinging nettle	0	-1	p	p	--	--	p	60
Verbena hastata	Blue vervain	3	-4	p	p	--	p	--	60
Verbena stricta	Hoary vervain	1	5	--	--	--	p	--	20
Verbena urticifolia	White vervain	2	-1	--	p	--	--	--	20
Vernonia fasciculata	Prairie ironweed	1	-3	p	--	--	p	--	40
Veronica peregrina	Purslane speedwell	0	-4	--	p	--	--	--	20

Scientific Name	Common Name	ICC	WS	RCG*	TF*	SF*	TGP	LW/F	CC%
Trees and Shrubs									
Acer negundo	Box elder	0	-2	p	--	--	--	--	20
Acer saccharinum	Silver maple	1	-3	--	--	--	--	p	20
Cornus foemina	Gray dogwood	1	-2	--	--	--	--	p	20
Juglans nigra	Black walnut	4	3	--	--	--	--	p	20
Populus deltoides	Cottonwood	1	-1	--	--	--	--	p	20
Quercus macrocarpa	Bur oak	4	1	--	--	--	p	--	20
Salix amygdaloides	Peach-leaved willow	1	-3	--	(p)	--	--	--	20
Symphoricarpos	Buckbrush	0	4	--	--	--	--	p	20
Toxicodendron radicans	Poison ivy	0	-1	--	--	--	--	p	20
Ulmus americana	American elm	2	-2	--	--	--	--	p	20
Non-native									
Agrostis gigantea	Redtop	*	-3	p	p	--	p	--	60
Bromus commutatus	Hairy chess	*	5	--	--	--	p	--	20
Bromus inermis	Smooth brome	*	5	p	--	--	--	--	20
Bromus tectorum	Downy chess	*	5	--	--	--	p	--	20
Capsella bursa-pastoris	Shepherd's purse	*	1	p	--	--	--	--	20
Cirsium arvense	Canada thistle	*	3	--	--	--	p	--	20
Cirsium vulgare	Bull thistle	*	4	--	--	--	p	--	20
Daucus carota	Queen Anne's lace	*	5	--	--	--	p	--	20
Echinochloa crusgalli	Barnyard grass	*	-3	--	p	--	--	--	20
Lactuca seriola	Prickly lettuce	*	0	--	p	--	p	--	40
Lamium purpureum	Purple dead nettle	*	5	--	--	--	p	--	20
Lepidium campestre	Field cress	*	5	--	--	--	p	--	20
Lonicera maackii	Tartarian honeysuckle	*	3	--	--	--	--	p	20
Lotus corniculatus	Bird's-foot trefoil	*	1	p	--	--	p	--	40
Medicago lupulina	Black medic	*	1	--	p	--	--	--	20
Phlaris arundinacea	Reed canary grass	*	-4	p	p	--	p	p	80
Phleum pratense	Timothy	*	3	p	--	--	p	--	40
Poa pratensis	Kentucky bluegrass	*	1	--	--	--	p	--	20
Potentilla recta	Sulphur cinquefoil	*	5	--	p	--	--	--	20
Robinia pseudoacacia	Black locust	*	4	--	--	--	p	--	20
Rumex crispus	Curly dock	*	-1	p	p	--	p	--	60
Secale cereale	Cult rye	*	5	--	--	--	p	--	20
Setaria faberi	Giant foxtail	*	2	--	--	--	p	--	20
Taraxacum officinale	Common dandelion	*	3	--	--	--	p	--	20

Scientific Name	Common Name	ICC	WS	RCG*	TF*	SF*	TGP	LW/F	CC%
Thlaspi arvense	Penny cress	*	5	p	--	--	p	--	40
Vicia cracca	Cow vetch	*	5	--	--	--	p	--	20
Total Species Richness				39	63	9	67	13	130
Native Richness				31	56	9	47	11	104
Non-native Richness				8	7	0	20	2	26
Native Richness Index				3.6	7.1	10.0	2.3	4.0	3.9
Mean Native Conservatism				2.0	3.3	4.3	2.4	1.6	
Mean Wetland Status				-0.8	-2.8	-4.8	0.9	-0.7	

Table 7. Brush Creek floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

SF – Semi-permanently flooded wetland/aquatic
TF – Temporary/seasonally flooded wetland
TFDF – Temporary flooded deciduous forest
CT – Temporary flooded cattail wetland
RCG – Temporary flooded reed canary grass
WC3 – Wet cool-season grassland
WS – Wet shrubland
C3 – Cool-season grassland
TGP – Tallgrass prairie reconstruction
UWS – Upland woodland/shrubland
C3W – Upland woodland and cool-season grass

Scientific Name	Common Name	ICC	WS	SF*	TF*	TFDF*	CT*	RCG*	WC3*	WS*	C3	TGP	UWS	C3W	CC%
Seedless Plants															
Equisetum arvense	Common horsetail	0	0	--	--	--	--	p	--	--	--	p	--	--	18
Equisetum hymale	Common scouring-rush	1	-2	--	--	--	--	--	p	--	--	--	--	--	9
Equisetum laevigatum	Smooth scouring-rush	6	-3	--	--	--	--	--	--	--	p	--	--	--	9
Graminoids															
Andropogon gerardii	Big bluestem	4	1	--	--	--	--	--	--	--	p	p	--	--	18
Bouteloua curtipendula	Side-oats grama	6	5	--	--	--	--	--	--	--	--	p	--	--	9
Carex brevior	Plains oval sedge	4	0	--	--	--	--	--	p	--	--	--	--	--	9
Carex cephalophora	Short-headed bracted sedge	5	3	--	--	--	--	--	--	--	p	--	--	--	9
Carex cristatella	Crested oval sedge	5	-4	--	p	--	--	p	--	--	--	--	--	--	18
Carex gravida	Long-awned bracted sedge	1	5	--	--	--	--	--	--	--	p	--	--	--	9
Carex molesta	Field oval sedge	2	0	--	--	--	--	--	--	--	p	--	--	--	9
Carex normalis	Spreading oval sedge	5	-3	--	--	--	--	--	p	--	--	--	--	--	9
Carex vulpinoidea	Brown fox sedge	3	-5	--	p	--	p	p	p	--	p	p	--	p	64
Carex sp.	Sedge	3	-3	--	p	--	--	--	--	--	--	--	p	--	18
Cyperus odoratus	Nutsedge	2	-3	--	p	--	--	--	--	--	--	--	--	--	9
Dichanthelium acuminatum	Panic grass	3	0	--	--	--	--	--	--	--	p	--	--	--	9
Dichanthelium oligosanthes	Scribner's panic grass	5	3	--	--	--	--	--	--	--	p	--	--	--	9
Eleocharis erythropoda	Red-rooted spike rush	4	-5	--	--	--	--	p	--	--	--	--	--	--	9
Eleocharis obtusa	Blunt spike rush	3	-5	--	p	--	--	p	--	--	--	--	--	--	18
Elymus villosa	Slender wild rye	5	3	--	--	--	--	--	--	--	--	--	p	--	9
Elymus virginicus	Virginia wild rye	3	-2	--	--	p	--	--	--	--	--	--	p	--	18
Glyceria striata	Fowl manna grass	5	-5	--	--	--	--	--	p	--	--	--	--	--	9
Juncus dudleyii	Dudley's rush	2	0	--	--	--	--	--	p	--	--	p	--	--	18
Juncus tenuis	Path rush	0	0	--	--	--	--	--	p	--	p	--	--	--	18

Scientific Name	Common Name	ICC	WS	SF*	TF*	TFDF*	CT*	RCG*	WC3*	WS*	C3	TGP	UWS	C3W	CC%
Leersia oryzoides	Rice cut-grass	2	-5	--	p	--	--	p	--	--	--	--	--	--	18
Leersia virginica	Whitegrass	6	-3	--	--	p	--	--	--	--	--	--	--	--	9
Muhlenbergia frondosa	Wirestem muhly	3	-3	--	--	--	--	--	--	--	--	--	p	--	9
Muhlenbergia sp.	Muhly grass	3	-1	--	--	--	--	--	--	p	--	--	--	p	18
Panicum virgatum	Switchgrass	5	-1	--	--	--	--	--	--	--	p	p	--	--	18
Schizachyrium scoparium	Little bluestem	5	4	--	--	--	--	--	--	--	p	p	--	--	18
Scirpus atrovirens	Dark green bulrush	1	-5	--	p	--	--	p	p	--	--	--	--	--	27
Scirpus validus	Soft-stemmed bulrush	3	-5	--	--	--	--	p	--	--	--	--	--	--	9
Sorghastrum nutans	Indian grass	4	2	--	--	--	--	--	--	--	p	p	--	--	18
Sporobolus asper	Dropseed	3	5	--	--	--	--	--	--	--	p	--	--	--	9
Typha angustifolia	Narrow-leaved cattail	1	-5	--	--	--	p	--	--	--	--	--	--	--	9
Typha latifolia	Common cattail	1	-5	--	p	--	p	p	p	--	--	--	--	--	36
Aquatic															
Ceratophyllum demersum	Coontail	0	-5	p	--	--	--	--	--	--	--	--	--	--	9
Lemna minor	Duckweed	3	-5	p	--	--	p	p	--	--	--	--	--	--	27
Potamogeton foliosus	Leafy pondweed	7	-5	p	--	--	--	--	--	--	--	--	--	--	9
Forbs															
Acalyphya rhomboidea	Three-seeded mercury	6	3	--	--	p	--	--	--	--	--	--	--	--	9
Acalyphya virginica	Three-seeded mercury	0	3	--	--	--	--	--	--	p	--	--	--	--	9
Achillea millefolium	Western yarrow	0	3	--	--	--	--	--	--	--	p	--	--	--	9
Ambrosia artemisiifolia	Common ragweed	0	3	--	--	--	--	--	--	--	p	--	--	--	9
Ambrosia trifida	Giant ragweed	0	-1	--	--	--	--	p	--	--	--	--	p	p	27
Antennaria neglecta	Pussytoes	2	5	--	--	--	--	--	--	--	p	--	--	--	9
Apios americana	Ground-nut	4	-3	--	--	--	--	p	--	--	--	--	--	--	9
Apocynum sibiricum	Indian hemp	1	-1	--	p	--	--	--	--	--	p	--	--	--	18
Asclepias incarnata	Swamp milkweed	4	-5	--	p	--	p	--	--	--	--	--	--	--	18
Asclepias syriaca	Common milkweed	0	5	--	p	p	--	p	--	--	p	p	--	p	55
Aster ericoides	Heath aster	3	4	--	--	--	--	--	--	--	--	p	--	--	9
Aster lanceolatus	Panicled aster	4	-3	--	--	--	--	p	--	--	--	p	--	--	18
Aster nova-angliae	New England aster	3	-3	--	--	--	--	--	--	--	--	p	--	--	9
Aster pilosus	Hairy aster	0	4	--	--	--	--	p	--	p	p	p	--	--	36
Aster sagittifolius	Arrow-leaved aster	6	5	--	--	--	--	--	--	p	--	--	--	--	9
Bidens cernua	Nodding bur marigold	2	-5	--	p	--	--	p	--	--	--	--	--	--	18
Bidens frondosa	Beggar-ticks	3	-3	--	--	p	--	--	--	--	--	--	--	--	9
Bidens polylepis	Tickseed	3	-3	--	--	--	--	p	--	--	--	--	--	--	9

Scientific Name	Common Name	ICC	WS	SF*	TF*	TFDF*	CT*	RCG*	WC3*	WS*	C3	TGP	UWS	C3W	CC%
Bidens tripartita	Swamp tickseed	3	-5	--	p	--	--	--	--	--	--	--	--	--	9
Calystegia sepium	American bindweed	0	0	--	p	--	--	p	p	--	p	--	p	--	45
Campanula americana	Tall bellflower	4	0	--	--	--	--	--	--	--	--	--	p	--	9
Chenopodium standleyanum	Woodland goosefoot	6	5	--	--	p	--	--	--	--	--	--	--	--	9
Cirsium discolor	Field thistle	1	5	--	--	--	--	p	--	p	p	p	p	--	45
Conyza canadensis	Horseweed	0	1	--	p	--	--	--	--	p	--	--	--	--	18
Cryptotaenia canadensis	Honewort	4	0	--	--	p	--	--	--	--	--	--	--	--	9
Dalea purpurea	Purple prairie clover	8	5	--	--	--	--	--	--	--	p	--	--	--	9
Desmodium paniculatum	Panicled tick-trefoil	8	3	--	--	--	--	--	--	--	p	--	--	--	9
Echinacea purpurea	Purple coneflower	9	5	--	--	--	--	--	--	--	p	p	--	--	18
Echinocystis lobata	Wild balsam apple	2	-2	--	--	p	--	--	--	--	--	--	--	--	9
Epilobium coloratum	Cinnamon willowherb	3	-5	--	p	--	--	--	p	--	--	--	--	--	18
Erechtites hieracifolia	Fireweed	0	3	--	p	--	--	--	--	--	--	--	--		18
Erigernon annuus	Annual fleabane	0	1	--	p	--	--	--	p	--	p	p	--	p	45
Eupatorium rugosum	White snakeroot	2	3	--	--	--	--	--	--	--	--	--	p	--	9
Euphorbia corollata	Flowering spurge	3	5	--	--	--	--	--	--	--	p	--	--	--	9
Galium aparine	Cleavers	1	3	--	p	--	--	p	--	--	p	p	p	--	45
Galium triflorum	Sweet-scented bedstraw	7	2	--	--	p	--	--	--	p	--	--	p	--	27
Geum canadense	White avens	2	0	--	--	--	--	p	--	--	--	--	p	--	18
Geum laciniatum	Rough avens	4	-3	--	--	--	--	--	p	--	--	p	--	--	18
Gnaphalium obtusifolium	Everlasting	1	5	--	--	--	--	--	--	--	p	--	--	--	9
Hackelia virginiana	Stickseed	0	1	--	--	--	--	p	--	--	--	--	p	--	18
Helianthus grosseserratus	Saw-tooth sunflower	4	-2	--	--	--	--	--	p	--	--	--	--	--	9
Helianthus tuberosus	Jerusalem artichoke	0	0	--	--	--	--	p	--	--	p	p	p	--	36
Lactuca canadensis	Yellow lettuce	1	2	--	--	--	--	p	--	--	p	p	--	--	27
Lactuca floridana	Blue lettuce	4	1	--	--	p	--	--	--	p	--	--	p	--	27
Lepidium virginicum	Poor-man's pepper	0	4	--	--	--	--	--	--	--	p	--	--	--	9
Lobelia siphilitica	Great lobelia	3	-4	--	--	--	p	--	--	--	--	--	--	--	9
Lycopus americanus	Water horehound	4	-5	--	p	--	p	p	--	--	--	--	--	--	27
Lythrum alatum	Winged loosestrife	3	-5	--	--	--	--	--	p	--	--	--	--	--	9
Mimulus ringens	Monkey flower	3	-5	--	p	--	--	p	--	--	--	--	--	--	18
Monarda fistulosa	Wild bergamot	2	3	--	--	--	--	p	--	--	p	p	--	p	36
Oenothera biennis	Common evening primrose	0	3	--	p	--	--	--	--	--	p	p	--	--	27
Osmorhiza longistylis	Anise root	5	4	--	--	--	--	--	--	--	--	--	p	--	9
Oxalis stricta	Yellow wood sorrel	0	3	--	--	--	--	--	p	--	p	p	--	--	27
Physalis heterophylla	Ground cherry	2	5	--	--	--	--	--	--	--	p	--	--	--	9
Physalis longifolia	Clammy ground cherry	3	3	--	--	--	--	--	--	--	p	--	--	--	9

Scientific Name	Common Name	ICC	WS	SF*	TF*	TFDF*	CT*	RCG*	WC3*	WS*	C3	TGP	UWS	C3W	CC%
Physalis virginana	Eastern ground cherry	4	5	--	--	--	--	--	--	--	p	--	--	--	9
Pilea pumila	Clearweed	3	-3	--	--	p	--	--	--	--	--	--	--	--	9
Plantago rugelli	Rugel's plantain	0	0	--	--	--	--	p	p	--	p	--	--	--	27
Polygonatum biflorum	Solomon's seal	4	3	--	--	--	--	--	--	--	--	--	p	--	9
Polygonum amphibium	Water smartweed	3	-5	--	p	--	--	--	--	--	--	--	--	--	9
Polygonum hydropiper	Water pepper	3	-5	--	p	--	--	--	--	--	--	--	--	--	9
Polygonum lapathifolium	Curttop lady's thumb	0	-4	--	p	--	--	--	--	--	--	--	--	--	9
Polygonum pennsylvanicum	Pinkweed	0	-4	--	p	--	--	--	--	--	--	--	--	--	9
Polygonum punctatum	Dotted smartweed	4	-5	--	--	p	--	p	--	--	--	--	--	--	18
Polygonum scandens	Climbing false buckwheat	2	0	--	--	p	--	--	--	p	--	--	p	--	27
Potentilla norvegica	Norwegian cinquefoil	2	0	--	p	--	--	--	--	--	--	--	--	--	9
Prunella vulgaris	Self heal	0	0	--	--	--	--	--	p	--	--	--	--	--	9
Ranunculus abortivus	Small-flowered crowfoot	0	-4	--	--	--	--	--	--	--	--	--	p	--	9
Ratibida pinnata	Gray-headed coneflower	4	5	--	--	--	p	--	--	--	p	p	--	--	27
Rorippa palustris	Marsh cress	7	-5	--	p	--	--	p	--	--	--	--	--	--	18
Rudbeckia hirta	Black-eyed Susan	2	3	--	--	--	--	--	p	--	p	p	--	--	27
Rumex altissimus	Pale dock	0	4	--	--	--	--	p	--	--	p	--	--	--	18
Sagittaria calycina	Thick-stalked arrowhead	8	-5	--	p	--	p	p	--	--	--	--	--	--	27
Sanicula canadensis	Black snakeroot	6	2	--	--	--	--	--	--	--	p	--	p	p	27
Sanicula gregaria	Common snakeroot	5	-1	--	--	p	--	--	--	--	--	--	p	--	18
Silene stellata	Starry campion	4	5	--	--	--	--	--	--	--	--	--	p	--	9
Silphium perfoliatum	Cup plant	1	-2	--	--	--	--	p	--	p	p	p	p	p	55
Solanum americanum	Black nightshade	0	4	--	--	--	--	--	--	--	p	--	--	--	9
Solanum carolinense	Horse nettle	0	4	--	--	--	--	p	--	--	p	--	--	--	18
Solidago canadensis	Canada goldenrod	0	3	--	p	--	--	p	--	p	p	p	p	p	64
Solidago gigantea	Giant goldenrod	3	-3	--	--	p	--	p	--	--	--	--	--	p	27
Teucrium canadense	American germander	4	-2	--	--	--	--	p	--	--	p	--	p	--	27
Urtica dioica	Stinging nettle	0	-1	--	p	p	--	p	--	p	p	--	p	--	55
Verbena hastata	Blue vervain	3	-4	--	p	--	--	--	--	--	--	--	--	--	9
Verbena stricta	Hoary vervain	1	5	--	--	--	--	--	--	--	--	p	--	--	9
Verbena urticifolia	White vervain	2	-1	--	p	p	p	p	--	--	--	--	p	p	55
Vernonia baldwinii	Baldwin's ironweed	2	5	--	--	--	--	--	--	--	p	--	p	--	18
Vernonia fasciculata	Prairie ironweed	1	-3	--	--	--	--	p	--	--	--	--	--	--	9
Viola sororia	Common blue violet	1	1	--	--	p	--	--	--	--	--	--	p	--	18
Trees and Shrubs															
Acer negundo	Box elder	0	-2	--	--	p	--	p	--	--	--	p	p	--	36

Scientific Name	Common Name	ICC	WS	SF*	TF*	TFDF*	CT*	RCG*	WC3*	WS*	C3	TGP	UWS	C3W	CC%
Acer saccharinum	Silver maple	1	-3	--	--	p	--	p	--	--	--	--	p	--	27
Amorpha fruticosa	Indigo bush	5	-4	--	--	--	--	p	--	--	--	--	--	--	9
Celtis occidentalis	Hackberry	2	1	--	--	--	--	--	--	p	--	--	p	--	18
Cornus amomum	Silky dogwood	6	-4	--	p	--	--	--	--	--	p	--	--	--	18
Cornus drummondii	Rough-leaved dogwood	6	0	--	--	--	--	--	--	--	p	p	--	--	18
Cornus foemina	Gray dogwood	1	-2	--	--	--	--	--	--	p	--	--	p	--	18
Crataegus mollis	Downy hawthorn	3	-2	--	--	--	--	p	--	--	--	--	--	--	9
Fraxinus pennsylvanicus	Green ash	1	-3	--	--	--	--	p	--	--	p	--	--	--	18
Gleditsia triacanthos	Honey locust	0	0	--	--	--	--	p	--	--	p	--	p	p	36
Juniperus virginia	Red cedar	1	3	--	--	--	--	--	--	--	p	p	--	--	18
Malus iowensis	Wild crab	4	5	--	--	--	--	--	--	--	--	--	p	--	9
Parthenocissus vitacea	Woodbine	1	3	--	--	--	--	p	--	--	--	--	p	p	27
Populus deltoides	Cottonwood	1	-1	--	--	--	--	p	--	--	p	p	p	--	36
Populus tremuloides	Quaking aspen	2	0	--	--	--	--	p	--	--	--	--	--	--	9
Prunus americana	Wild plum	2	5	--	--	--	--	p	--	--	p	--	p	--	27
Prunus serotina	Wild black cherry	3	3	--	--	--	--	--	--	--	p	p	p	--	27
Quercus bicolor	Swamp white oak	8	-4	--	--	--	--	--	--	--	p	--	--	--	9
Quercus borealis	Northern red oak	6	3	--	--	--	--	--	--	--	p	--	--	--	9
Quercus macrocarpa	Bur oak	4	1	--	--	--	--	p	--	--	p	p	--	--	27
Ribes missouriensis	Wild gooseberry	3	5	--	--	--	--	--	--	p	--	--	p	p	27
Rubus allegheniensis	Blackberry	2	2	--	--	--	--	--	--	--	p	--	--	--	9
Rubus occidentalis	Black raspberry	1	5	--	--	--	--	p	--	p	p	p	p	p	55
Salix exigua	Sandbar willow	0	-5	--	--	--	--	--	p	--	--	--	--	--	9
Salix nigra	Black willow	3	-5	--	--	p	p	p	--	--	--	--	--	--	27
Salix sp.	Willow	2	-3	--	p	--	--	--	--	--	p	--	--	--	18
Sambuccus canadensis	Elderberry	1	4	--	--	p	--	p	--	p	--	--	p	--	36
Smilax hispida	Greenbrier	4	0	--	--	--	--	--	--	--	--	--	p	--	9
Symphoricarpos orbiculatus	Coralberry	0	3	--	--	--	--	p	--	p	p	p	p	p	55
Toxicodendron radicans	Poison ivy	0	-1	--	--	--	--	p	--	--	p	--	p	p	36
Ulmus americana	American elm	2	-2	--	--	--	--	p	--	p	--	--	p	--	27
Ulmus rubra	Red elm	2	0	--	--	--	--	--	--	--	--	--	--	p	9
Vitis riparia	Riverbank grape	1	-2	--	--	p	--	p	--	p	p	--	--	p	45
Non-native															
Abutilon theophrastii	Buttonweed	*	4	--	--	--	--	p	--	--	--	--	--	--	9
Agropyron repens	Quack grass	*	3	--	--	--	--	p	--	--	--	--	--	--	9
Amaranthus sp.	Pigweed	*	0	--	--	--	--	p	--	--	--	--	--	--	9

Scientific Name	Common Name	ICC	WS	SF*	TF*	TFDF*	CT*	RCG*	WC3*	WS*	C3	TGP	UWS	C3W	CC%
Arctium minus	Common burdock	*	5	--	--	--	--	--	--	--	--	--	p	p	18
Barbarea vulgaris	Yellow rocket	*	0	--	p	--	--	p	--	--	p	p	--	p	45
Bromus commutatus	Hairy chess	*	5	--	--	--	--	--	--	--	p	--	--	--	9
Bromus inermis	Smooth brome	*	5	--	--	--	--	--	--	--	p	p	p	p	36
Carduus nutans	Musk thistle	*	5	--	--	--	--	--	--	--	p	--	--	--	9
Chenopodium album	Lamb's quarters	*	1	--	--	p	--	--	--	--	--	--	p	--	18
Cirsium arvense	Canada thistle	*	3	--	--	--	--	p	--	--	p	p	--	--	27
Cirsium vulgare	Bull thistle	*	4	--	--	--	--	--	--	--	p	--	--	--	9
Coronilla varia	Crown vetch	*	5	--	--	--	--	--	--	--	p	--	--	--	9
Dactylis glomerata	Orchard grass	*	3	--	--	--	--	--	p	--	p	p	p	--	36
Daucus carota	Queen Anne's lace	*	5	--	--	--	--	--	--	--	p	--	--	p	18
Dianthus armeria	Deptford pink	*	5	--	--	--	--	--	--	--	p	--	--	--	9
Digitaria ischaemum	Smooth crabgrass	*	3	--	--	--	--	--	p	--	--	--	--	--	9
Echinochloa crusgalli	Barnyard grass	*	-3	--	p	p	--	--	--	--	--	--	--	--	18
Elaeagnus angustifolia	Russian olive	*	4	--	--	--	--	--	--	--	p	--	--	--	9
Festuca arundinacea	Tall fescue	*	2	--	--	--	--	--	p	--	p	p	--	p	36
Glechoma hederacea	Creeping Charlie	*	4	--	--	p	--	--	--	--	--	--	--	--	9
Hemerocallus fulva	Day lily	*	5	--	--	--	--	--	--	--	--	--	--	p	9
Hypericum perforatum	Common St. John's wort	*	5	--	--	--	--	--	p	--	--	--	--	--	9
Lactuca seriola	Prickly lettuce	*	0	--	--	--	--	p	p	--	p	--	--	--	27
Leonurus cardiaca	Motherwort	*	5	--	--	p	--	--	--	--	--	--	p	p	27
Lepidium campestre	Field cress	*	5	--	--	--	--	--	--	--	p	--	--	p	18
Lonicera sp.	Honeysuckle	*	4	--	--	--	--	--	--	--	--	--	p	--	9
Lotus corniculatus	Bird's-foot trefoil	*	1	--	--	--	--	p	p	--	p	--	--	--	27
Melilotus alba	White sweet clover	*	3	--	--	--	--	--	p	--	p	p	p	--	36
Melilotus officinales	Yellow sweet clover	*	3	--	--	--	--	--	--	--	p	--	--	--	9
Morus alba	White mulberry	*	0	--	--	--	--	p	--	--	--	--	p	p	27
Pastinaca sativa	Wild parsnip	*	5	--	p	--	p	p	--	p	p	p	p	p	73
Phalaris arundinacea	Reed canary grass	*	-4	--	p	p	p	p	--	p	p	p	p	p	82
Phleum pratense	Timothy	*	3	--	--	--	--	p	--	--	--	--	--	--	9
Plantago major	Common plantain	*	-1	--	--	--	--	--	p	--	--	--	--	--	9
Poa pratensis	Kentucky bluegrass	*	1	--	--	--	--	p	--	--	p	p	p	p	45
Polygonum persicaria	Lady's thumb	*	-3	--	p	--	--	p	--	--	--	--	--	--	18
Robinia pseudoacacia	Black locust	*	4	--	--	--	--	p	--	--	--	--	--	--	9
Rosa multiflora	Multiflora rose	*	3	--	--	--	--	p	--	--	p	p	p	p	45
Rumex crispus	Curly dock	*	-1	--	p	--	--	--	--	--	p	p	--	--	27
Sonchus arvensis	Perennial sow thistle	*	1	--	--	--	--	p	--	--	--	--	--	--	9

Scientific Name	Common Name	ICC	WS	SF*	TF*	TFDF*	CT*	RCG*	WC3*	WS*	C3	TGP	UWS	C3W	CC%
Taraxacum officinale	Common dandelion	*	3	--	--	--	--	p	--	--	p	p	p	p	45
Thlaspi arvense	Penny cress	*	5	--	p	--	--	p	--	--	p	--	--	--	27
Trifolium pratense	Red clover	*	2	--	--	--	--	--	--	--	p	p	--	--	18
Trifolium repens	White clover	*	2	--	--	--	--	--	p	--	p	p	--	--	27
Ulmus pumila	Siberian elm	*	5	--	--	--	--	--	--	--	p	--	--	p	18
Verbascum blattaria	Moth mullein	*	4	--	--	--	--	--	--	--	p	--	--	--	9
Viburnum opulus	Guelder-rose	*	0	--	p	--	--	--	--	p	p	--	--	--	27
Total Species Richness				3	43	28	13	76	29	23	95	50	59	35	207
Native Richness				3	35	23	11	58	20	20	66	36	46	20	160
Non-native Richness				0	8	5	2	18	9	3	29	14	13	15	47
Native Richness Index				4.0	4.0	4.0	4.0	3.1	2.1	5.3	2.2	2.5	3.4	1.3	3.4
Mean Native Conservatism				3.3	2.2	2.9	3.3	1.9	1.9	1.8	2.35	2.3	2.1	1.4	
Mean Wetland Status				-5.0	-2.1	-0.4	-3.0	-0.5	-0.7	1.4	2.19	1.8	1.3	1.7	

Table 8. Grooms floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

TF – Temporary/seasonally flooded wetland
NC3/F – Wet-mesic cool-season grass & forb
LW/F – Lowland woodland & forest

Scientific Name	Common Name	ICC	WS	TF*	NC3F	LW/F	CC%
Seedless Plants							
Equisetum arvense	Common horsetail	0	0	p	--	p	67
Graminoids							
Andropogon gerardii	Big bluestem	4	1	p	p	--	67
Carex amphibola	Narrowleaf sedge	4	-1	--	--	p	33
Carex vulpinoidea	Brown fox sedge	3	-5	p	p	--	67
Cyperus esculentus	Yellow nut grass	0	-3	p	--	--	33
Dichanthelium latifolium	Broad-leaved panic grass	8	3	--	--	p	33
Echinochloa muricata	Spiny barnyard grass	3	-5	p	--	--	33
Eleocharis obtusa	Blunt spike rush	3	-5	p	--	--	33
Elymus canadensis	Canada wild rye	5	1	p	--	p	67
Elymus virginicus	Virginia wild rye	3	-2	(p)	p	--	67
Festuca obtusa	Nodding fescue	7	2	--	--	p	33
Juncus dudleyii	Dudley's rush	2	0	p	--	--	33
Juncus tenuis	Path rush	0	0	p	--	--	33
Panicum dichotomofolium	Fall panicum	0	-2	p	--	--	33
Panicum virgatum	Switchgrass	5	-1	--	p	--	33
Scirpus atrovirens	Dark green bulrush	1	-5	p	p	--	67
Sporobolus asper	Dropseed	3	5	p	--	--	33
Forbs							
Acalyphya virginica	Three-seeded mercury	0	3	--	p	--	33
Alisma subcordatum	Water plantain	3	-5	p	--	--	33
Amarantus tuberculatus	Water pigweed	0	-5	p	--	--	33
Ambrosia artemisiifolia	Common ragweed	0	3	--	p	--	33
Ambrosia trifida	Giant ragweed	0	-1	p	p	p	100
Ammanica coccinea	Toothcup	4	-5	p	--	--	33
Asclepias incarnata	Swamp milkweed	4	-5	p	--	--	33
Aster nova-angliae	New England aster	3	-3	--	p	--	33
Aster pilosus	Hairy aster	0	4	p	f	--	67
Bidens sp.	Tickseed	3	-4	p	p	--	67
Boltonia asteroides	False aster	5	-3	p	p	--	67
Calystegia sepium	American bindweed	0	0	--	p	p	67
Campanula americana	Tall bellflower	4	0	--	--	p	33
Chaerophyllum procumbens	Chervil	2	-1	--	--	p	33
Cirsium discolor	Field thistle	1	5	--	p	--	33
Cuscuta gronovii	Common dodder	4	-3	--	p	--	33
Cryptotaenia canadensis	Honewort	4	0	--	--	p	33
Erigernon annuus	Annual fleabane	0	1	--	f	p	67

Scientific Name	Common Name	ICC	WS	TF*	NC3F	LW/F	CC%
Eupatorium serotinum	Late boneset	2	-1	p	p	--	67
Galium aparine	Cleavers	1	3	--	--	p	33
Gaura biennis	Bienniel gaura	3	4	--	f	--	33
Helianthus tuberosus	Jerusalem artichoke	0	0	--	p	p	67
Heracleum lanatum	Cow parsnip	4	-3	--	--	p	33
Humulus lupulinus	Common hops	3	3	--	--	p	33
Hydrophyllum virginianum	Virginia waterleaf	3	-2	--	--	p	33
Impatiens sp.	Touch-me-not	4	-3	--	--	p	33
Lactuca floridana	Blue lettuce	4	1	--	--	p	33
Laportea canadensis	Yellow lettuce	1	2	--	--	p	33
Lepidium virginicum	Poor-man's pepper	0	4	p	--	--	33
Lindernia dubia	False pimpernel	4	-5	p	--	--	33
Lythrum alatum	Winged loosestrife	3	-5	p	--	--	33
Osmorhiza longistylis	Anise root	5	4	--	--	p	33
Oxalis stricta	Yellow wood sorrel	0	3	p	--	--	33
Penthorum sedoides	Ditch stonecrop	3	-5	p	--	--	33
Phlox divaricata	Sweet William	5	3	--	--	p	33
Plantago rugelli	Rugel's plantain	0	0	p	p	--	67
Plantago virginica	Dwarf plantain	0	4	p	--	--	33
Polygonum pennsylvanicum	Pinkweed	0	-4	p	p	--	67
Polygonum ramosissimum	Bushy knotweed	3	1	p	--	--	33
Potentilla norvegica	Norwegian cinquefoil	2	0	p	p	--	67
Ratibida pinnata	Gray-headed coneflower	4	5	--	p	--	33
Rorippa palustris	Marsh cress	7	-5	p	--	--	33
Rudbeckia hirta	Black-eyed Susan	2	3	--	f	--	33
Rudbeckia laciniata	Tall coneflower	4	-4	--	--	p	33
Rudbeckia triloba	Brown-eyed Susan	5	1	--	p	--	33
Rumex altissimus	Pale dock	0	4	p	p	--	67
Sanicula gregaria	Common snakeroot	5	-1	--	--	p	33
Scrophularia sp.	Figwort	4	3	--	--	p	33
Silphium perfoliatum	Cup plant	1	-2	--	--	p	33
Solanum carolinense	Horse nettle	0	4	--	p	--	33
Solanum americanum	Black nightshade	0	4	p	--	--	33
Solidago canadensis	Canada goldenrod	0	3	--	p	--	33
Solidago gigantea	Giant goldenrod	3	-3	--	--	p	33
Stachys tenuifolia	Smooth hedge nettle	5	-5	--	--	p	33
Thalictrum dasycarpum	Purple meadow-rue	4	-2	--	--	p	33
Urtica dioica	Stinging nettle	0	-1	--	--	p	33
Verbena hastata	Blue vervain	3	-4	p	p	--	67
Verbena urticifolia	White vervain	2	-1	(p)	p	p	100
Vernonia fasciculata	Prairie ironweed	1	-3	p	--	--	33
Veronica peregrina	Purslane speedwell	0	-4	p	--	--	33
Viola sororia	Common blue violet	1	1	--	--	p	33
Trees and Shrubs							
Acer negundo	Box elder	0	-2	--	--	p	33
Acer saccharinum	Silver maple	1	-3	--	p	--	33
Betula nigra	River birch	6	-3	--	p	p	67
Cornus foemina	Gray dogwood	1	-2	--	p	p	67
Fraxinus pennsylvanicus	Green ash	1	-3	--	p	p	67
Gleditsia triacanthos	Honey locust	0	0	--	--	p	33

Scientific Name	Common Name	ICC	WS	TF*	NC3F	LW/F	CC%
Juglans nigra	Black walnut	4	3	--	--	p	33
Populus deltoides	Cottonwood	1	-1	p	--	p	67
Quercus bicolor	Swamp white oak	8	-4	--	p	--	33
Ribes missouriense	Wild gooseberry	3	5	--	--	p	33
Rubus occidentalis	Black raspberry	1	5	--	--	p	33
Salix exigua	Sandbar willow	0	-5	p	--	--	33
Salix nigra	Black willow	3	-5	--	--	p	33
Sambuccus canadensis	Elderberry	1	4	--	p	p	67
Smilax hispida	Greenbrier	4	0	--	--	p	33
Symphoricarpos orbiculatus	Coralberry	0	3	--	--	p	33
Toxicodendron radicans	Poison ivy	0	-1	--	--	p	33
Ulmus americana	American elm	2	-2	--	--	p	33
Vitis riparia	Riverbank grape	1	-2	--	--	p	33
Non-native							
Agrostis gigantea	Redtop	*	-3	p	p	--	67
Alliaria petiolata	Garlic mustard	*	0	--	--	p	33
Amarantus hybridus	Green amaranth	*	5	p	--	--	33
Barbarea vulgaris	Yellow rocket	*	0	--	p	--	33
Bromus commutatus	Hairy chess	*	5	--	p	--	33
Chenopodium album	Lamb's quarters	*	1	p	--	--	33
Dactylis glomerata	Orchard grass	*	3	--	p	--	33
Daucus carota	Queen Anne's lace	*	5	--	p	--	33
Festuca arundinacea	Tall fescue	*	2	--	p	--	33
Gailardia pulchella	Blanket flower	*	5	--	p	--	33
Hesperis matronalis	Dame's rocket	*	5	--	--	p	33
Hibiscus trionum	Flower-of-an-hour	*	5	p	--	--	33
Lotus corniculatus	Bird's-foot trefoil	*	1	p	p	--	67
Melilotus alba	White sweet clover	*	3	p	p	--	67
Melilotus officinales	Yellow sweet clover	*	3	p	p	--	67
Phlaris arundinacea	Reed canary grass	*	-4	p	p	p	100
Phleum pratense	Timothy	*	3	--	p	--	33
Plantago lanceolata	Buckhorn plantain	*	0	--	p	--	33
Poa pratensis	Kentucky bluegrass	*	1	--	--	p	33
Polygonum persicaria	Lady's thumb	*	-3	p	p	--	67
Robinia pseudoacacia	Black locust	*	4	--	--	p	33
Rosa multiflora	Multiflora rose	*	3	--	--	p	33
Rumex crispus	Curly dock	*	-1	p	p	--	67
Setaria glauca	Yellow foxtail	*	0	p	p	--	67
Stellaria media	Common chickweed	*	3	--	--	p	33
Taraxacum officinale	Common dandelion	*	3	--	--	p	33
Trifolium hybridum	Alsike clover	*	1	p	p	--	67
Trifolium pratense	Red clover	*	2	p	p	--	67
Trifolium repens	White clover	*	2	p	p	--	67
Total Species Richness				55	55	55	126
Native Richness				41	36	47	97
Non-native Richness				14	19	8	29
Native Richness Index				2.8	1.9	5.3	3.3
Mean Native Conservatism				1.9	2.0	2.6	

Scientific Name	Common Name	ICC	WS	TF*	NC3F	LW/F	CC%
Mean Wetland Status				-1.0	0.3	0.2	

Table 9. New Hampton floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

SMS – Sedge meadow/shrubland
RCG – Temporary flooded reed canary grass
WP – Wet prairie
TF – Temporary/seasonally flooded wetland
SF – Semi-permanently flooded wetland/aquatic
WS – Wet shrubland-mixed
C3 – Cool-season grassland
NC3F – Wet-mesic cool-season grass & forb
ESOF – Early Successional Old Field

Scientific Name	Common Name	ICC	WS	SMS*	RCG*	WP*	TF*	SF*	WS*	C3	NC3F	ESOF	CC%
Seedless Plants													
Equisetum arvense	Common horsetail	0	0	--	--	--	--	--	--	--	p	--	11
Onoclea sensibilis	Sensitive fern	6	-3	--	p	--	p	--	--	--	--	--	22
Graminoids													
Agrostis hyemalis	Ticklegrass	4	1	--	--	--	--	--	--	--	(p)	--	11
Calamgrostis canadensis	Bluejoint	5	-5	--	p	--	--	--	--	--	--	--	11
Carex aquatilis	Water sedge	7	-5	--	--	p	--	--	--	--	--	--	11
Carex bebbii	Bebb's oval sedge	8	-5	--	p	--	p	--	--	--	--	--	22
Carex brevior	Plains oval sedge	4	0	--	p	--	--	--	--	--	--	--	11
Carex cristatella	Crested oval sedge	5	-4	--	p	--	--	--	--	--	--	--	11
Carex frankii	Bristly cattail sedge	8	-5	--	--	--	p	--	--	--	--	--	11
Carex hystericina	Porcupine sedge	5	-5	--	--	--	p	--	--	--	--	--	11
Carex lacustris	Common lake sedge	7	-5	--	--	--	p	--	--	--	--	--	11
Carex lanuginosa	Wooly sedge	4	-5	p	p	p	--	--	--	--	--	--	33
Carex stipitata	Common fox sedge	5	-5	--	--	--	p	--	--	--	--	--	11
Carex stricta	Common tussock sedge	6	-5	p	--	--	--	--	--	--	--	--	11
Carex tribuloides	Awl-fruited oval sedge	3	-4	--	--	--	p	--	--	--	--	--	11
Carex vulpinoidea	Brown fox sedge	3	-5	--	p	--	p	--	--	--	--	--	22
Carex sp.	Sedge	3	-3	--	--	--	--	--	p	--	p	--	22
Cyperus strigosus	Long-scaled nut sedge	2	-3	--	p	--	p	--	--	--	--	--	22
Echinochloa muricata	Spiny barnyard grass	3	-5	--	--	--	p	--	--	--	--	--	11
Eleocharis erythropoda	Red-rooted spike rush	4	-5	--	p	--	p	--	--	--	p	--	33
Glyceria grandis	American manna grass	6	-5	--	p	--	--	--	--	--	--	--	11
Glyceria striata	Fowl manna grass	5	-5	--	--	--	p	--	--	--	p	--	22
Juncus dudleyii	Dudley's rush	2	0	--	p	--	--	--	--	--	p	--	22

Scientific Name	Common Name	ICC	WS	SMS*	RCG*	WP*	TF*	SF*	WS*	C3	NC3F	ESOF	CC%
Juncus tenuis	Path rush	0	0	--	p	--	--	--	--	--	--	--	11
Leersia oryzoides	Rice cut-grass	2	-5	--	--	--	--	--	p	--	--	--	11
Leersia virginica	Whitegrass	6	-3	--	p	--	--	--	--	--	--	--	11
Muhlenbergia sp.	Muhly grass	3	-1	--	--	--	--	--	--	p	--	--	11
Panicum dichotomoflorum	Fall panicum	0	-2	--	--	--	p	--	--	--	--	--	11
Scirpus atrovirens	Dark green bulrush	1	-5	--	p	--	p	--	--	--	p	--	33
Scirpus validus	Soft-stemmed bulrush	3	-5	--	p	--	p	--	--	--	p	--	33
Scirpus sp.	Bulrush	4	-5	--	p	--	--	--	--	--	--	--	11
Spartina pectinata	Prairie cord grass	4	-4	--	p	p	--	--	--	--	p	--	33
Typha latifolia	Common cattail	1	-5	--	p	--	p	--	--	--	--	--	22
Aquatic													
Lemna minor	Duckweed	3	-5	--	--	--	--	p	--	--	--	--	11
Najas sp.	Naiad	5	-5	--	--	--	--	p	--	--	--	--	11
Potomageton nodosus	American pondweed	7	-5	--	--	--	p	p	--	--	--	--	22
Forbs													
Achillea millefolium	Western yarrow	0	3	--	--	--	--	--	--	--	p	p	22
Agalinus tenuifolia	Slender false foxglove	4	-3	--	--	--	p	--	--	--	--	--	11
Alisma sp.	Water plantain	3	-5	--	p	--	--	--	--	--	--	--	11
Ambrosia artemisiifolia	Common ragweed	0	3	--	p	--	--	--	--	--	--	--	11
Ambrosia trifida	Giant ragweed	0	-1	--	p	--	--	--	p	--	p	p	44
Apocynum sibiricum	Indian hemp	1	-1	--	--	--	--	--	--	p	p	--	22
Artemisia ludoviciana	White sage	2	5	--	--	--	--	--	--	--	p	--	11
Asclepias incarnata	Swamp milkweed	4	-5	--	--	--	p	--	p	p	--	--	33
Asclepias syriaca	Common milkweed	0	5	--	p	p	--	--	--	p	p	--	44
Aster lanceolatus	Panicled aster	4	-3	--	p	--	--	--	p	--	--	--	22
Aster pilosus	Hairy aster	0	4	--	p	--	p	--	P	--	--	p	44
Aster praealtus	Willow aster	5	-5	--	(p)	--	--	--	--	--	--	--	11
Bidens cernua	Nodding bur marigold	2	-5	--	p	--	p	--	--	--	p	--	33
Bidens connata	Purplestemmed tickseed	3	-5	--	p	--	p	p	--	--	--	--	33
Bidens (frondosa)	Beggar-ticks	3	-3	--	p	--	p	--	p	--	--	--	33
Calystegia sepium	American bindweed	0	0	--	p	--	--	--	--	p	--	--	22
Cardamine bulbosa	Spring cress	6	-5	p	--	--	--	--	--	--	--	--	11
Cirsium discolor	Field thistle	1	5	--	--	--	--	--	--	p	--	--	11
Conyza canadensis	Horseweed	0	1	--	--	--	--	--	--	p	--	--	11
Epilobium coloratum	Cinnamon willowherb	3	-5	--	--	--	p	--	--	--	--	--	11

Scientific Name	Common Name	ICC	WS	SMS*	RCG*	WP*	TF*	SF*	WS*	C3	NC3F	ESOF	CC%
Erigernon annuus	Annual fleabane	0	1	--	p	--	--	--	p	--	p	p	44
Eupatorium perfoliatum	Boneset	6	-4	--	p	--	p	--	--	--	--	--	22
Fragaria virginiana	Wild strawberry	3	1	--	p	p	--	--	--	--	--	--	22
Galium obtusum	Wild madder	7	-4	p	p	--	--	--	--	--	--	--	22
Geum laciniatum	Rough avens	4	-3	p	p	p	p	--	p	--	p	p	78
Gratiola neglecta	Hedge hyssop	6	-5	--	--	--	p	--	--	--	--	--	11
Helianthus grosseserratus	Saw-tooth sunflower	4	-2	--	p	p	p	--	--	--	p	p	56
Impatiens sp.	Touch-me-not	4	-3	--	--	--	--	--	--	--	p	--	11
Iris shrevei	Blue flag	6	-5	p	p	p	p	--	--	p	--	--	56
Lilium michiganense	Michigan lily	6	-1	--	--	p	--	--	--	--	--	--	11
Lobelia silphilitica	Great lobelia	3	-4	--	p	--	p	--	--	--	--	--	22
Lycopus americanus	Water horehound	4	-5	--	p	--	p	--	--	--	--	p	33
Lysimachia quadriflora	Narrow-leaved loosestrife	7	5	--	p	--	--	--	--	--	--	--	11
Mimulus ringens	Monkey flower	3	-5	--	p	--	--	--	p	--	--	--	22
Monarda fistulosa	Wild bergamot	2	3	--	p	--	--	--	--	p	--	p	33
Oxalis stricta	Yellow wood sorrel	0	3	--	--	--	--	--	--	p	--	--	11
Penthorum sedoides	Ditch stonecrop	3	-5	--	p	--	--	--	p	--	--	--	22
Phlox maculata	Marsh phlox	7	-5	p	--	p	--	--	--	--	--	--	22
Plantago rugelli	Rugel's plantain	0	0	--	--	--	--	--	--	p	--	p	22
Polygonum amphibium	Water smartweed	3	-5	p	p	--	--	--	--	p	p	--	44
Polygonum hydropiper	Water pepper	3	-5	--	--	--	p	--	p	--	--	--	22
Polygonum hydropiperoides	Mild water pepper	6	-5	--	--	--	p	--	--	--	--	--	11
Polygonum lapathifolium	Curttop lady's thumb	0	-4	--	--	--	--	--	--	p	--	--	11
Polygonum sagittatum	Tearthumb	4	-5	--	--	--	p	--	p	--	--	--	22
Potentilla norvegica	Norwegian cinquefoil	2	0	--	p	--	--	--	--	--	--	--	11
Potentilla simplex	Common cinquefoil	3	4	--	p	--	--	--	--	--	--	--	11
Prunella vulgaris	Self heal	0	0	--	p	--	--	--	--	--	--	--	11
Pycnanthemum virginianum	Virginia mountain mint	4	-4	--	p	p	--	--	--	--	--	--	22
Ranunculus pensylvanicus	Bristly crowfoot	6	-5	--	p	--	--	--	--	--	--	--	11
Ranunculus septentrionalis	Swamp buttercup	6	-4	--	p	--	--	--	--	--	p	--	22
Rorippa palustris	Marsh cress	7	-5	--	p	--	--	--	--	--	--	--	11
Rudbeckia hirta	Black-eyed Susan	2	3	--	--	--	p	--	--	--	--	--	11
Rumex altissimus	Pale dock	0	4	--	p	--	p	--	--	p	p	p	56
Sagittaria latifolia	Common arrowhead	4	-5	--	p	--	p	--	--	--	--	--	22
Solidago canadensis	Canada goldenrod	0	3	--	p	p	--	--	p	--	--	p	44
Solidago gigantea	Giant goldenrod	3	-3	p	p	--	p	--	p	--	--	--	44
Stachys palustris	Woundwort	4	-5	--	p	p	--	--	p	--	--	p	44

Scientific Name	Common Name	ICC	WS	SMS*	RCG*	WP*	TF*	SF*	WS*	C3	NC3F	ESOF	CC%
Thalictrum dasycarpum	Purple meadow-rue	4	-2	p	--	--	--	--	--	--	p	--	22
Urtica dioica	Stinging nettle	0	-1	--	p	--	--	--	--	--	p	--	22
Verbena hastata	Blue vervain	3	-4	--	p	--	p	--	p	--	--	p	44
Veronicastrum virginicum	Culver's root	5	0	--	p	--	--	--	--	--	--	--	11
Trees and Shrubs													
Acer negundo	Box elder	0	-2	--	--	--	--	--	p	--	--	--	11
Cornus foemina	Gray dogwood	1	-2	p	p	--	--	--	p	--	--	--	33
Cornus rugosa	Speckled dogwood	10	5	p	--	--	--	--	--	--	--	--	11
Cornus sp.	Dogwood	2	-2	--	--	p	--	--	--	--	--	--	11
Parthenocissus quinquefolia	Virginia creeper	2	1	p	p	--	--	--	--	p	--	--	33
Prunus mexicana	Big-tree plum	2	5	--	--	--	--	--	p	--	--	--	11
Ribes americana	Wild black currant	6	-3	p	p	--	--	--	--	--	p	--	33
Rosa arkansana	Prairie rose	4	5	--	--	--	--	--	--	(p)	--	--	11
Rubus allegheniensis	Blackberry	2	2	--	(p)	--	--	--	--	--	--	--	11
Salix amygdaloides	Peach-leaved willow	1	-3	--	p	p	--	--	--	--	p	--	33
Salix discolor	Pussy willow	3	-3	--	p	--	--	--	--	--	--	--	11
Salix exigua	Sandbar willow	0	-5	--	p	--	--	--	--	--	p	--	22
Salix nigra	Black willow	3	-5	--	p	--	--	--	p	--	--	--	22
Sambuccus canadensis	Elderberry	1	4	--	p	--	p	--	p	--	p	p	56
Spirea alba	Meadowsweet	5	-4	--	p	--	--	--	--	--	--	--	11
Vitis riparia	Riverbank grape	1	-2	p	--	--	p	--	--	--	--	--	22
Non-native													
Abutilon theophrasti	Buttonweed	*	4	--	--	--	--	--	--	p	--	--	11
Agropyron repens	Quack grass	*	3	--	p	--	--	--	--	p	--	p	33
Agrostis gigantea	Redtop	*	-3	--	p	--	--	--	p	--	p	--	33
Barbarea vulgaris	Yellow rocket	*	0	--	--	--	--	--	--	p	p	--	22
Bromus inermis	Smooth brome	*	5	--	--	p	--	--	--	p	--	p	33
Cerastium (vulgatum)	Mouse-ear chickweed	*	3	--	--	--	--	--	--	p	--	--	11
Cirsium arvense	Canada thistle	*	3	--	p	--	--	--	--	p	p	p	44
Cirsium vulgare	Bull thistle	*	4	--	--	--	--	--	--	--	--	p	11
Daucus carota	Queen Anne's lace	*	5	--	--	--	--	--	--	--	--	p	11
Festuca arundinacea	Tall fescue	*	2	--	p	--	--	--	--	--	p	--	22
Hesperis matronalis	Dame's rocket	*	5	--	--	--	--	--	--	--	p	--	11
Lactuca seriola	Prickly lettuce	*	0	--	--	--	--	--	--	p	--	--	11
Melilotus alba	White sweet clover	*	3	--	--	--	--	--	--	--	--	p	11

Scientific Name	Common Name	ICC	WS	SMS*	RCG*	WP*	TF*	SF*	WS*	C3	NC3F	ESOF	CC%
Melilotus officinales	Yellow sweet clover	*	3	--	--	--	--	--	--	--	--	p	11
Myosoton aquaticum	Giant chickweed	*	-1	--	p	--	--	--	--	--	--	--	11
Pastinaca sativa	Wild parsnip	*	5	--	p	--	--	--	--	p	p	p	44
Phlaris arundinacea	Reed canary grass	*	-4	p	p	--	p	--	p	p	p	p	78
Phleum pratense	Timothy	*	3	--	p	--	--	--	--	p	--	p	33
Plantago major	Common plantain	*	-1	--	--	--	--	--	--	p	--	--	11
Poa pratensis	Kentucky bluegrass	*	1	--	p	p	--	--	--	p	--	--	33
Polygonum persicaria	Lady's thumb	*	-3	--	p	--	--	--	--	--	--	--	11
Rhamnus cathartica	Common buckthorn	*	3	p	--	--	--	--	--	--	--	--	11
Rumex crispus	Curly dock	*	-1	--	p	--	--	--	P	--	p	p	44
Secale cereale	Cult rye	*	5	--	--	--	--	--	--	p	--	--	11
Setaria faberii	Giant foxtail	*	2	--	--	--	p	--	--	p	--	--	22
Setaria glauca	Yellow foxtail	*	0	--	--	--	p	--	--	--	--	--	11
Silene pratensis	White campion	*	nr	--	--	--	--	--	--	p	--	--	11
Solanum dulcamara	European bittersweet	*	0	--	p	--	--	--	--	--	--	--	11
Sonchus asper	Spiny-leaved sow thistle	*	0	--	--	--	--	--	--	p	--	--	11
Taraxacum officinale	Common dandelion	*	3	--	--	--	p	--	--	--	--	--	11
Thlaspi arvense	Penny cress	*	5	--	--	--	--	--	--	p	--	--	11
Trifolium hybridum	Alsike clover	*	1	--	--	--	--	--	--	p	--	p	22
Trifolium pratense	Red clover	*	2	--	--	--	p	--	--	--	--	p	22
Vicia cracca	Cow vetch	*	5	--	p	--	--	--	--	p	--	p	33
Xanthium strumarium	Cocklebur	*	0	--	--	--	p	--	--	--	--	--	11
Total Species Richness				17	81	17	47	4	25	35	36	28	148
Native Richness				15	68	15	41	4	22	16	28	14	113
Non-native Richness				2	13	2	6	0	3	19	8	14	35
Native Richness Index				5.3	4.9	5.3	6.0	5.0	5.8	0.9	3.2	1.0	3.2
Mean Native Conservatism				4.7	3.1	3.7	3.7	4.5	2.3	1.6	2.3	1.6	
Mean Wetland Status				-2.6	-1.8	-1.7	-3.0	-5.0	-2.2	1.3	-1.0	1.4	

Table 10. Wickiup Hill floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

RCG – Temporary flooded reed canary grass
TF – Temporary/seasonally flooded wetland
TFDF – Temporary flooded deciduous forest
TFW – Lowland woodland & forest
SM – Sedge meadow
WS/W – Wet shrubland-willow
TGP – Tallgrass prairie reconstruction
NC3F – Wet-mesic cool-season grass & forb
SOW – Sand oak woodland
UMF – Upland mixed forest
LW/C3 – Lowland woodland & cool-season grass
ESOF – Early successional old-field

Scientific Name	Common Name	ICC	WS	RCG*	TF*	TFDF*	TFW*	SM*
Non-seed Plants								
Equisetum arvense	Common horsetail	0	0	--	--	--	--	p
Equisetum hymale	Common scouring-rush	1	-2	--	--	--	--	--
Onoclea sensibilis	Sensitive fern	6	-3	p	--	--	--	p
Thelypteris palustris	Marsh fern	6	-5	--	--	--	--	p
Graminoids								
Andropogon gerardii	Big bluestem	4	1	p	--	--	--	--
Bouteloua curtipendula	Side-oats grama	6	5	--	--	--	--	--
Calamgrostis canadensis	Bluejoint	5	-5	--	--	--	--	p
Carex aggregata	Smooth clustered sedge	5	2	--	--	--	--	--
Carex blanda	Common wood sedge	2	0	--	--	--	--	--
Carex brevior	Plains oval sedge	4	0	--	p	--	--	--
Carex cephalophora	Smooth clustered sedge	5	5	(p)	--	--	--	--
Carex conjuncta	Green-headed fox sedge	7	-3	--	--	p	p	--
Carex cristatella	Crested oval sedge	5	-4	--	--	--	--	--
Carex davisii	Awned graceful sedge	4	-1	--	--	--	p	--
Carex gravida	Long-awned bracted sedge	1	5	--	--	p	p	--
Carex grayii	Common bur sedge	7	-4	--	--	--	p	--
Carex amphibola	Gray sedge	4	5	--	--	p	p	--
Carex laeviconica	Long-toothed lake sedge	6	-5	p	--	--	--	--
Carex leavenworthii	Dwarf bracted sedge	3	5	--	--	--	--	--
Carex lupulina	Common hop sedge	6	-5	--	--	p	p	--
Carex molesta	Field oval sedge	2	0	--	--	--	--	--
Carex pennsylvanica	Pennsylvania oak sedge	6	4	--	--	--	--	--
Carex sprengelii	Long-beaked sedge	4	0	--	--	--	--	--
Carex stipitata	Common fox sedge	5	-5	p	--	--	--	--
Carex tribuloides	Awl-fruited oval sedge	3	-4	--	--	p	--	--
Carex vesicaria	Tufted lake sedge	7	-5	--	p	--	--	--
Carex vulpinoidea	Brown fox sedge	3	-5	p	p	--	--	--
Carex sp.	Sedge	3	-3	--	--	--	--	p
Cyperus filiculmis	Slender flat sedge	8	4	--	--	--	--	--
Cyperus sp.	Nut sedge	3	-3	--	--	--	--	--
Dichanthelium acuminatum	Panic grass	3	0	--	--	--	--	--
Dichanthelium oligosanthes	Scribner panic grass	5	3	--	--	--	--	--
Dichanthelium sp.	Panic grass	6	2	--	--	--	--	--
Eleocharis sp.	Spikerush	5	-4	--	--	--	--	--
Elymus canadensis	Canada wild rye	5	1	p	p	--	--	--
Elymus virginicus	Virginia wild rye	3	-2	--	--	p	p	--

Scientific Name	Common Name	ICC	WS	RCG*	TF*	TFDF*	TFW*	SM*
Eragrostis hypnoides	Pony grass	2	-5	--	--	--	p	--
Eragrostis spectabilis	Purple lovegrass	2	5	--	--	--	--	--
Juncus tenuis	Path rush	0	0	--	--	--	--	--
Leersia oryzoides	Rice cut-grass	2	-5	p	--	--	--	--
Leersia virginica	Whitegrass	6	-3	--	--	p	p	--
Panicum capillare	Witchgrass	0	0	--	p	--	--	--
Panicum virgatum	Switchgrass	5	-1	p	--	--	--	p
Paspalum setaceum	Bead grass	4	0	--	--	--	--	--
Schizachyrium scoparium	Little bluestem	5	4	--	--	--	--	--
Scirpus atrovirens	Dark green bulrush	1	-5	p	--	--	--	--
Scirpus cyperinus	Wooly bulrush	4	-5	p	--	--	--	--
Sorghastrum nutans	Indian grass	4	2	--	--	--	--	--
Sparganium eurycarpum	Common bur reed	6	-5	--	--	--	--	p
Spartina pectinata	Prairie cord grass	4	-4	--	--	--	--	p
Sphenopholis obtusata	Prairie wedge grass	8	0	--	p	--	--	--
Tridens flavus	Purple top	0	5	--	--	--	--	--
Typha latifolia	Common cattail	1	-5	p	--	--	--	p
Forbs								
Acalyphya rhomboidea	Three-seeded mercury	6	3	--	--	p	--	--
Acalyphya virginica	Three-seeded mercury	0	3	--	--	--	--	--
Achillea millefolium	Western yarrow	0	3	--	--	--	--	--
Agalinus tenuifolia	Slender false foxglove	4	-3	--	--	--	--	--
Agrimonia parviflora	Swamp agrimony	3	-1	--	--	--	--	--
Alisma subcordatum	Water plantain	3	-5	--	--	--	(p)	--
Amaranthus tuberculatus	Water pigweed	0	-5	--	p	--	--	--
Ambrosia artemisiifolia	Common ragweed	0	3	--	p	--	--	--
Ambrosia trifida	Giant ragweed	0	-1	p	--	--	p	--
Anemone canadensis	Canada anemone	2	-3	p	--	--	p	--
Anemone virginiana	Tall anemone	4	5	--	--	--	--	--
Apios americana	Ground-nut	4	-3	--	--	--	--	p
Apocynum sibiricum	Dogbane	1	-1	p	--	--	--	--
Aquilegia canadensis	Columbine	6	1	--	--	--	--	--
Asclepias incarnata	Swamp milkweed	4	-5	p	p	--	--	p
Asclepias syriaca	Common milkweed	0	5	p	--	--	--	--
Asclepias tuberosa	Butterfly weed	6	5	--	--	--	--	--
Asclepias verticillata	Whorled milkweed	0	5	--	--	--	--	--
Aster ericoides	Heath aster	3	4	--	--	--	--	--
Aster lanceolatus	Panicled aster	4	-3	--	--	--	p	--
Aster nova-angliae	New England aster	3	-3	--	p	--	--	--
Aster ontarionsis	Ontario aster	3	0	--	p	p	p	--
Aster umbellatus	Flat-topped aster	6	-3	--	--	--	--	p
Aster pilosus	Hairy aster	0	4	--	--	--	--	--
Aster puniceus	Swamp aster	5	-5	--	--	--	--	--
Baptisia lactea	White wild indigo	6	3	--	--	--	--	--
Bidens cernua	Nodding bur marigold	2	-5	p	p	--	--	--
Bidens tripartita	Swamp tickseed	3	-5	--	p	--	p	--
Bidens frondosa	Beggar-ticks	3	-3	p	--	(p)	--	--
Bidens vulgata	Tall beggar-ticks	1	-3	--	--	p	p	--
Boehmeria cylindrica	Bog hemp	5	-5	--	--	p	p	--
Boltonia asteroides	False aster	5	-3	--	p	--	--	p

Scientific Name	Common Name	ICC	WS	RCG*	TF*	TFDF*	TFW*	SM*
Calystegia sepium	American bindweed	0	0	p	--	--	--	--
Campanula americana	Tall bellflower	4	0	--	--	--	p	--
Cephalanthes occidentalis	Buttonbush	6	-5	--	--	(p)	p	--
Chamaecrista fasciculata	Partridge pea	1	4	--	--	--	--	--
Chenopodium hybridum	Maple-leaved goosefoot	0	-1	--	--	--	--	--
Cicuta maculata	Water hemlock	7	-5	--	--	--	--	--
Cinna arundinacea	Wood reed	4	-3	--	--	p	p	--
Circaea lutetiana	Enchanter's nightshade	5	3	--	--	--	--	--
Cirsium discolor	Field thistle	1	5	--	p	--	--	--
Conyza canadensis	Horseweed	0	1	--	p	--	--	--
Coreopsis tripteris	Tall tickseed	4	0	--	--	--	--	--
Desmnanthus illinoensis	Prairie mimosa	4	1	--	--	--	--	--
Desmodium canadense	Showy tick-trefoil	6	1	--	--	--	--	--
Echinacea pallida	Pale coneflower	7	5	--	--	--	--	--
Echinacea purpurea	Purple coneflower	9	5	--	--	--	--	--
Echinocystis lobata	Wild balsam apple	2	-2	--	--	--	p	--
Ellisia nyctelea	Waterpod	1	-1	--	--	--	--	--
Epilobium leptophyllum	Bog willowherb	10	-5	--	--	--	--	--
Erigeron annuus	Annual fleabane	0	1	--	p	--	--	--
Erigeron strigosus	Daisy fleabane	2	1	--	--	--	--	--
Eupatorium altissimum	Tall thoroughwort	2	3	--	p	--	--	--
Eupatorium maculatum	Spotted Joe-pye-weed	5	-5	--	--	--	--	p
Eupatorium perfoliatum	Boneset	6	-4	p	p	--	--	--
Eupatorium rugosum	White snakeroot	2	3	--	--	--	--	--
Euphorbia corollata	Flowering spurge	3	5	--	--	--	--	--
Fragaria virginiana	Wild strawberry	3	1	--	--	--	--	--
Galium aparine	Cleavers	1	3	p	--	p	--	--
Geum canadense	White avens	2	0	--	--	--	p	--
Gnaphalium obtusifolium	Everlasting	1	5	--	--	--	--	--
Hackelia virginiana	Stickseed	0	1	--	--	p	p	--
Helenium autumnale	Sneezeweed	4	-4	p	p	p	--	--
Helianthus maximiliani	Maximilian's sunflower	4	5	--	--	--	--	--
Helianthus rigidus	Prairie sunflower	8	5	--	--	--	--	--
Helianthus tuberosus	Jerusalem artichoke	0	0	p	--	--	--	--
Heliopsis helianthoides	Ox-eye	4	5	--	--	--	--	--
Hydrophyllum virginianum	Virginia waterleaf	3	-2	--	--	--	--	--
Hypericum pyramidatum	Giant St. John's wort	6	-1	--	--	--	--	--
Impatiens capensis	Orange touch-me-not	3	-3	--	--	--	--	p
Impatiens sp.	Touch-me-not	4	-3	p	--	--	p	p
Iris shrevei	Blue flag	6	-5	p	--	--	--	p
Krigia biflora	False dandelion	7	3	--	--	--	--	--
Lactuca canadensis	Yellow lettuce	1	2	--	--	--	--	--
Laportea canadensis	Wood nettle	3	-3	--	--	p	p	--
Lepidium virginicum	Poor-man's pepper	0	4	--	--	--	--	--
Lespedeza capitata	Round-headed bush clover	3	3	--	--	--	--	--
Lithospermum canescens	Hoary puccoon	7	5	--	--	--	--	--
Lithospermum incisum	Fringed puccoon	5	5	--	--	--	--	--
Lobelia silphilitica	Great lobelia	3	-4	p	p	--	p	p
Lycopus americanus	Water horehound	4	-5	--	--	--	--	--
Menispermum canadense	Moonseed	5	-1	--	--	--	p	--
Mentha arvensis	Marsh mint	4	-3	--	--	--	--	--
Mimulus ringens	Monkey flower	3	-5	--	--	--	--	--

Scientific Name	Common Name	ICC	WS	RCG*	TF*	TFDF*	TFW*	SM*
Monarda fistulosa	Wild bergamot	2	3	--	--	--	--	--
Monarda punctata	Spotted horsemint	6	5	--	--	--	--	--
Muhlenbergia bushii	Short-leaved satin grass	6	5	--	--	--	p	--
Muhlenbergia sp.	Muhly grass	3	-1	p	--	--	--	--
Oenothera biennis	Common evening primrose	0	3	--	--	--	--	--
Oxalis stricta	Yellow wood sorrel	0	3	p	--	--	--	--
Penstemon digitalis	Foxglove penstemon	4	1	--	--	--	--	--
Penthorum sedoides	Ditch stonecrop	3	-5	--	--	--	--	--
Phyla lanceolata	Fogfruit	3	-5	--	--	--	--	--
Physalis heterophylla	Clammy ground cherry	2	5	--	--	--	--	--
Physostegia sp.	False dragonhead	6	-3	--	--	--	--	p
Pilea pumila	Clearweed	3	-3	p	--	p	p	--
Plantago rugelli	Rugel's plantain	0	0	--	--	--	--	--
Podophyllum peltatum	Mayapple	4	3	--	--	--	--	--
Polygonum amphibium	Water smartweed	3	-5	--	--	--	p	--
Polygonum lapathifolium	Stout smartweed	0	-4	--	p	--	--	--
Polygonum pennsylvanicum	Pinkweed	0	-4	p	p	--	--	p
Polygonum persicaria	Lady's thumb	*	-3	--	(p)	--	--	--
Polygonum punctatum	Dotted smartweed	4	-5	p	--	p	p	p
Polygonum sagittatum	Tearthumb	4	-5	--	--	--	--	p
Polygonum scandens	Climbing false buckwheat	2	0	--	--	--	--	--
Polygonum virginianum	Jumpseed	5	0	--	--	--	--	--
Potentilla norvegica	Norwegian cinquefoil	2	0	--	(p)	--	--	--
Potentilla simplex	Common cinquefoil	3	4	--	--	--	--	--
Prunella vulgaris	Self heal	0	0	--	--	--	--	--
Ranunculus sceleratus	Cursed crowfoot	4	-5	--	p	--	--	--
Ranunculus septentrionalis	Swamp buttercup	6	-4	--	--	--	p	--
Ratibida pinnata	Gray-headed coneflower	4	5	--	--	--	--	--
Rorippa palustris	Marsh cress	7	-5	--	p	--	--	--
Rorippa sessiliflora	Sessile-flowered cress	4	-5	--	p	--	--	--
Rudbeckia hirta	Black-eyed Susan	2	3	--	--	--	--	--
Rudbeckia laciniata	Tall coneflower	4	-4	--	--	--	p	--
Rudbeckia subtomentosa	Fragrant coneflower	4	-3	--	--	--	--	--
Rumex altissimus	Pale dock	0	4	p	p	--	--	--
Rumex verticillata	Swamp dock	4	-5	--	--	p	p	--
Sagitaria latifolia	Common arrowhead	4	-5	(p)	--	--	--	(p)
Sanicula canadensis	Black snakeroot	6	2	--	--	--	p	--
Sanicula gregaria	Common snakeroot	5	-1	--	--	--	--	--
Scrophularia lanceolata	Early figwort	4	2	--	--	--	--	--
Scutellaria galericulata	Marsh skullcap	6	-5	--	--	--	--	p
Scutellaria lateriflora	Mad-dog skullcap	6	-5	--	--	--	--	--
Senecio pauperculus	Meadow ragwort	5	-1	p	--	--	--	--
Senecio plattensis	Prairie ragwort	3	4	--	--	--	--	--
Silene antirrhina	Sleepy catchfly	1	5	--	p	--	--	--
Silene stellata	Starry campion	4	5	--	--	--	--	--
Silphium integrifolium	Rosinweed	4	5	p	--	--	--	--
Silphium laciniatum	Compass plant	7	4	--	--	--	--	--
Silphium perfoliatum	Cup plant	1	-2	p	--	--	--	--
Solanum americanum	Black nightshade	0	4	--	p	p	--	--
Solanum carolinense	Horse nettle	0	4	p	--	--	--	--
Solidago canadensis	Canada goldenrod	0	3	p	p	--	--	--
Solidago gigantea	Giant goldenrod	3	-3	p	p	--	p	p

Scientific Name	Common Name	ICC	WS	RCG*	TF*	TFDF*	TFW*	SM*
Solidago rigida	Stiff goldenrod	4	4	--	--	--	--	--
Solidago speciosa	Showy goldenrod	7	5	--	--	--	--	--
Stachys tenuifolia	Smooth hedge nettle	5	-5	p	--	p	p	p
Teucrium canadense	American germander	4	-2	p	--	--	--	--
Tradescantia bracteata	Long-bracted spiderwort	4	4	--	--	--	--	--
Tradescantia ohioensis	Common spiderwort	4	2	p	--	--	--	--
Triodanis perfoliata	Venus' looking-glass	3	0	--	p	--	--	--
Triosteum perfoliatum	Late horse gentian	4	5	--	--	--	--	--
Urtica dioica	Stinging nettle	0	-1	--	--	--	p	--
Verbena hastata	Blue vervain	3	-4	--	p	--	--	p
Verbena stricta	Hoary vervain	1	5	--	--	--	--	--
Verbena urticifolia	White vervain	2	-1	--	p	--	(p)	--
Vernonia fasciculata	Prairie ironweed	1	-3	--	p	--	--	--
Veronica peregrina	Purslane speedwell	0	-4	--	p	--	--	--
Viola sororia	Common blue violet	1	1	--	--	(p)	(p)	--
Zizia aurea	Golden alexanders	6	-1	--	--	--	--	--
Trees and Shrubs								
Acer negundo	Box elder	0	-2	--	--	p	--	--
Acer saccharinum	Silver maple	1	-3	p	--	p	p	--
Amorpha fruticosa	Indigo bush	5	-4	p	--	--	--	--
Betula nigra	River birch	6	-3	--	--	--	p	p
Celastrus scandens	Bittersweet	1	3	--	--	--	--	--
Celtis occidentalis	Hackberry	2	1	--	--	--	p	--
Cornus drummondii	Rough-leaved dogwood	6	0	--	--	--	p	--
Cornus foemina	Gray dogwood	1	-2	--	--	--	p	--
Crataegus margaretta	Margaret's hawthorn	6	nr	--	--	--	p	--
Crataegus mollis	Downy hawthorn	3	-2	--	--	--	p	--
Crataegus sp.	Hawthorn	4.5	3	--	--	--	--	--
Fraxinus pennsylvanicus	Green ash	1	-3	--	--	p	p	--
Gleditsia triacanthos	Honey locust	0	0	p	--	--	p	--
Juglans nigra	Black walnut	4	3	--	--	--	p	--
Juniperus virginia	Red cedar	1	3	--	--	--	--	--
Parthenocissus vitacea	Woodbine	1	3	--	--	--	p	--
Populus deltoides	Cottonwood	1	-1	--	p	--	p	--
Populus tremuloides	Quaking aspen	2	0	--	p	--	--	--
Prunus serotina	Black cherry	3	3	--	--	--	--	--
Prunus virginiana	Choke cherry	2	1	--	--	--	p	--
Quercus alba	White oak	6	3	--	--	--	--	--
Quercus borealis	Northern red oak	6	3	--	--	--	--	--
Quercus velutina	Black oak	4	5	--	--	--	--	--
Quercus macrocarpa	Bur oak	4	1	--	--	--	p	--
Rhus glabra	Smooth sumac	0	5	--	--	--	--	--
Ribes sp.	Gooseberry	3.5	5	--	--	--	--	--
Rosa arkansana	Prairie rose	4	5	--	--	--	--	--
Rubus allegheniensis	Common blackberry	2	2	--	--	--	--	--
Rubus occidentalis	Black raspberry	1	5	--	--	--	--	--
Rubus sp.	Raspberry	4	1	--	--	--	--	--
Salix amygdaloides	Peach-leaved willow	1	-3	p	--	--	--	--
Salix exigua	Sandbar willow	0	-5	p	p	--	p	--
Salix nigra	Black willow	3	-5	p	--	p	p	--

Scientific Name	Common Name	ICC	WS	RCG*	TF*	TFDF*	TFW*	SM*
Sambuccus canadensis	Elderberry	1	4	--	--	--	p	--
Smilax hispida	Greenbrier	4	0	--	--	p	p	--
Toxicodendron radicans	Poison ivy	0	-1	--	--	--	p	--
Ulmus americana	American elm	2	-2	--	--	p	p	--
Ulmus sp.	Elm	2	-1	--	--	--	--	--
Vitis riparia	Riverbank grape	1	-2	p	--	--	p	--
Vitis vulpina	Frost grape	6	-2	--	--	--	p	--
Zanthoxylem americanum	Prickly ash	3	5	--	--	--	p	--
Non-native								
Abutilon theophrastii	Buttonweed	*	4	--	p	--	--	--
Agropyron repens	Quack grass	*	3	--	--	--	--	--
Agrostis gigantea	Redtop	*	-3	--	--	--	--	--
Alliaria petiolata	Garlic mustard	*	0	p	--	--	--	--
Barbarea vulgaris	Yellow rocket	*	0	p	p	--	--	--
Bromus commutatus	Hairy chess	*	5	--	p	--	--	--
Bromus inermis	Smooth brome	*	5	--	--	--	--	--
Chenopodium album	Lamb's quarters	*	1	--	p	--	--	--
Cirsium arvense	Canada thistle	*	3	--	p	--	--	--
Cirsium vulgare	Bull thistle	*	4	--	--	--	--	--
Dactylis glomerata	Orchard grass	*	3	--	p	--	--	--
Dianthus armeria	Deptford pink	*	5	--	--	--	--	--
Echinochloa crusgalli	Barnyard grass	*	-3	--	p	--	--	--
Festuca arundinacea	Tall fescue	*	2	--	--	--	--	--
Lactuca seriola	Prickly lettuce	*	0	--	p	--	--	--
Leonurus cardiaca	Motherwort	*	5	--	p	--	--	--
Lysimachia nummularia	Moneywort	*	-4	--	--	p	p	--
Medicago lupulina	Black medic	*	1	--	p	--	--	--
Melilotus alba	White sweet clover	*	3	--	--	--	--	--
Melilotus officinales	Yellow sweet clover	*	3	--	--	--	--	--
Mollugo verticillata	Carpetweed	*	0	--	p	--	--	--
Morus alba	White mulberry	*	0	--	p	--	--	--
Myosoton aquaticum	Giant chickweed	*	-1	--	--	--	--	--
Pastinaca sativa	Wild parsnip	*	5	p	--	--	--	--
Phalaris arundinacea	Reed canary grass	*	-4	p	p	p	p	p
Phleum pratense	Timothy	*	3	--	--	--	--	--
Plantago lanceolata	Buckhorn plantain	*	0	--	--	--	--	--
Plantago major	Common plantain	*	-1	--	--	--	--	--
Poa compressa	Canadian bluegrass	*	2	--	--	--	--	--
Poa pratensis	Kentucky bluegrass	*	1	p	--	--	--	--
Potentilla recta	Sulphur cinquefoil	*	5	--	--	--	--	--
Rosa multiflora	Multiflora rose	*	3	--	--	--	p	--
Rumex acetosella	Red sorrel	*	0	--	--	--	--	--
Rumex crispus	Curly dock	*	-1	--	p	p	--	--
Setaria faberii	Giant foxtail	*	2	--	p	--	--	--
Setaria glauca	Yellow foxtail	*	0	--	--	--	--	--
Silene pratensis	White campion	*	nr	--	p	--	--	--
Sisymbrium loeselii	Tall hedge mustard	*	5	--	p	--	--	--
Sonchus arvensis	Perennial sow thistle	*	1	--	--	--	--	p
Sonchus asper	Spiny-leaved sow thistle	*	0	--	--	--	--	--
Taraxacum officinale	Common dandelion	*	3	p	--	--	--	--

Scientific Name	Common Name	ICC	WS	RCG*	TF*	TFDF*	TFW*	SM*
Thlaspi arvense	Penny cress	*	5	--	p	--	--	--
Tragopogon dubius	Goat's-beard	*	5	--	--	--	--	--
Trifolium hybridum	Alsike clover	*	1	--	--	--	--	--
Trifolium pratense	Red clover	*	2	--	--	--	--	--
Trifolium repens	White clover	*	2	--	--	--	--	--
Verbascum thapsus	Common mullein	*	5	p	p	--	--	--
Veronica officinales	Common speedwell	*	5	--	--	--	--	--
Vicia cracca	Cow vetch	*	5	--	--	--	--	--
Xanthium strumarium	Cocklebur	*	0	--	p	--	--	--
Total Species Richness				57	61	33	66	30
Native Richness				50	41	30	63	28
Non-native Richness				7	20	3	3	2
Native Richness Index				6.4	2.0	7.8	16.0	9.7
Mean Native Conservatism				2.7	2.3	3.1	3.2	4.2
Mean Wetland Status				-1.5	-0.6	-1.9	-1.6	-3.7

Scientific Name	WS/W*	TGP	NC3F	SOW	UMF	LW/C3	ESOF	HF%
Non-seed Plants								
Equisetum arvense	--	--	p	--	--	--	--	17
Equisetum hymale	--	--	--	p	--	--	--	8
Onoclea sensibilis	--	--	p	--	--	--	--	25
Thelypteris palustris	--	--	--	--	--	--	--	8
Graminoids								
Andropogon gerardii	--	p	--	p	--	--	--	25
Bouteloua curtipendula	--	--	--	p	--	--	--	8
Calamgrostis canadensis	--	--	--	--	--	--	--	8
Carex aggregata	--	--	p	--	--	--	--	8
Carex blanda	--	--	--	p	--	--	--	8
Carex brevior	p	p	(p)	--	--	p	p	50
Carex cephalophora	--	--	--	--	--	--	--	8
Carex conjuncta	p	--	--	--	--	--	--	25
Carex cristatella	p	--	--	--	--	--	--	8
Carex davisii	--	--	--	--	--	--	--	8
Carex gravida	--	--	--	p	--	p	--	33
Carex grayii	--	--	--	--	--	--	--	8
Carex amphibola	--	--	--	p	--	--	--	25
Carex laeviconica	--	--	--	--	--	--	--	8
Carex leavenworthii	--	p	--	--	--	--	--	8
Carex lupulina	p	--	--	--	--	--	--	25
Carex molesta	p	p	p	--	--	p	--	33
Carex pennsylvanica	--	--	--	(p)	(p)	--	--	17
Carex sprengelii	--	--	--	p	--	--	--	8
Carex stipitata	--	--	p	--	--	--	--	17
Carex tribuloides	--	--	--	--	--	--	--	8
Carex vesicaria	--	--	--	--	--	--	--	8
Carex vulpinoidea	p	--	p	--	--	--	--	33
Carex sp.	--	--	--	--	--	--	--	8
Cyperus filiculmis	--	--	--	--	--	p	--	8
Cyperus sp.	p	--	--	--	--	--	--	8
Dichanthelium acuminatum	--	--	--	--	--	p	--	8
Dichanthelium oligosanthes	--	--	p	p	--	p	--	25
Dichanthelium sp.	--	--	--	p	--	--	--	8
Eleocharis sp.	p	--	--	--	--	--	--	8
Elymus canadensis	--	p	p	--	--	--	--	33
Elymus virginicus	--	--	--	--	--	p	--	25

Scientific Name	WS/W*	TGP	NC3F	SOW	UMF	LW/C3	ESOF	HF%
Eragrostis hypnoides	--	--	--	--	--	--	--	8
Eragrostis spectabilis	--	--	p	p	--	p	--	25
Juncus tenuis	--	--	p	--	--	--	--	8
Leersia oryzoides	p	--	--	--	--	--	--	17
Leersia virginica	--	--	--	--	--	--	--	17
Panicum capillare	--	--	--	--	--	--	--	8
Panicum virgatum	--	p	--	--	--	--	--	25
Paspalum setaceum	--	--	--	p	--	--	--	8
Schizachyrium scoparium	--	p	--	p	--	--	--	17
Scirpus atrovirens	p	--	--	--	--	--	--	17
Scirpus cyperinus	--	--	p	--	--	--	--	17
Sorghastrum nutans	--	p	--	p	--	--	p	25
Sparganium eurycarpum	--	--	--	--	--	--	--	8
Spartina pectinata	--	p	--	--	--	--	--	17
Sphenopholis obtusata	--	--	p	--	--	--	--	17
Tridens flavus	--	--	--	--	--	p	--	8
Typha latifolia	--	--	--	--	--	--	--	17
Forbs								
Acalyphya rhomboidea	--	--	--	--	--	--	--	8
Acalyphya virginica	p	--	--	--	--	--	--	8
Achillea millefolium	--	p	p	p	--	p	p	42
Agalinus tenuifolia	p	--	--	--	--	--	--	8
Agrimonia parviflora	--	--	p	p	--	p	--	25
Alisma subcordatum	--	--	--	--	--	--	--	8
Amaranthus tuberculatus	--	--	--	--	--	--	--	8
Ambrosia artemisiifolia	p	--	p	p	--	p	--	42
Ambrosia trifida	p	p	p	p	--	p	--	58
Anemone canadensis	--	--	--	--	--	--	--	17
Anemone virginiana	--	--	--	--	p	--	--	8
Apios americana	p	--	p	--	--	--	--	25
Apocynum sibiricum	--	--	p	--	--	--	--	17
Aquilegia canadensis	--	--	--	p	--	--	--	8
Asclepias incarnata	p	--	p	--	--	--	--	42
Asclepias syriaca	--	p	p	p	--	p	--	42
Asclepias tuberosa	--	p	p	--	--	--	--	17
Asclepias verticillata	--	--	--	p	--	--	--	8
Aster ericoides	--	p	--	--	--	--	--	8
Aster lanceolatus	--	p	--	--	--	--	--	17
Aster nova-angliae	p	p	--	--	--	--	p	33
Aster ontarionsis	p	--	p	--	--	--	p	50
Aster umbellatus	--	--	--	--	--	--	--	8
Aster pilosus	--	--	p	p	--	p	p	33
Aster puniceus	--	--	(p)	--	--	--	--	8
Baptisia lactea	--	p	--	--	--	--	--	8
Bidens cernua	--	--	--	--	--	--	--	17
Bidens tripartita	p	--	--	--	--	--	--	25
Bidens frondosa	p	--	--	--	--	--	--	25
Bidens vulgata	--	--	--	--	--	--	--	17
Boehmeria cylindrica	p	--	--	--	--	--	--	25
Boltonia asteroides	p	--	--	--	--	--	--	25

Scientific Name	WS/W*	TGP	NC3F	SOW	UMF	LW/C3	ESOF	HF%
Calystegia sepium	p	p	--	--	--	--	--	25
Campanula americana	--	--	--	--	--	--	--	8
Cephalanthes occidentalis	--	--	--	--	--	--	--	17
Chamaecrista fasciculata	--	p	p	--	--	p	--	25
Chenopodium hybridum	p	--	--	--	--	--	--	8
Cicuta maculata	p	--	--	--	--	--	--	8
Cinna arundinacea	--	--	--	--	--	--	--	17
Circaea lutetiana	--	--	--	p	--	--	--	8
Cirsium discolor	p	--	p	--	--	p	--	33
Conyza canadensis	--	--	--	p	--	--	--	17
Coreopsis tripteris	--	p	--	--	--	--	--	8
Desmnanthus illinoensis	--	p	--	--	--	--	--	8
Desmodium canadense	--	p	p	--	--	--	--	17
Echinacea pallida	--	p	--	--	--	--	--	8
Echinacea purpurea	--	--	--	--	--	p	--	8
Echinocystis lobata	--	--	--	--	--	--	--	8
Ellisia nyctelea	p	--	--	--	--	--	--	8
Epilobium leptophyllum	p	--	--	--	--	--	--	8
Erigeron annuus	--	p	--	p	--	p	p	42
Erigeron strigosus	--	--	--	p	--	--	--	8
Eupatorium altissimum	--	p	--	--	--	--	p	25
Eupatorium maculatum	--	--	p	--	--	--	--	17
Eupatorium perfoliatum	--	--	p	--	--	--	--	25
Eupatorium rugosum	--	--	--	--	p	p	--	17
Euphorbia corollata	--	--	--	p	--	--	--	8
Fragaria virginiana	--	--	--	--	--	p	--	8
Galium aparine	p	--	--	--	--	--	--	25
Geum canadense	--	--	--	p	p	--	--	25
Gnaphalium obtusifolium	--	--	--	p	--	p	p	25
Hackelia virginiana	p	--	--	--	--	p	--	33
Helenium autumnale	p	--	--	--	--	--	--	33
Helianthus maximiliani	--	p	--	--	--	--	--	8
Helianthus rigidus	--	p	--	--	--	--	--	8
Helianthus tuberosus	p	p	p	--	--	--	--	33
Heliopsis helianthoides	--	p	p	--	--	--	--	17
Hydrophyllum virginianum	--	--	--	--	p	--	--	8
Hypericum pyramidatum	p	--	--	--	--	--	--	8
Impatiens capensis	--	--	--	--	--	--	--	8
Impatiens sp.	p	--	--	--	--	--	--	33
Iris shrevei	p	--	--	--	--	--	--	25
Krigia biflora	--	--	--	p	--	--	--	8
Lactuca canadensis	--	--	--	p	--	p	--	17
Laportea canadensis	--	--	--	--	--	--	--	17
Lepidium virginicum	--	--	--	p	--	p	--	17
Lespedeza capitata	--	p	--	p	--	--	--	17
Lithospermum canescens	--	--	--	p	--	--	--	8
Lithospermum incisum	--	--	p	--	--	--	--	8
Lobelia silphilitica	p	p	p	--	--	--	--	58
Lycopus americanus	p	--	--	--	--	--	--	8
Menispermum canadense	--	--	--	--	--	p	--	17
Mentha arvensis	p	--	--	--	--	--	--	8
Mimulus ringens	p	--	--	--	--	--	--	8

Scientific Name	WS/W*	TGP	NC3F	SOW	UMF	LW/C3	ESOF	HF%
Monarda fistulosa	p	p	p	p	--	p	--	42
Monarda punctata	--	--	--	p	--	--	--	8
Muhlenbergia bushii	--	--	--	--	--	--	--	8
Muhlenbergia sp.	--	p	--	--	--	--	--	17
Oenothera biennis	--	--	--	--	--	p	--	8
Oxalis stricta	p	--	p	p	p	--	--	42
Penstemon digitalis	--	p	p	--	--	--	--	17
Penthorum sedoides	p	--	--	--	--	--	--	8
Phyla lanceolata	p	--	--	--	--	p	--	17
Physalis heterophylla	--	p	p	p	--	p	--	33
Physostegia sp.	p	--	p	--	--	--	--	25
Pilea pumila	p	--	--	--	--	--	--	33
Plantago rugelli	p	p	--	p	--	--	--	25
Podophyllum peltatum	--	--	--	p	--	p	--	17
Polygonum amphibium	--	--	--	--	--	--	--	8
Polygonum lapathifolium	--	--	--	--	--	--	--	8
Polygonum pennsylvanicum	--	--	--	--	--	--	--	25
Polygonum persicaria	--	--	--	--	--	--	--	8
Polygonum punctatum	--	--	--	--	--	--	--	33
Polygonum sagittatum	--	--	--	--	--	--	--	8
Polygonum scandens	--	--	--	--	--	p	--	8
Polygonum virginianum	--	--	--	--	--	p	--	8
Potentilla norvegica	p	p	--	--	--	--	--	25
Potentilla simplex	--	--	--	p	--	--	--	8
Prunella vulgaris	p	--	--	--	--	--	--	8
Ranunculus sceleratus	--	--	--	--	--	--	--	8
Ranunculus septentrionalis	--	--	--	--	--	--	--	8
Ratibida pinnata	--	p	p	--	--	--	--	17
Rorippa palustris	--	--	--	--	--	--	--	8
Rorippa sessiliflora	--	--	--	--	--	--	--	8
Rudbeckia hirta	p	p	--	p	--	p	--	33
Rudbeckia laciniata	--	--	--	--	--	--	--	8
Rudbeckia subtomentosa	p	--	--	--	--	--	--	8
Rumex altissimus	p	p	p	p	--	--	--	50
Rumex verticillata	--	--	--	--	--	--	--	17
Sagitaria latifolia	--	--	--	--	--	--	--	17
Sanicula canadensis	--	--	--	--	--	--	--	8
Sanicula gregaria	--	--	--	--	p	--	--	8
Scrophularia lanceolata	--	--	--	p	p	--	--	17
Scutellaria galericulata	--	--	--	--	--	--	--	8
Scutellaria lateriflora	p	--	--	--	--	--	--	8
Senecio pauperculus	--	p	p	--	--	--	--	25
Senecio plattensis	--	--	--	p	--	--	--	8
Silene antirrhina	p	--	--	--	--	--	--	17
Silene stellata	--	--	--	p	--	--	--	8
Silphium integrifolium	--	p	p	--	--	--	--	25
Silphium laciniatum	--	p	--	--	--	--	--	8
Silphium perfoliatum	p	p	p	--	--	--	--	33
Solanum americanum	--	--	--	--	--	--	--	17
Solanum carolinense	--	--	p	p	--	--	--	25
Solidago canadensis	--	p	p	p	--	p	p	58
Solidago gigantea	p	p	p	p	--	--	--	67

Scientific Name	WS/W*	TGP	NC3F	SOW	UMF	LW/C3	ESOF	HF%
Solidago rigida	p	p	--	--	--	--	--	17
Solidago speciosa	--	p	--	--	--	--	--	8
Stachys tenuifolia	p	--	--	--	--	--	--	42
Teucrium canadense	--	--	p	p	p	p	--	42
Tradescantia bracteata	--	--	p	--	--	--	--	8
Tradescantia ohioensis	--	--	p	p	--	--	--	25
Triodanis perfoliata	--	--	--	--	--	--	--	8
Triosteum perfoliatum	--	--	--	p	--	--	--	8
Urtica dioica	p	--	--	--	p	--	--	25
Verbena hastata	--	--	--	--	--	--	--	17
Verbena stricta	--	p	p	p	--	p	p	42
Verbena urticifolia	p	--	--	p	--	p	--	42
Vernonia fasciculata	p	p	--	--	--	--	--	25
Veronica peregrina	p	--	--	--	--	--	--	17
Viola sororia	--	--	--	p	--	--	--	25
Zizia aurea	--	p	p	--	--	--	--	17
Trees and Shrubs								
Acer negundo	--	--	--	--	--	--	--	8
Acer saccharinum	--	--	--	--	--	--	--	25
Amorpha fruticosa	--	--	--	--	--	--	--	8
Betula nigra	--	--	--	p	p	--	p	42
Celastrus scandens	--	--	--	--	p	--	--	8
Celtis occidentalis	--	--	--	--	p	--	--	17
Cornus drummondii	--	--	--	--	--	--	--	8
Cornus foemina	--	--	--	--	--	p	--	17
Crataegus margaretta	--	--	--	--	--	p	--	17
Crataegus mollis	--	--	--	--	--	--	--	8
Crataegus sp.	--	--	--	--	--	coll	--	8
Fraxinus pennsylvanicus	--	--	p	--	--	--	--	25
Gleditsia triacanthos	--	--	p	--	p	--	--	33
Juglans nigra	--	--	p	p	--	p	--	33
Juniperus virginia	--	--	p	--	--	--	--	8
Parthenocissus vitacea	--	--	p	--	p	p	--	33
Populus deltoides	p	p	p	--	--	--	--	42
Populus tremuloides	--	--	--	--	--	--	--	8
Prunus serotina	--	p	--	--	p	p	--	25
Prunus virginiana	--	--	--	--	--	--	--	8
Quercus alba	--	--	--	p	p	p	--	25
Quercus borealis	--	--	--	--	p	p	--	17
Quercus velutina	--	--	--	p	--	p	--	17
Quercus macrocarpa	--	--	--	--	--	p	--	17
Rhus glabra	--	--	--	--	--	p	--	8
Ribes sp.	--	--	--	--	p	--	--	8
Rosa arkansana	--	--	--	p	--	--	--	8
Rubus allegheniensis	--	p	p	p	--	--	--	25
Rubus occidentalis	p	--	p	--	p	p	--	33
Rubus sp.	--	--	--	p	--	--	--	8
Salix amygdaloides	--	--	(p)	--	--	--	--	17
Salix exigua	p	p	p	--	--	--	--	50
Salix nigra	p	--	p	--	--	--	--	42

Scientific Name	WS/W*	TGP	NC3F	SOW	UMF	LW/C3	ESOF	HF%
Sambuccus canadensis	--	--	--	--	--	--	--	8
Smilax hispida	--	--	--	--	p	--	--	25
Toxicodendron radicans	--	--	p	p	p	p	--	42
Ulmus americana	--	--	--	--	--	--	--	17
Ulmus sp.	--	p	--	--	p	p	--	25
Vitis riparia	p	p	p	p	--	p	--	58
Vitis vulpina	--	--	--	--	--	--	--	8
Zanthoxylem americanum	--	--	--	--	--	p	--	17
Non-native								
Abutilon theophrastii	--	--	--	--	--	--	--	8
Agropyron repens	--	p	p	--	--	p	--	25
Agrostis gigantea	p	p	p	--	--	p	--	33
Alliaria petiolata	p	--	--	--	p	--	--	25
Barbarea vulgaris	p	--	p	--	--	--	--	33
Bromus commutatus	--	p	p	--	--	p	--	33
Bromus inermis	--	p	p	p	--	p	--	33
Chenopodium album	p	p	--	--	--	--	--	25
Cirsium arvense	p	p	--	--	--	--	--	25
Cirsium vulgare	p	--	p	--	--	--	--	17
Dactylis glomerata	--	p	--	--	--	--	--	17
Dianthus armeria	--	p	--	--	--	--	--	8
Echinochloa crusgalli	--	--	--	--	--	--	--	8
Festuca arundinacea	--	--	p	--	--	--	--	8
Lactuca seriola	--	--	--	--	--	--	--	8
Leonurus cardiaca	--	--	--	--	--	--	--	8
Lysimachia nummularia	--	--	--	--	--	--	--	17
Medicago lupulina	p	--	p	--	--	p	--	33
Melilotus alba	--	p	(p)	--	--	--	--	17
Melilotus officinales	p	--	--	--	--	--	--	8
Mollugo verticillata	--	--	--	--	--	--	--	8
Morus alba	--	--	--	--	--	--	--	8
Myosoton aquaticum	p	--	--	--	--	--	--	8
Pastinaca sativa	--	--	p	--	--	--	--	17
Phalaris arundinacea	p	p	p	--	--	--	--	67
Phleum pratense	--	p	--	--	--	--	--	8
Plantago lanceolata	--	--	p	p	--	p	--	25
Plantago major	p	--	--	--	--	--	--	8
Poa compressa	--	p	--	--	--	--	--	8
Poa pratensis	p	p	p	p	--	p	--	50
Potentilla recta	--	--	p	p	--	p	--	25
Rosa multiflora	--	p	p	p	--	p	--	42
Rumex acetosella	--	--	--	p	--	--	--	8
Rumex crispus	p	p	p	--	--	--	--	42
Setaria faberii	--	--	--	--	--	p	--	17
Setaria glauca	--	--	p	--	--	p	--	17
Silene pratensis	--	--	p	p	--	--	--	25
Sisymbrium loeselii	--	--	--	p	--	--	--	17
Sonchus arvensis	--	--	--	--	--	--	--	8
Sonchus asper	p	--	--	--	--	--	--	8
Taraxacum officinale	p	--	p	--	--	--	--	25

Scientific Name	WS/W*	TGP	NC3F	SOW	UMF	LW/C3	ESOF	HF%
Thlaspi arvense	--	--	--	--	--	--	--	8
Tragopogon dubius	--	--	--	--	--	p	--	8
Trifolium hybridum	p	p	p	--	--	--	--	25
Trifolium pratense	--	--	p	--	--	--	--	8
Trifolium repens	p	--	--	--	--	--	--	8
Verbascum thapsus	--	--	p	p	--	--	p	42
Veronica officinales	--	--	--	p	--	--	--	8
Vicia cracca	--	--	p	--	--	--	--	8
Xanthium strumarium	--	--	--	--	--	--	--	8
Total Species Richness	83	73	88	74	24	66	13	296
Native Richness	66	57	66	64	23	54	12	246
Non-native Richness	17	16	22	10	1	12	1	50
Native Richness Index	3.7	3.4	2.9	5.9	12.0	4.2	6.5	4.8
Mean Native Conservatism	2.7	3.0	2.6	2.7	2.8	2.4	2.0	
Mean Wetland Status	-1.3	1.5	0.9	2.5	1.3	2.1	1.9	

Table 11. Badger Creek floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

RCG – Temporary flooded reed canary grass
SF – Semi-permanently flooded wetland/aquatic
TF – Temporary/seasonally flooded wetland
TFDF – Temporary flooded deciduous forest
TFW – Temporary flooded woodland
WC3F – Wet cool-season grass & forb
NC3F – Wet mesic cool-season grass & forb
WS/W – Wet shrubland -willow
TGP – Tallgrass prairie reconstruction
C3 – Cool-season grassland
LSW – Lowland shrubland/woodland
UWS – Upland woodland/shrubland

Scientific Name	Common Name	ICC	WS	RCG*	SF*	TF*	TFDF*	TFW*
Seedless Plants								
Equisetum arvense	Common horsetail	0	0	--	--	--	--	--
Graminoids								
Andropogon gerardii	Big bluestem	4	1	--	--	--	--	--
Bouteloua curtipendula	Side-oats grama	6	5	--	--	--	--	--
Carex amphibola	Narrowleaf sedge	4	5	--	--	--	--	--
Carex blanda	Common wood sedge	2	0	--	--	p	--	--
Carex brevior	Plains oval sedge	4	0	--	--	p	--	--
Carex cephalophora	Short-headed bracted sedge	5	3	--	--	p	--	--
Carex cristatella	Crested oval sedge	5	-4	--	--	--	--	--
Carex gravida	Long-awned bracted sedge	1	5	--	--	--	--	--
Carex normalis	Spreading oval sedge	5	-3	--	--	p	--	--
Carex tribuloides	Awl-fruited oval sedge	3	-4	--	--	p	--	--
Carex trichocarpa	Hairy-fruited lake sedge	8	-5	--	--	--	--	--
Carex vulpinoidea	Brown fox sedge	3	-5	--	--	p	--	--
Cyperus acuminatus	Short-pointed flat sedge	8	-5	--	--	p	--	--
Eleocharis erythropoda	Red-rooted spike rush	4	-5	--	--	p	--	--
Eleocharis obtusa	Blunt spike rush	3	-5	--	--	p	--	--
Elymus canadensis	Canada wild rye	5	1	--	--	--	--	--
Elymus virginicus	Virginia wild rye	3	-2	--	--	p	--	--
Festuca obtusa	Nodding fescue	7	2	--	--	--	p	--
Hordeum jubatum	Squirrel-tail barley	0	-1	--	--	p	--	--
Juncus dudleyii	Dudley's rush	2	0	--	--	p	--	--
Juncus tenuis	Path rush	0	0	--	--	p	--	--
Leersia oryzoides	Rice cut-grass	2	-5	--	--	p	--	--
Muhlenbergia frondosa	Wirestem muhly	3	-3	--	--	--	--	--
Muhlenbergia sp.	Muhly grass	3	-1	--	--	p	--	--
Panicum dichotomoflorum	Fall panicum	0	-2	--	--	p	--	--
Schizachyrium scoparium	Little bluestem	5	4	--	--	--	--	--
Scirpus atrovirens	Dark green bulrush	1	-5	--	--	p	--	--
Scirpus validus	Soft-stemmed bulrush	3	-5	--	--	p	--	--
Sorghastrum nutans	Indian grass	4	2	--	--	--	--	--
Typha latifolia	Common cattail	1	-5	--	--	p	--	--
Forbs								
Agrimonia gryposepala	Tall agrimony	3	2	--	--	--	--	--
Alisma subcordatum	Water plantain	3	-5	--	--	p	--	--

Scientific Name	Common Name	ICC	WS	RCG*	SF*	TF*	TFDF*	TFW*
Ambrosia artemisiifolia	Common ragweed	0	3	--	--	--	--	--
Ambrosia trifida	Giant ragweed	0	-1	--	--	--	p	--
Ammania coccinea	Toothcup	4	-5	--	--	p	--	--
Apocynum cannabinum	Indian hemp	1	0	--	--	(p)	--	--
Apocynum sibiricum	Dogbane	1	-1	--	--	--	--	--
Asclepias incarnata	Swamp milkweed	4	-5	--	--	p	--	--
Asclepias sullivantii	Sullivant's milkweed	7	5	--	--	--	--	--
Asclepias syriaca	Common milkweed	0	5	--	--	--	--	--
Asclepias tuberosa	Butterfly milkweed	6	5	--	--	--	--	--
Asclepias verticillata	Whorled milkweed	0	5	--	--	--	--	--
Aster lanceolatus	Panicled aster	4	-3	--	--	p	--	--
Aster pilosus	Hairy aster	0	4	--	--	p	--	--
Baptisia lactea	White wild indigo	6	3	--	--	--	--	--
Bidens cernua	Nodding bur marigold	2	-5	--	--	p	--	--
Bidens tripartita	Swamp tickseed	3	-5	--	--	p	--	--
Boltonia asteroides	False aster	5	-3	--	--	p	--	--
Brickelia eupatoroides	False boneset	5	5	--	--	--	--	--
Chaerophyllum procumbens	Chervil	2	-1	--	--	--	p	--
Chamaecrista fasciculata	Partridge pea	1	4	--	--	p	--	--
Cicuta maculata	Water hemlock	7	-5	--	--	--	--	--
Cirsium altissimum	Tall thistle	4	5	--	--	--	--	--
Cirsium discolor	Field thistle	1	5	--	--	--	--	--
Conyza canadensis	Horseweed	0	1	--	--	--	--	--
Dalea candida	White prairie clover	10	5	--	--	--	--	--
Dalea purpurea	Purple prairie clover	8	5	--	--	--	--	--
Descurainia pinnata	Tansy mustard	1	5	--	--	p	--	--
Echinacea pallida	Pale purple coneflower	7	5	--	--	--	--	--
Echinacea purpurea	Purple coneflower	9	5	--	--	--	--	--
Ellisia nyctelea	Waterpod	1	-1	--	--	--	p	--
Erigernon annuus	Annual fleabane	0	1	--	--	p	--	--
Eryngium yuccifolium	Rattlesnake master	8	-1	--	--	--	--	--
Eupatorium altissimum	Tall thoroughwort	2	3	--	--	--	--	--
Euphorbia nutans	Nodding spurge	0	3	--	--	--	--	--
Euphorbia maculata	Carpet spurge	0	4	--	--	p	--	--
Galium aparine	Cleavers	1	3	--	--	--	p	--
Gaura biennis	Bienniel gaura	3	4	--	--	--	--	--
Geum canadense	White avens	2	0	--	--	--	--	--
Gratiola neglecta	Hedge hyssop	6	-5	--	--	p	--	--
Hackelia virginiana	Stickseed	0	1	--	--	--	p	--
Helianthus grosseserratus	Saw-tooth sunflower	4	-2	--	--	--	--	--
Heliopsis helianthoides	Ox-eye	4	5	--	--	--	--	--
Impatiens sp.	Touch-me-not	4	-3	--	--	--	p	--
Laportea canadensis	Wood nettle	3	-3	--	--	--	p	--
Lepidium virginicum	Poor-man's pepper	0	4	--	--	--	--	--
Lespedeza capitata	Round-headed bush clover	3	3	--	--	--	--	--
Liatris aspera	Rough blazing star	8	5	--	--	--	--	--
Liatris pycnostachya	Prairie blazing star	6	1	--	--	--	--	--
Lindernia dubia	False pimpernel	4	-5	--	--	p	--	--
Lobelia siphilitica	Great lobelia	3	-4	--	--	p	--	--
Ludwigia polycarpa	False loosestrife	7	-5	--	--	p	--	--
Lycopus americanus	Water horehound	4	-5	--	--	p	--	--
Lythrum alatum	Winged loosestrife	3	-5	--	--	p	--	--

Scientific Name	Common Name	ICC	WS	RCG*	SF*	TF*	TFDF*	TFW*
Mimulus ringens	Monkey flower	3	-5	--	--	p	--	--
Onosmodium molle	False gromwell	4	5	--	--	--	--	--
Oxalis stricta	Yellow wood sorrel	0	3	--	--	--	--	--
Penstemon digitalis	Foxglove penstemon	4	1	--	--	p	--	--
Penstemon grandiflorus	Large-flowered beardtongue	5	5	--	--	--	--	--
Penthorum sedoides	Ditch stonecrop	3	-5	--	--	p	--	--
Physalis heterophylla	Clammy ground cherry	2	5	--	--	--	--	--
Plantago rugelli	Rugel's plantain	0	0	--	--	--	--	--
Polygonum pennsylvanicum	Pinkweed	0	-4	--	--	p	--	--
Polygonum ramosissimum	Bushy knotweed	3	1	--	--	p	--	--
Polygonum virginianum	Jumpseed	5	0	--	--	--	p	--
Potentilla arguta	Prairie cinquefoil	8	4	--	--	--	--	--
Potentilla norvegica	Norwegian cinquefoil	2	0	--	--	p	--	--
Potentilla rivalis	Brook cinquefoil	4	-4	--	--	p	--	--
Prunella vulgaris	Self heal	0	0	--	--	--	--	--
Ranunculus abortivus	Small-flowered crowfoot	0	-4	--	--	--	p	--
Ranunculus septentrionalis	Swamp buttercup	6	-4	--	--	--	p	--
Ratibida pinnata	Gray-headed coneflower	4	5	--	--	--	--	--
Rorippa palustris	Marsh cress	7	-5	--	--	p	--	--
Rudbeckia hirta	Black-eyed Susan	2	3	--	--	--	--	--
Rudbeckia laciniata	Tall coneflower	4	-4	--	--	--	p	--
Rumex altissimus	Pale dock	0	4	--	--	p	--	--
Sagitaria graminea	Grass-leaved arrowhead	9	-5	--	--	p	--	--
Sagitaria latifolia	Common arrowhead	4	-5	--	--	(p)	--	--
Sanicula gregaria	Common snakeroot	5	-1	--	--	--	p	--
Silphium integrifolium	Rosinweed	4	5	--	--	--	--	--
Silphium laciniatum	Compass plant	7	4	--	--	--	--	--
Silphium perfoliatum	Cup plant	1	-2	--	--	--	--	--
Solidago canadensis	Canada goldenrod	0	3	--	--	p	--	--
Solidago gigantea	Giant goldenrod	3	-3	--	--	--	--	--
Solidago rigida	Stiff goldenrod	4	4	--	--	--	--	--
Solidago speciosa	Showy goldenrod	7	5	--	--	--	--	--
Stachys palustris	Woundwort	4	-5	--	--	p	--	--
Stachys tenuiflora	Smooth hedge nettle	5	-5	--	--	--	p	--
Tradescantia ohioensis	Ohio spiderwort	4	2	--	--	--	--	--
Urtica dioica	Stinging nettle	0	-1	--	--	--	p	--
Verbena hastata	Blue vervain	3	-4	--	--	p	--	--
Verbena stricta	Hoary vervain	1	5	--	--	--	--	--
Veronica peregrina	Purslane speedwell	0	-4	--	--	--	--	--
Viola sororia	Common blue violet	1	1	--	--	p	(p)	--
Zizia aurea	Golden alexanders	6	-1	--	--	--	--	--
Trees and Shrubs								
Acer negundo	Box elder	0	-2	--	--	--	p	--
Acer saccharinum	Silver maple	1	-3	--	--	p	p	--
Celtis occidentalis	Hackberry	2	1	--	--	--	p	--
Cornus sp.	Dogwood	2	-2	--	--	--	--	--
Fraxinus pennsylvanicus	Green ash	1	-3	--	--	--	p	--
Juglans nigra	Black walnut	4	3	--	--	--	p	--
Juniperus virginia	Red cedar	1	3	--	--	--	--	--
Parthenocissus vitacea	Woodbine	1	3	--	--	--	--	--

Scientific Name	Common Name	ICC	WS	RCG*	SF*	TF*	TFDF*	TFW*
Populus deltoides	Cottonwood	1	-1	--	--	p	p	--
Prunus serotina	Black cherry	3	3	--	--	--	--	--
Salix amygdaloides	Peach-leaved willow	1	-3	--	--	p	--	--
Salix exigua	Sandbar willow	0	-5	--	--	p	--	--
Salix nigra	Black willow	3	-5	--	--	p	--	--
Salix rigida	Heart-leaved willow	3	-4	--	--	p	--	--
Sambuccus canadensis	Elderberry	1	4	--	--	--	p	--
Smilax hispida	Greenbrier	4	0	--	--	--	p	--
Symphoricarpos sp.	Buckbrush	0	4	--	--	--	p	--
Toxicodendron radicans	Poison ivy	0	-1	--	--	--	p	--
Ulmus americana	American elm	2	-2	--	--	--	p	--
Ulmus sp.	Elm	2	-1	--	--	--	--	--
Vitis riparia	Riverbank grape	1	-2	--	--	--	p	--
Non-native								
Abutilon theophrastii	Buttonweed	*	4	--	--	p	--	--
Amaranthus sp.	Pigweed	*	0	--	--	p	--	--
Bromus inermis	Smooth brome	*	5	--	--	--	--	--
Bromus tectorum	Downy chess	*	5	--	--	--	--	--
Carduus nutans	Musk thistle	*	5	--	--	--	--	--
Chenopodium album	Lamb's quarters	*	1	--	--	--	--	--
Daucus carota	Queen Anne's lace	*	5	--	--	--	--	--
Echinochloa crusgalli	Barnyard grass	*	-3	--	--	p	--	--
Eriochloa villosa	Cup grass	*	0	--	--	--	--	--
Hibiscus trionum	Flower-of-an-hour	*	5	--	--	--	--	--
Humulus japonicus	Japanese hops	*	3	--	--	--	--	--
Hypericum perforatum	Common St. John's wort	*	5	--	--	--	--	--
Lactuca seriola	Prickly lettuce	*	0	--	--	p	--	--
Lotus corniculatus	Bird's-foot trefoil	*	1	--	--	p	--	--
Medicago lupulina	Black medic	*	1	--	--	--	--	--
Melilotus alba	White sweet clover	*	3	--	--	--	--	--
Melilotus officinales	Yellow sweet clover	*	3	--	--	--	--	--
Pastinaca sativa	Wild parsnip	*	5	--	--	--	--	--
Phalaris arundinacea	Reed canary grass	*	-4	p	--	p	p	--
Poa pratensis	Kentucky bluegrass	*	1	--	--	--	--	--
Polygonum persicaria	Lady's thumb	*	-3	--	--	p	--	--
Rumex crispus	Curly dock	*	-1	--	--	p	--	--
Setaria faberii	Giant foxtail	*	2	--	--	--	--	--
Setaria glauca	Yellow foxtail	*	0	--	--	--	--	--
Taraxacum officinale	Common dandelion	*	3	--	--	p	--	--
Thlaspi arvense	Penny cress	*	5	--	--	--	--	--
Trifolium hybridum	Alsike clover	*	1	--	--	p	--	--
Trifolium pratense	Red clover	*	2	--	--	p	--	--
Trifolium repens	White clover	*	2	--	--	--	--	--
Verbascum thapsus	Common mullein	*	5	--	--	--	--	--
Veronica officinalis	Common speedwell	*	5	--	--	--	--	--
Xanthium strumarium	Cocklebur	*	0	--	--	p	--	--
Total Species Richness				1		71	29	
Native Richness				0	nd	59	28	nd
Non-native Richness				1		12	1	

Scientific Name	Common Name	ICC	WS	RCG*	SF*	TF*	TFDF*	TFW*
Native Richness Index				0.5		4.6	14.5	
Mean Native Conservatism				0.0		2.8	2.2	
Mean Wetland Status				-4.0		-2.0	-0.9	

Scientific Name	NC3F & WC3F*	WS/W*	TGP	C3	LSW	UWS	CC%
Seedless Plants							
Equisetum arvense	--	--	p	--	--	--	9
Graminoids							
Andropogon gerardii	--	--	p	--	--	--	9
Bouteloua curtipendula	--	--	p	--	--	--	9
Carex amphibola	p	--	--	--	--	--	9
Carex blanda	p	--	p	--	--	--	27
Carex brevior	p	--	p	--	--	--	27
Carex cephalophora	--	--	--	--	--	--	9
Carex cristatella	p	--	--	--	--	--	9
Carex gravida	p	--	--	--	--	--	9
Carex normalis	--	--	p	--	--	--	18
Carex tribuloides	--	--	--	--	--	--	9
Carex trichocarpa	p	--	--	--	--	--	9
Carex vulpinoidea	p	--	--	--	--	--	18
Cyperus acuminatus	--	--	--	--	--	--	9
Eleocharis erythropoda	--	--	--	--	--	--	9
Eleocharis obtusa	--	--	--	--	--	--	9
Elymus canadensis	p	--	p	--	--	--	18
Elymus virginicus	--	--	--	--	--	--	9
Festuca obtusa	--	--	--	--	--	--	9
Hordeum jubatum	p	--	--	--	--	--	18
Juncus dudleyii	p	--	--	--	--	--	18
Juncus tenuis	--	--	--	--	--	--	9
Leersia oryzoides	p	--	--	--	--	--	18
Muhlenbergia frondosa	--	--	--	p	--	--	9
Muhlenbergia sp.	--	--	--	--	--	--	9
Panicum dichotomoflorum	--	--	--	--	--	--	9
Schizachyrium scoparium	--	--	p	--	--	--	9
Scirpus atrovirens	p	--	p	--	--	--	27
Scirpus validus	--	--	--	--	--	--	9
Sorghastrum nutans	--	--	p	--	--	--	9
Typha latifolia	p	--	--	--	--	--	18
Forbs							
Agrimonia gryposepala	--	--	--	--	p	--	9
Alisma subcordatum	--	--	--	--	--	--	9

Scientific Name	WC3F*	WS/W*	TGP	C3	LSW	UWS	CC%
Ambrosia artemisiifolia	--	--	p	--	--	--	9
Ambrosia trifida	p	--	p	--	--	--	27
Ammania coccinea	--	--	--	--	--	--	9
Apocynum cannabinum	--	--	--	--	--	--	9
Apocynum sibiricum	(p)	--	--	--	--	--	9
Asclepias incarnata	p	--	--	--	--	--	18
Asclepias sullivantii	--	--	p	--	--	--	9
Asclepias syriaca	p	--	p	--	--	--	18
Asclepias tuberosa	--	--	p	--	--	--	9
Asclepias verticillata	--	--	p	--	--	--	9
Aster lanceolatus	p	--	p	--	--	--	27
Aster pilosus	p	--	--	p	--	--	27
Baptisia lactea	--	--	p	--	--	--	9
Bidens cernua	--	--	--	--	--	--	9
Bidens tripartita	p	--	--	--	--	--	18
Boltonia asteroides	--	--	--	--	--	--	9
Brickelia eupatoroides	--	--	--	p	--	--	9
Chaerophyllum procumbens	--	--	--	--	--	--	9
Chamaecrista fasciculata	p	--	p	p	--	--	36
Cicuta maculata	p	--	--	--	--	--	9
Cirsium altissimum	p	--	--	--	--	--	9
Cirsium discolor	p	--	p	--	--	--	18
Conyza canadensis	p	--	--	--	--	--	9
Dalea candida	--	--	p	--	--	--	9
Dalea purpurea	--	--	p	--	--	--	9
Descurainia pinnata	--	--	--	--	--	--	9
Echinacea pallida	--	--	p	--	--	--	9
Echinacea purpurea	--	--	p	--	--	--	9
Ellisia nyctelea	--	--	--	--	--	--	9
Erigernon annuus	p	--	--	--	--	--	18
Eryngium yuccifolium	--	--	p	--	--	--	9
Eupatorium altissimum	--	--	p	--	--	--	9
Euphorbia nutans	--	--	p	--	--	--	9
Euphorbia maculata	--	--	--	--	--	--	9
Galium aparine	--	--	p	--	--	--	18
Gaura biennis	--	--	p	--	--	--	9
Geum canadense	p	--	--	--	--	--	9
Gratiola neglecta	--	--	--	--	--	--	9
Hackelia virginiana	--	--	--	--	--	--	9
Helianthus grosseserratus	--	--	p	--	--	--	9
Heliopsis helianthoides	--	--	p	--	--	--	9
Impatiens sp.	--	--	--	--	--	--	9
Laportea canadensis	--	--	--	--	--	--	9
Lepidium virginicum	p	--	p	--	--	--	18
Lespedeza capitata	--	--	--	p	--	--	9
Liatris aspera	--	--	p	--	--	--	9
Liatris pycnostachya	--	--	p	--	--	--	9
Lindernia dubia	--	--	--	--	--	--	9
Lobelia siphilitica	--	--	--	--	--	--	9
Ludwigia polycarpa	--	--	--	--	--	--	9
Lycopus americanus	p	--	--	--	--	--	18
Lythrum alatum	--	--	--	--	--	--	9

Scientific Name	WC3F*	WS/W*	TGP	C3	LSW	UWS	CC%
Mimulus ringens	--	--	--	--	--	--	9
Onosmodium molle	--	--	p	--	--	--	9
Oxalis stricta	--	--	p	--	--	--	9
Penstemon digitalis	p	--	p	--	--	--	27
Penstemon grandiflorus	--	--	p	--	--	--	9
Penthorum sedoides	--	--	--	--	--	--	9
Physalis heterophylla	p	--	--	--	--	--	9
Plantago rugelli	p	--	--	--	--	--	9
Polygonum pennsylvanicum	--	--	--	--	--	--	9
Polygonum ramosissimum	--	--	--	--	--	--	9
Polygonum virginianum	--	--	--	--	--	--	9
Potentilla arguta	--	--	p	--	--	--	9
Potentilla norvegica	--	--	--	--	--	--	9
Potentilla rivalis	--	--	--	--	--	--	9
Prunella vulgaris	--	--	p	--	--	--	9
Ranunculus abortivus	--	--	--	--	--	--	9
Ranunculus septentrionalis	--	--	--	--	--	--	9
Ratibida pinnata	--	--	p	--	--	--	9
Rorippa palustris	--	--	--	--	--	--	9
Rudbeckia hirta	p	--	p	--	--	--	18
Rudbeckia laciniata	--	--	--	--	--	--	9
Rumex altissimus	p	--	p	--	--	--	27
Sagitaria graminea	--	--	--	--	--	--	9
Sagitaria latifolia	--	--	--	--	--	--	9
Sanicula gregaria	--	--	--	--	--	--	9
Silphium integrifolium	--	--	p	--	--	--	9
Silphium laciniatum	--	--	p	--	--	--	9
Silphium perfoliatum	p	--	p	--	--	--	18
Solidago canadensis	p	--	--	p	--	--	27
Solidago gigantea	p	--	--	--	--	--	9
Solidago rigida	--	--	p	--	--	--	9
Solidago speciosa	--	--	p	--	--	--	9
Stachys palustris	--	--	--	--	--	--	9
Stachys tenuiflora	--	--	--	--	--	--	9
Tradescantia ohioensis	--	--	p	--	--	--	9
Urtica dioica	--	--	--	--	--	--	9
Verbena hastata	--	--	--	--	--	--	9
Verbena stricta	--	--	p	--	--	--	9
Veronica peregrina	--	--	p	--	--	--	9
Viola sororia	--	--	--	--	--	--	18
Zizia aurea	--	--	p	--	--	--	9
Trees and Shrubs							
Acer negundo	p	--	--	--	--	--	18
Acer saccharinum	p	--	--	--	--	--	27
Celtis occidentalis	--	--	--	--	--	--	9
Cornus sp.	--	--	p	--	--	--	9
Fraxinus pennsylvanicus	p	--	--	--	--	--	18
Juglans nigra	--	--	--	--	--	--	9
Juniperus virginia	--	--	--	p	--	--	9
Parthenocissus vitacea	p	--	--	--	--	--	9

Scientific Name	WC3F*	WS/W*	TGP	C3	LSW	UWS	CC%
Populus deltoides	p	--	p	--	p	--	45
Prunus serotina	--	--	--	p	--	--	9
Salix amygdaloides	--	--	--	--	--	--	9
Salix exigua	p	p	p	--	--	--	36
Salix nigra	p	--	--	--	--	--	18
Salix rigida	p	--	--	--	--	--	18
Sambuccus canadensis	--	--	--	--	--	--	9
Smilax hispida	--	--	--	--	--	--	9
Symphoricarpos sp.	p	--	--	--	--	--	18
Toxicodendron radicans	p	--	--	--	--	--	18
Ulmus americana	--	--	--	--	--	--	9
Ulmus sp.	p	--	p	--	--	--	18
Vitis riparia	--	--	p	--	--	--	18
Non-native							
Abutilon theophrastii	--	--	--	--	--	--	9
Amaranthus sp.	--	--	--	--	--	--	9
Bromus inermis	p	--	p	p	--	--	27
Bromus tectorum	p	--	p	--	--	--	18
Carduus nutans	p	--	p	p	--	--	27
Chenopodium album	--	--	--	p	--	--	9
Daucus carota	--	--	p	--	--	--	9
Echinochloa crusgalli	--	--	--	--	--	--	9
Eriochloa villosa	--	--	p	--	--	--	9
Hibiscus trionum	p	--	--	--	--	--	9
Humulus japonicus	--	--	p	--	--	--	9
Hypericum perforatum	p	--	p	--	--	--	18
Lactuca seriola	p	--	p	--	--	--	27
Lotus corniculatus	p	--	p	p	--	--	36
Medicago lupulina	--	--	p	--	--	--	9
Melilotus alba	--	--	p	--	--	--	9
Melilotus officinales	--	--	p	--	--	--	9
Pastinaca sativa	p	--	p	--	--	--	18
Phalaris arundinacea	p	--	p	--	--	--	45
Poa pratensis	p	--	p	--	--	--	18
Polygonum persicaria	--	--	--	--	--	--	9
Rumex crispus	p	--	p	--	--	--	27
Setaria faberii	--	--	p	p	--	--	18
Setaria glauca	--	--	p	--	--	--	9
Taraxacum officinale	p	--	p	--	--	--	27
Thlaspi arvense	--	--	p	--	--	--	9
Trifolium hybridum	--	--	--	--	--	--	9
Trifolium pratense	--	--	p	--	--	--	18
Trifolium repens	--	--	p	--	--	--	9
Verbascum thapsus	p	--	--	p	--	--	18
Veronica officinalis	--	--	p	--	--	--	9
Xanthium strumarium	--	--	--	--	--	--	9
Total Species Richness	61	1	80	14	2		179
Native Richness	48	1	57	8	2	nd	147
Non-native Richness	13	0	23	6	0		32

Scientific Name	WC3F*	WS/W*	TGP	C3	LSW	UWS	CC%
Native Richness Index	3.5	2.0	2.4	1.3	3.0		4.5
Mean Native Conservatism	1.9	0.0	3.5	2.0	2.0		
Mean Wetland Status	0.2	-5.0	2.2	2.9	0.5		

Table 12. Dike floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

TF – Temporary/seasonally flooded wetland
SF – Semi-permanently flooded wetland/aquatic
RCG – Temporary flooded reed canary grass
C3 – Cool-season grassland
RCGS – Temporary flooded reed canary grass pseudosavanna
TFW – Temporary flooded woodland
WS – Wet shrubland-mixed
NC3F – Wet-mesic cool-season grass & forb

Scientific Name	Common Name	ICC	WS	TF*	SF*	RCG*	C3	RCGS*	WS*	TFW*	NC3F	CC%
Seedless Plants												
Equisetum arvense	Common horsetail	0	0	--	--	p	--	--	--	--	--	13
Equisetum hymale	Common scouring-rush	1	-2	--	--	p	--	--	--	--	--	13
Graminoids												
Andropogon gerardii	Big bluestem	4	1	--	--	--	--	--	--	--	p	13
Carex cristatella	Crested oval sedge	5	-4	(p)	--	--	--	--	--	--	(p)	25
Carex stricta	Common tussock sedge	6	-5	--	--	(p)	--	--	--	--	--	13
Carex tribuloides	Awl-fruited oval sedge	3	-4	p	--	--	--	--	--	--	--	13
Carex vulpinoidea	Brown fox sedge	3	-5	p	--	--	--	--	--	--	--	13
Carex sp.	Sedge	3	-3	p	--	--	--	--	p	--	--	25
Cyperus esculentus	Yellow nut grass	0	-3	p	--	--	--	--	--	--	--	13
Cyperus strigosus	Long-scaled nut sedge	2	-3	p	--	--	--	--	--	--	--	13
Echinochloa muricata	Spiny barnyard grass	3	-5	p	--	--	--	--	--	--	p	25
Eleocharis sp.	Spikerush	5	-4	p	--	--	--	--	--	--	--	13
Elymus canadensis	Canada wild rye	5	1	--	--	--	--	--	--	--	p	13
Elymus virginicus	Virginia wild rye	3	-2	--	--	--	--	--	--	--	p	13
Juncus dudleyii	Dudley's rush	2	0	p	--	--	--	--	--	--	p	25
Juncus tenuis	Path rush	0	0	--	--	--	--	--	--	--	p	13
Leersia oryzoides	Rice cut-grass	2	-5	p	--	--	--	--	--	--	--	13
Muhlenbergia frondosa	Wirestem muhly	3	-3	--	--	--	--	--	--	--	p	13
Panicum dichotomoflorum	Fall panicum	0	-2	p	--	--	--	--	--	--	p	25
Panicum virgatum	Switchgrass	5	-1	--	--	--	--	--	--	--	p	13
Paspalum setaceum	Bead grass	4	0	--	--	--	--	--	--	--	p	13
Schizachyrium scoparium	Little bluestem	5	4	--	--	--	--	--	--	--	p	13

Scientific Name	Common Name	ICC	WS	TF*	SF*	RCG*	C3	RCGS*	WS*	TFW*	NC3F	CC%
Scirpus atrovirens	Dark green bulrush	1	-5	p	--	--	--	--	--	--	p	25
Scirpus cyperinus	Wooly bulrush	4	-5	p	--	--	--	--	--	--	p	25
Scirpus fluviatilis	River bulrush	5	-5	p	p	p	--	--	--	--	--	38
Scirpus validus	Soft-stemmed bulrush	3	-5	p	--	--	--	--	--	--	--	13
Sorghastrum nutans	Indian grass	4	2	--	--	--	--	--	--	--	p	13
Spartina pectinata	Prairie cord grass	4	-4	--	--	p	--	--	--	--	--	13
Typha latifolia	Common cattail	1	-5	p	--	--	--	--	--	--	--	13
Aquatic												
Lemna minor	Duckweed	3	-5	p	--	--	--	--	--	--	--	13
Potamogeton foliosus	Leafy pondweed	7	-5	--	p	--	--	--	--	--	--	13
Forbs												
Acalyphya rhomboidea	Three-seeded mercury	6	3	--	--	--	--	p	--	--	p	25
Acalyphya virginica	Three-seeded mercury	0	3	p	--	--	--	--	--	--	p	25
Achillea millefolium	Western yarrow	0	3	--	--	p	--	--	--	--	--	13
Agalinus tenuifolia	Slender false foxglove	4	-3	p	--	--	--	--	--	--	p	25
Alisma sp.	Water plantain	3	-5	p	--	--	--	--	--	--	--	13
Allium canadense	Wild onion	6	3	--	--	p	--	--	--	--	--	13
Amaranthus tuberculatus	Water pigweed	0	-5	p	--	--	--	--	--	--	p	25
Ambrosia artemisiifolia	Common ragweed	0	3	--	--	--	--	--	--	--	p	13
Ambrosia trifida	Giant ragweed	0	-1	p	--	p	--	p	--	--	p	50
Anemone canadensis	Canada anemone	2	-3	--	--	p	--	--	--	--	--	13
Apocynum cannabinum	Indian hemp	1	0	p	--	--	--	--	--	--	--	13
Apocynum sibiricum	Dogbane	1	-1	p	--	--	--	--	--	--	p	25
Asclepias incarnata	Swamp milkweed	4	-5	--	--	p	--	--	--	--	p	25
Asclepias syriaca	Common milkweed	0	5	--	--	p	p	--	--	--	p	38
Aster lanceolatus	Panicled aster	4	-3	p	--	p	--	--	--	--	p	38
Aster pilosus	Hairy aster	0	4	--	--	--	--	p	--	--	p	25
Bidens cernua	Nodding bur marigold	2	-5	p	--	--	--	--	--	--	--	13
Bidens tripartita	Swamp tickseed	3	-5	p	--	--	--	--	--	--	--	13
Bidens frondosa	Beggar-ticks	3	-3	p	--	--	--	p	p	--	p	50
Bidens polylepis	Tickseed	3	-3	--	--	--	--	--	--	--	p	13
Bidens vulgata	Tall beggar-ticks	1	-3	--	--	p	--	--	--	--	p	25
Calystegia sepium	American bindweed	0	0	--	--	p	--	--	--	--	--	13
Cerastium nutans	Nodding chickweed	0	2	p	--	--	--	--	--	--	--	13
Cirsium altissimum	Tall thistle	4	5	p	--	--	--	--	--	--	p	25

Scientific Name	Common Name	ICC	WS	TF*	SF*	RCG*	C3	RCGS*	WS*	TFW*	NC3F	CC%
Cirsium discolor	Field thistle	1	5	--	--	--	--	--	--	--	p	13
Conyza canadensis	Horseweed	0	1	--	--	--	--	--	p	--	p	25
Echinacea purpurea	Purple coneflower	9	5	--	--	--	--	--	--	--	p	13
Ellisia nyctelea	Waterpod	1	-1	--	--	--	--	--	p	--	--	13
Epilobium coloratum	Cinnamon willowherb	3	-5	p	--	--	--	--	--	--	p	25
Erigernon annuus	Annual fleabane	0	1	--	--	--	--	--	p	--	p	25
Eupatorium perfoliatum	Boneset	6	-4	--	--	--	--	--	--	--	p	13
Galium aparine	Cleavers	1	3	p	--	p	p	--	--	--	--	38
Geum laciniatum	Rough avens	4	-3	p	--	--	--	p	p	(p)	p	63
Hackelia virginica	Stickseed	0	1	--	--	--	--	p	--	--	--	13
Helenium autumnale	Sneezeweed	4	-4	--	--	p	--	--	--	--	p	25
Helianthus grosseserratus	Saw-tooth sunflower	4	-2	--	--	p	--	p	--	--	p	38
Laportea canadensis	Wood nettle	3	-3	--	--	--	--	--	--	--	p	13
Lepidium virginicum	Poor-man's pepper	0	4	p	--	--	--	--	--	--	--	13
Lobelia silphilitica	Great lobelia	3	-4	--	--	p	--	--	--	--	--	13
Lycopus americanus	Water horehound	4	-5	p	--	--	--	--	--	--	--	13
Monarda fistulosa	Wild bergamot	2	3	--	--	p	p	--	--	--	--	25
Oenothera biennis	Common evening primrose	0	3	--	--	--	--	--	--	--	p	13
Oxalis stricta	Yellow wood sorrel	0	3	--	--	--	--	--	--	--	p	13
Physalis heterophylla	Clammy ground cherry	2	5	--	--	--	--	--	--	--	p	13
Physalis longifolia	Tall ground cherry	3	3	--	--	--	--	--	--	--	p	13
Plantago rugelli	Rugel's plantain	0	0	p	--	--	--	p	--	--	--	25
Polygonum amphibium	Water smartweed	3	-5	p	--	p	--	--	--	--	p	38
Polygonum hydropiper	Water pepper	3	-5	p	--	p	--	--	--	--	--	25
Polygonum pennsylvanicum	Pinkweed	0	-4	p	--	p	--	p	--	--	p	50
Polygonum punctatum	Dotted smartweed	4	-5	p	--	--	--	--	--	--	--	13
Polygonum sagittatum	Tearthumb	4	-5	p	--	--	--	--	--	--	--	13
Polygonum scandens	Climbing false buckwheat	2	0	--	--	p	--	p	--	--	--	25
Potentilla norvegica	Norwegian cinquefoil	2	0	p	--	--	--	--	p	--	p	38
Ratibida pinnata	Gray-headed coneflower	4	5	--	--	--	--	--	--	--	p	13
Rorippa palustris	Marsh cress	7	-5	--	--	--	--	--	p	--	--	13
Rudbeckia laciniata	Tall coneflower	4	-4	--	--	--	--	p	--	--	--	13
Rumex altissimus	Pale dock	0	4	--	--	p	p	--	p	--	--	38
Sagittaria (latifolia)	Common arrowhead	4	-5	p	--	--	--	--	--	--	--	13
Sanicula sp.	Snakeroot	4	0	--	--	--	--	p	--	--	--	13
Senecio pauperculus	Meadow ragwort	5	-1	--	--	p	--	--	--	--	--	13
Silphium perfoliatum	Cup plant	1	-2	--	--	p	--	--	--	--	--	13

Scientific Name	Common Name	ICC	WS	TF*	SF*	RCG*	C3	RCGS*	WS*	TFW*	NC3F	CC%
Solanum americanum	Black nightshade	0	4	--	--	--	--	--	--	--	p	13
Solanum carolinense	Horse nettle	0	4	--	--	p	--	--	--	--	--	13
Solidago canadensis	Canada goldenrod	0	3	--	--	--	--	--	--	--	p	13
Solidago gigantea	Giant goldenrod	3	-3	p	--	p	--	p	p	p	p	75
Stachys palustris	Woundwort	4	-5	--	--	p	--	--	--	--	--	13
Thalictrum dasycarpum	Purple meadow-rue	4	-2	--	--	p	--	--	--	--	--	13
Urtica dioica	Stinging nettle	0	-1	--	--	p	--	p	--	--	--	25
Verbena hastata	Blue vervain	3	-4	p	--	p	--	--	--	--	p	38
Vernonia fasciculata	Ironweed	1	-3	--	--	p	--	--	--	--	--	13
Veronica peregrina	Purslane speedwell	0	-4	--	--	--	--	--	p	--	--	13
Viola sororia	Common blue violet	1	1	--	--	p	--	--	--	--	p	25
Zizia aurea	Golden alexanders	6	-1	--	--	--	p	--	--	--	--	13
Trees and Shrubs												
Acer negundo	Box elder	0	-2	--	--	--	--	--	--	--	p	13
Acer saccharinum	Silver maple	1	-3	--	--	p	--	--	--	--	p	25
Aesculus glabra	Ohio buckeye	4	-1	--	--	--	p	--	--	--	--	13
Cornus amomum	Silky dogwood	6	-4	--	--	--	--	p	--	--	p	25
Cornus foemina	Gray dogwood	1	-2	p	--	p	--	--	p	p	p	63
Fraxinus nigra	Black ash	9	-4	--	--	--	--	p	--	--	--	13
Fraxinus pennsylvanicus	Green ash	1	-3	--	--	--	--	p	--	--	--	13
Juniperus virginia	Red cedar	1	3	--	--	--	--	--	--	--	p	13
Parthenocissus quinquefolia	Virginia creeper	2	1	--	--	--	--	--	--	--	p	13
Populus deltoides	Cottonwood	1	-1	p	--	--	--	p	p	p	p	63
Quercus bicolor	Swamp white oak	8	-4	--	--	--	--	--	--	--	p	13
Quercus macrocarpa	Bur oak	4	1	--	--	--	--	--	--	--	p	13
Rubus occidentalis	Black raspberry	1	5	--	--	--	--	--	--	--	p	13
Salix amygdaloides	Peach-leaved willow	1	-3	p	--	--	--	--	--	--	--	13
Salix exigua	Sandbar willow	0	-5	p	--	--	--	--	p	p	p	50
Salix nigra	Black willow	3	-5	--	--	p	--	p	--	p	--	38
Sambuccus canadensis	Elderberry	1	4	--	--	p	--	p	p	p	--	50
Non-native												
Abutilon theophrastii	Buttonweed	*	4	--	--	--	--	--	--	--	p	13
Agropyron repens	Quack grass	*	3	p	--	p	--	--	--	--	--	25
Agrostis gigantea	Redtop	*	-3	p	--	--	--	--	--	--	p	25
Barbarea vulgaris	Yellow rocket	*	0	p	--	p	--	--	--	--	--	25

Scientific Name	Common Name	ICC	WS	TF*	SF*	RCG*	C3	RCGS*	WS*	TFW*	NC3F	CC%
Bromus commutatus	Hairy chess	*	5	--	--	--	p	--	--	--	--	13
Bromus inermis	Smooth brome	*	5	--	--	p	--	--	p	--	--	25
Canabis sativa	Hemp	*	0	--	--	p	--	--	--	--	--	13
Cirsium arvense	Canada thistle	*	3	--	--	p	p	p	--	--	p	50
Cirsium vulgare	Bull thistle	*	4	--	--	--	--	--	p	--	--	13
Dactylis glomerata	Orchard grass	*	3	--	--	--	p	--	--	--	p	25
Daucus carota	Queen Anne's lace	*	5	--	--	--	--	p	--	--	p	25
Eriochloa villosa	Cup grass	*	0	--	--	--	--	--	--	--	p	13
Festuca arundinacea	Tall fescue	*	2	--	--	--	p	--	--	--	p	25
Glechoma hederacea	Creeping Charlie	*	4	--	--	p	--	--	--	--	--	13
Lactuca seriola	Prickly lettuce	*	0	--	--	p	--	--	--	--	p	25
Lepidium campestre	Field cress	*	5	--	--	p	p	--	--	--	p	38
Lotus corniculatus	Bird's-foot trefoil	*	1	--	--	--	--	--	--	--	p	13
Medicago lupulina	Black medic	*	1	--	--	--	p	--	--	--	p	25
Melilotus alba	White sweet clover	*	3	p	--	--	p	--	--	--	p	38
Morus alba	White mulberry	*	0	--	--	--	--	p	--	--	--	13
Myosoton aquaticum	Giant chickweed	*	-1	--	--	p	--	p	--	--	--	25
Pastinaca sativa	Wild parsnip	*	5	--	--	p	p	--	--	--	p	38
Phlaris arundinacea	Reed canary grass	*	-4	p	p	p	p	p	p	p	p	100
Phleum pratense	Timothy	*	3	p	--	--	--	--	--	--	--	13
Plantago major	Common plantain	*	-1	--	--	--	--	--	p	--	--	13
Poa comressa	Canadian bluegrass	*	2	p	--	--	--	--	--	--	--	13
Poa pratensis	Kentucky bluegrass	*	1	p	--	p	p	--	--	--	p	50
Rumex crispus	Curly dock	*	-1	p	--	p	--	p	p	--	p	63
Setaria faberii	Giant foxtail	*	2	--	--	--	--	--	--	--	p	13
Setaria glauca	Yellow foxtail	*	0	--	--	--	--	--	--	--	p	13
Taraxacum officinale	Common dandelion	*	3	p	--	p	p	p	p	--	p	75
Thlaspi arvense	Penny cress	*	5	--	--	p	--	--	--	--	--	13
Trifolium hybridum	Alsike clover	*	1	--	--	--	--	--	--	--	p	13
Trifolium pratense	Red clover	*	2	p	--	--	p	--	--	--	p	38
Trifolium repens	White clover	*	2	p	--	--	--	--	--	--	p	25
Xanthium strumarium	Cocklebur	*	0	p	--	--	--	--	--	--	--	13
Total Species Richness				62	3	53	18	27	21	8	86	157
Native Richness				49	2	38	6	20	15	7	64	121
Non-native Richness				13	1	15	12	7	6	1	22	36

Scientific Name	Common Name	ICC WS	TF*	SF*	RCG*	C3	RCGS*	WS*	TFW*	NC3F	CC%
Native Richness Index			3.6	1.5	2.4	0.5	2.6	2.3	4.0	2.8	3.3
Mean Native Conservatism			2.3	6.0	2.2	2.2	2.6	1.7	1.9	2.5	
Mean Wetland Status			-2.1	-4.7	-0.5	2.3	-0.8	-0.7	-2.4	0.0	

Table 13. Jarvis floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

TF – Temporary/seasonally flooded wetland
WS/M – Wet shrubland - maple
WS/W – Wet shrubland -willow
WS – Wet shrubland - mixed
RCG – Temporary flooded reed canary grass
TFM – Tall forb meadow
RC – Row crop
LW/F – Lowland woodland & forest
ESOF – Early successional old-field
C3 – Cool-season grassland
LW/C3 – Lowland woodland & cool-season grass

Scientific Name	Common Name	ICC	WS	TF*	WS/M*	WS/W*	WS*	RCG*
Non-seed Plants								
Equisetum arvense	Common horsetail	0	0	--	--	--	p	--
Graminoids								
Carex crawfordii	Crawford's oval sedge	8	-1	--	p	--	p	--
Carex cristatella	Crested oval sedge	5	-4	--	--	--	--	--
Carex gravida	Long-awned bracted sedge	1	5	--	--	--	p	--
Carex grayii	Common bur sedge	7	-4	p	--	--	--	--
Carex amphibola	Gray sedge	4	5	--	--	--	--	--
Carex laeviconica	Long-toothed lake sedge	6	-5	--	--	--	--	p
Carex lupulina	Common hop sedge	6	-5	--	--	--	p	--
Carex muskingumensis	Swamp oval sedge	8	-5	--	--	--	p	--
Carex tribuloides	Awl-fruited oval sedge	3	-4	--	p	--	--	--
Carex vulpinoidea	Brown fox sedge	3	-5	p	p	--	--	--
Cyperus esculentus	Yellow nut grass	0	-3	--	--	--	--	--
Eleocharis erythropoda	Red-rooted spike rush	4	-5	p	p	--	--	--
Elymus canadensis	Canada wild rye	5	1	--	--	--	--	--
Elymus virginicus	Virginia wild rye	3	-2	--	--	--	p	--
Festuca obtusa	Nodding fescue	7	2	p	--	--	--	--
Hordeum jubatum	Squirrel-tail barley	0	-1	--	--	--	--	--
Leersia oryzoides	Rice cut-grass	2	-5	--	--	--	--	--
Leersia virginica	Whitegrass	6	-3	--	--	--	p	--
Panicum dichotomiflorum	Fall panicum	0	-2	p	--	--	--	--
Panicum virgatum	Switchgrass	5	-1	p	--	--	p	p
Forbs								
Acalypha virginica	Three-seeded mercury	0	3	--	--	--	--	--
Achillea millefolium	Western yarrow	0	3	--	--	--	--	--
Allium canadense	Wild onion	6	3	--	--	--	--	--
Ambrosia artemisiifolia	Common ragweed	0	3	p	p	--	--	--
Ambrosia trifida	Giant ragweed	0	-1	p	--	--	p	--
Anemone canadensis	Canada anemone	2	-3	--	--	--	p	--
Apocynum cannabinum	Indian hemp	1	0	--	--	--	--	--
Apocynum sibiricum	Indian hemp	1	-1	p	p	p	p	p
Asclepias incarnata	Swamp milkweed	4	-5	p	--	--	--	p
Asclepias syriaca	Common milkweed	0	5	--	--	--	--	p
Aster lanceolatus	Panicled aster	4	-3	p	--	--	--	--
Aster lateriflorus	Side-flowered aster	4	-2	--	--	--	--	--

Scientific Name	Common Name	ICC	WS	TF*	WS/M*	WS/W*	WS*	RCG*
Aster ontarionsis	Ontario aster	3	0	p	--	--	p	--
Aster pilosus	Hairy aster	0	4	p	p	--	--	--
Aster (praealtus)	Willow aster	5	-5	p	--	--	--	--
Bidens cernua	Nodding bur marigold	2	-5	p	--	--	--	--
Bidens tripartita	Swamp tickseed	3	-5	p	--	--	--	--
Bidens connata	Purplestemmed tickseed	3	-5	p	--	--	--	--
Bidens frondosa	Beggar-ticks	3	-3	p	--	--	--	--
Bidens polylepis	Tickseed	3	-3	--	--	--	--	--
Bidens vulgata	Tall beggar-ticks	1	-3	p	--	--	--	--
Boehmeria cylindrica	Bog hemp	5	-5	p	--	--	p	p
Boltonia asteroides	False aster	5	-3	p	p	--	--	--
Calystegia sepium	American bindweed	0	0	--	--	--	p	p
Chaerophyllum procumbens	Chervil	2	-1	--	--	--	--	--
Chamaecrista fasciculata	Partridge pea	1	4	p	--	--	--	--
Chelone glabra	White turtlehead	8	-5	--	--	--	--	--
Conyza canadensis	Horseweed	0	1	p	p	p	p	--
Cryptotaenia canadensis	Honewort	4	0	--	--	--	--	--
Cynanchum laeve	Bluevine	0	0	p	p	p	p	p
Dyssodia papposa	Fetid marigold	0	5	p	--	--	--	--
Ellisia nyctelea	Waterpod	1	-1	--	--	--	--	--
Erechtites hieracifolia	Fireweed	0	3	p	--	--	--	--
Erigernon annuus	Annual fleabane	0	1	p	p	--	p	--
Eupatorium rugosum	White snakeroot	2	3	--	--	--	--	--
Eupatorium serotinum	Late boneset	2	-1	p	p	--	--	--
Galium aparine	Cleavers	1	3	p	--	--	--	--
Gaura biennis	Bienniel gaura	3	4	--	--	--	--	--
Geum canadense	White avens	2	0	--	--	--	p	--
Geum laciniatum	Rough avens	4	-3	--	--	--	p	--
Hackelia virginiana	Stickseed	0	1	p	p	--	--	--
Helenium autumnale	Sneezeweed	4	-4	p	--	--	--	--
Helianthus grosseserratus	Saw-tooth sunflower	4	-2	--	--	--	--	p
Helianthus tuberosus	Jerusalem artichoke	0	0	--	--	--	--	--
Humulus lupulus	Common hops	3	3	--	p	--	--	--
Impatiens sp.	Touch-me-not	4	-3	p	--	--	--	--
Laportea canadensis	Wood nettle	3	-3	--	--	--	p	--
Lepidium densiflorum	Peppergrass	0	0	--	--	--	--	--
Lindernia dubia	False pimpernel	4	-5	--	--	--	--	--
Lycopus americanus	Water horehound	4	-5	--	--	--	--	p
Mentha arvensis	Marsh mint	4	-3	--	--	--	--	p
Mimulus ringens	Monkey flower	3	-5	p	--	--	--	--
Oenothera biennis	Common evening primrose	0	3	p	--	--	--	p
Osmorhiza longistylis	Anise root	5	4	--	--	--	--	--
Oxalis stricta	Yellow wood sorrel	0	3	--	--	--	--	--
Parietaria pensylvanica	Pellitory	3	3	--	--	--	--	--
Penthorum sedoides	Ditch stonecrop	3	-5	--	--	--	--	--
Phyla lanceolata	Fogfruit	3	-5	p	p	--	--	--
Physalis longifolia	Tall ground cherry	3	3	--	p	--	--	p
Physostegia (virginiana)	False dragonhead	6	-3	p	--	--	--	p
Phytolacca americana	Pokeweed	0	1	--	--	--	--	--
Pilea pumila	Clearweed	3	-3	--	--	--	--	--
Plantago aristata	Bracted plantain	0	5	--	--	--	--	--
Plantago virginica	Dwarf plantain	0	4	--	--	--	--	--

Scientific Name	Common Name	ICC	WS	TF*	WS/M*	WS/W*	WS*	RCG*
Polygonum amphibium	Water smartweed	3	-5	p	p	--	p	--
Polygonum lapathifolium	Stout smartweed	0	-4	p	--	--	--	--
Polygonum pennsylvanicum	Pinkweed	0	-4	(p)	p	--	p	--
Polygonum punctatum	Dotted smartweed	4	-5	p	p	--	--	--
Polygonum ramosissimum	Bushy knotweed	3	1	--	p	--	--	--
Polygonum scandens	Climbing false buckwheat	2	0	--	--	--	--	--
Polygonum sp.	Smartweed	2	-4	--	--	p	--	p
Potentilla norvegica	Norwegian cinquefoil	2	0	p	p	--	--	--
Potentilla rivalis	Brook cinquefoil	4	-4	--	--	--	--	--
Ranunculus abortivus	Small-flowered crowfoot	0	-4	--	--	--	p	--
Ranunculus septentrionalis	Swamp buttercup	6	-4	p	--	--	--	--
Rorippa palustris	Marsh cress	7	-5	--	--	--	--	--
Rudbeckia hirta	Black-eyed Susan	2	3	--	--	--	--	--
Rudbeckia laciniata	Tall coneflower	4	-4	--	--	--	--	--
Rumex altissimus	Pale dock	0	4	p	--	--	p	--
Sanicula gregaria	Common snakeroot	5	-1	--	--	--	--	--
Senecio pauperculus	Meadow ragwort	5	-1	--	p	--	--	--
Sium suave	Water parsnip	8	-5	p	p	--	--	--
Solanum americanum	Black nightshade	0	4	p	--	--	--	--
Solanum carolinense	Horse nettle	0	4	--	--	--	--	--
Solidago canadensis	Canada goldenrod	0	3	p	--	--	--	p
Solidago gigantea	Giant goldenrod	3	-3	--	--	--	p	p
Stachys tenuiflora	Smooth hedge nettle	5	-5	--	--	--	p	--
Teucrium canadense	American germander	4	-2	p	--	--	p	p
Urtica dioica	Stinging nettle	0	-1	p	--	--	p	--
Verbena stricta	Hoary vervain	1	5	p	--	--	--	--
Verbena urticifolia	White vervain	2	-1	p	p	--	--	p
Vernonia fasciculata	Prairie ironweed	1	-3	p	--	--	--	--
Veronica peregrina	Purslane speedwell	0	-4	p	--	--	--	--
Viola sororia	Common blue violet	1	1	--	--	--	--	--
Vitis riparia	Riverbank grape	1	-2	p	--	--	p	p
Trees and Shrubs								
Acer negundo	Box elder	0	-2	--	--	--	--	p
Acer saccharinum	Silver maple	1	-3	p	p	--	p	--
Betula nigra	River birch	6	-3	--	--	--	--	--
Celtis occidentalis	Hackberry	2	1	--	--	--	--	--
Cornus foemina	Gray dogwood	1	-2	--	--	--	--	--
Fraxinus pennsylvanicus	Green ash	1	-3	p	--	p	p	--
Gleditsia triacanthos	Honey locust	0	0	--	--	--	--	p
Juglans nigra	Black walnut	4	3	--	--	--	--	--
Parthenocissus sp.	Woodbine/creeper	1.5	2	--	--	--	--	--
Platanus occidentalis	Sycamore	5	-3	p	--	--	--	--
Populus deltoides	Cottonwood	1	-1	p	p	--	--	--
Prunus serotina	Black cherry	3	3	--	--	--	--	--
Quercus bicolor	Swamp white oak	8	-4	--	--	--	--	--
Salix exigua	Sandbar willow	0	-5	--	p	p	p	--
Salix nigra	Black willow	3	-5	--	--	--	--	--
Sambuccus canadensis	Elderberry	1	4	--	--	--	p	p
Smilax hispida	Greenbrier	4	0	--	--	--	--	--
Toxicodendron radicans	Poison ivy	0	-1	p	--	--	--	p

Scientific Name	Common Name	ICC	WS	TF*	WS/M*	WS/W*	WS*	RCG*
Ulmus americana	American elm	2	-2	--	--	--	--	--
Ulmus sp.	Elm	2	-1	p	--	--	p	--
Non-native								
Abutilon theophrastii	Buttonweed	*	4	p	p	p	--	--
Agropyron repens	Quack grass	*	3	--	--	--	--	--
Agrostis gigantea	Redtop	*	-3	p	--	--	--	--
Alliaria petiolata	Garlic mustard	*	0	--	--	--	p	--
Amaranthus hybridus	Green amaranth	*	5	p	--	--	--	--
Bromus commutatus	Hairy chess	*	5	--	--	--	--	--
Chenopodium album	Lamb's quarters	*	1	p	p	p	--	p
Cirsium arvense	Canada thistle	*	3	--	--	--	--	--
Cirsium vulgare	Bull thistle	*	4	p	p	--	--	--
Coronilla varia	Crown vetch	*	5	--	--	--	--	--
Daucus carota	Queen Anne's lace	*	5	--	--	--	--	--
Echinochloa (crusgalli)	Barnyard grass	*	-3	p	--	--	--	--
Festuca arundinacea	Tall fescue	*	2	p	--	--	--	--
Glycine max	Soybean	*	5	--	--	--	--	--
Hibiscus trionum	Flower-of-an-hour	*	5	--	--	--	--	--
Hordeum pusillum	Little barley	*	0	p	--	--	--	--
Ipomea hederacea	Ivy-leaved morning glory	*	0	--	--	--	--	--
Lactuca seriola	Prickly lettuce	*	0	p	p	--	--	--
Leonurus cardiaca	Motherwort	*	5	--	--	--	--	--
Leonurus marrubiastrum	Lion's tail	*	5	p	--	--	--	--
Lysimachia nummularia	Moneywort	*	-4	--	--	--	--	--
Melilotus alba	White sweet clover	*	3	p	--	--	--	--
Morus alba	White mulberry	*	0	--	--	--	--	p
Pastinaca sativa	Wild parsnip	*	5	--	--	--	--	--
Phalaris arundinacea	Reed canary grass	*	-4	p	--	--	p	p
Phleum pratense	Timothy	*	3	--	--	--	--	--
Plantago lanceolata	Buckhorn plantain	*	0	--	--	--	--	--
Polygonum persicaria	Lady's thumb	*	-3	p	p	--	--	--
Rorippa austrica	Austrian field cress	*	-2	p	p	--	--	--
Rosa multiflora	Multiflora rose	*	3	--	--	--	--	--
Rumex crispus	Curly dock	*	-1	p	p	p	p	p
Setaria faberi	Giant foxtail	*	2	p	--	--	--	p
Setaria glauca	Yellow foxtail	*	0	--	--	--	--	--
Sonchus asper	Spiny-leaved sow thistle	*	0	p	--	--	--	p
Thlaspi arvense	Penny cress	*	5	p	--	--	--	--
Trifolium pratense	Red clover	*	2	p	--	--	--	--
Ulmus pumila	Siberian elm	*	5	--	--	--	--	--
Xanthium strumarium	Cocklebur	*	0	p	--	--	--	--
Total Species Richness				79	34	9	37	30
Native Richness				59	27	6	34	24
Non-native Richness				20	7	3	3	6
Native Richness Index				2.9	3.5	1.8	8.8	3.6
Mean Native Conservatism				2.2	2.4	0.7	2.3	2.3
Mean Wetland Status				-0.9	-1.0	-0.9	-1.6	-1.0

Scientific Name	TFM	RC	LW/F	ESOF	C3	LW/C3	CC%
Non-seed Plants							
Equisetum arvense	--	--	--	--	--	--	9
Graminoids							
Carex crawfordii	--	--	--	--	--	--	18
Carex cristatella	--	--	--	p	--	--	9
Carex gravida	--	--	--	--	--	--	9
Carex grayii	--	--	p	--	--	--	18
Carex amphibola	--	--	p	--	--	--	9
Carex laeviconica	--	--	--	p	--	p	27
Carex lupulina	--	--	p	--	--	--	18
Carex muskingumensis	--	--	--	--	--	--	9
Carex tribuloides	--	--	--	--	--	--	9
Carex vulpinoidea	--	--	--	--	--	--	18
Cyperus esculentus	--	--	--	p	--	--	9
Eleocharis erythropoda	--	--	--	p	--	--	27
Elymus canadensis	--	--	p	--	--	--	9
Elymus virginicus	--	--	p	--	--	p	27
Festuca obtusa	--	--	p	--	--	--	18
Hordeum jubatum	--	--	--	p	--	--	9
Leersia oryzoides	--	--	--	p	--	--	9
Leersia virginica	--	--	p	--	--	p	27
Panicum dichotomiflorum	--	--	--	--	--	--	9
Panicum virgatum	--	--	--	p	--	p	45
Forbs							
Acalypha virginica	--	--	--	--	--	p	9
Achillea millefolium	--	--	--	p	p	--	18
Allium canadense	--	--	p	--	--	--	9
Ambrosia artemisiifolia	--	--	--	p	--	--	27
Ambrosia trifida	--	--	p	p	--	p	45
Anemone canadensis	--	--	p	p	--	--	27
Apocynum cannabinum	--	--	--	p	--	--	9
Apocynum sibiricum	--	--	--	p	--	p	64
Asclepias incarnata	--	--	--	p	--	--	27
Asclepias syriaca	--	--	--	p	--	--	18
Aster lanceolatus	--	--	--	p	p	--	27
Aster lateriflorus	--	--	--	--	--	p	9

Scientific Name	TFM	RC	LW/F	ESOF	C3	LW/C3	CC%
Aster ontarionsis	--	--	p	p	--	p	45
Aster pilosus	--	--	p	p	--	--	36
Aster (praealtus)	--	--	--	--	--	--	9
Bidens cernua	--	--	--	--	--	--	9
Bidens tripartita	--	--	--	--	--	--	9
Bidens connata	--	--	--	--	--	--	9
Bidens frondosa	--	--	p	p	--	--	27
Bidens polylepis	--	--	--	--	--	p	9
Bidens vulgata	--	--	--	--	--	--	9
Boehmeria cylindrica	--	--	p	p	--	p	55
Boltonia asteroides	--	--	--	p	--	--	27
Calystegia sepium	--	--	p	--	p	p	45
Chaerophyllum procumbens	--	--	p	--	--	--	9
Chamaecrista fasciculata	--	--	--	p	--	--	18
Chelone glabra	--	--	p	--	--	--	9
Conyza canadensis	--	--	p	p	--	p	64
Cryptotaenia canadensis	--	--	p	--	--	--	9
Cynanchum laeve	--	--	p	p	--	p	73
Dyssodia papposa	--	--	--	--	--	--	9
Ellisia nyctelea	--	--	p	--	--	--	9
Erechtites hieracifolia	--	--	--	p	--	--	18
Erigernon annuus	--	--	--	p	--	p	45
Eupatorium rugosum	--	--	p	--	--	--	9
Eupatorium serotinum	--	--	p	p	p	--	45
Galium aparine	--	--	p	p	--	--	27
Gaura biennis	--	--	--	p	--	--	9
Geum canadense	--	--	p	--	--	--	18
Geum laciniatum	--	--	--	--	--	--	9
Hackelia virginiana	--	--	p	--	--	p	36
Helenium autumnale	--	--	--	p	--	--	18
Helianthus grosseserratus	--	--	--	--	--	--	9
Helianthus tuberosus	--	--	--	p	--	--	9
Humulus lupulus	--	--	--	p	--	--	18
Impatiens sp.	--	--	p	--	--	--	18
Laportea canadensis	--	--	p	--	--	--	18
Lepidium densiflorum	--	--	--	p	--	--	9
Lindernia dubia	--	--	--	p	--	--	9
Lycopus americanus	--	--	--	p	--	--	18
Mentha arvensis	--	--	--	--	--	--	9
Mimulus ringens	--	--	--	--	--	--	9
Oenothera biennis	--	--	--	p	p	p	45
Osmorhiza longistylis	--	--	p	--	--	--	9
Oxalis stricta	--	--	p	--	--	p	18
Parietaria pensylvanica	--	--	p	--	--	--	9
Penthorum sedoides	--	--	--	p	--	p	18
Phyla lanceolata	--	--	p	p	--	p	45
Physalis longifolia	--	--	--	--	--	--	18
Physostegia (virginiana)	--	--	--	p	--	p	36
Phytolacca americana	--	--	p	--	--	--	9
Pilea pumila	--	--	p	--	--	--	9
Plantago aristata	--	--	--	p	--	--	9
Plantago virginica	--	--	--	p	--	--	9

Scientific Name	TFM	RC	LW/F	ESOF	C3	LW/C3	CC%
Polygonum amphibium	--	--	--	p	--	p	45
Polygonum lapathifolium	--	--	--	--	--	--	9
Polygonum pennsylvanicum	--	--	(p)	p	--	p	55
Polygonum punctatum	--	--	p	p	--	--	36
Polygonum ramosissimum	--	--	--	--	--	--	9
Polygonum scandens	--	--	p	--	--	--	9
Polygonum sp.	--	--	p	--	--	--	27
Potentilla norvegica	--	--	p	p	p	p	55
Potentilla rivalis	--	--	--	p	--	--	9
Ranunculus abortivus	--	--	p	--	--	--	18
Ranunculus septentrionalis	--	--	p	--	--	--	18
Rorippa palustris	--	--	--	p	--	--	9
Rudbeckia hirta	--	--	--	p	--	--	9
Rudbeckia laciniata	--	--	p	--	--	--	9
Rumex altissimus	--	--	--	p	p	--	36
Sanicula gregaria	--	--	p	--	--	--	9
Senecio pauperculus	--	--	--	--	--	--	9
Sium suave	--	--	--	--	--	p	27
Solanum americanum	--	--	p	--	--	--	18
Solanum carolinense	--	--	--	p	--	--	9
Solidago canadensis	--	--	--	p	p	--	36
Solidago gigantea	--	--	p	p	--	--	36
Stachys tenuiflora	--	--	p	--	--	p	27
Teucrium canadense	--	--	p	p	--	p	55
Urtica dioica	--	--	p	p	--	--	36
Verbena stricta	--	--	--	--	--	--	9
Verbena urticifolia	--	--	p	(p)	--	p	55
Vernonia fasciculata	--	--	--	--	--	--	9
Veronica peregrina	--	--	--	p	--	--	18
Viola sororia	--	--	p	--	--	--	9
Vitis riparia	--	--	p	p	--	p	55
Trees and Shrubs							
Acer negundo	--	--	p	p	--	--	27
Acer saccharinum	--	--	p	p	p	p	64
Betula nigra	--	--	--	p	--	--	9
Celtis occidentalis	--	--	p	--	--	--	9
Cornus foemina	--	--	p	--	--	--	9
Fraxinus pennsylvanicus	--	--	p	p	p	p	64
Gleditsia triacanthos	--	--	--	p	--	--	18
Juglans nigra	--	--	p	--	--	--	9
Parthenocissus sp.	--	--	p	--	--	--	9
Platanus occidentalis	--	--	--	--	--	--	9
Populus deltoides	--	--	p	p	--	p	45
Prunus serotina	--	--	p	--	--	--	9
Quercus bicolor	--	--	--	--	p	--	9
Salix exigua	--	--	--	--	--	p	36
Salix nigra	--	--	p	--	--	p	18
Sambuccus canadensis	--	--	p	--	--	--	27
Smilax hispida	--	--	p	--	--	--	9
Toxicodendron radicans	--	--	p	--	--	--	27

Scientific Name	TFM	RC	LW/F	ESOF	C3	LW/C3	CC%
Ulmus americana	--	--	p	p	--	--	18
Ulmus sp.	--	--	--	--	--	--	18
Non-native							
Abutilon theophrastii	--	--	--	p	--	--	36
Agropyron repens	--	--	--	p	--	--	9
Agrostis gigantea	--	--	--	p	--	--	18
Alliaria petiolata	--	--	p	--	--	--	18
Amaranthus hybridus	--	--	--	p	--	--	18
Bromus commutatus	--	--	--	p	--	--	9
Chenopodium album	--	--	--	p	--	p	55
Cirsium arvense	--	--	--	p	--	--	9
Cirsium vulgare	--	--	p	p	--	--	36
Coronilla varia	--	--	--	p	p	--	18
Daucus carota	--	--	--	p	--	--	9
Echinochloa (crusgalli)	--	--	--	--	--	--	9
Festuca arundinacea	--	--	--	p	p	--	27
Glycine max	--	p	--	--	--	--	9
Hibiscus trionum	--	--	--	p	--	--	9
Hordeum pusillum	--	--	--	p	--	--	18
Ipomea hederacea	--	--	--	--	--	p	9
Lactuca seriola	--	--	p	p	--	--	36
Leonurus cardiaca	--	--	p	--	--	--	9
Leonurus marrubiastrum	--	--	--	p	--	--	18
Lysimachia nummularia	--	--	p	--	--	p	18
Melilotus alba	--	--	--	p	--	--	18
Morus alba	--	--	p	p	--	--	27
Pastinaca sativa	--	--	--	p	--	--	9
Phalaris arundinacea	--	--	p	p	p	p	64
Phleum pratense	--	--	--	p	--	--	9
Plantago lanceolata	--	--	--	p	--	--	9
Polygonum persicaria	--	--	--	p	--	--	27
Rorippa austrica	--	--	--	p	--	--	27
Rosa multiflora	--	--	p	--	--	--	9
Rumex crispus	--	p	p	p	p	p	91
Setaria faberi	--	--	--	p	--	--	27
Setaria glauca	--	--	--	p	--	--	9
Sonchus asper	--	--	p	p	--	--	36
Thlaspi arvense	--	--	--	p	p	--	27
Trifolium pratense	--	--	--	--	--	--	9
Ulmus pumila	--	--	p	--	--	--	9
Xanthium strumarium	--	--	--	p	--	--	18
Total Species Richness	ND	2	76	93	16	39	174
Native Richness		0	65	64	11	34	136
Non-native Richness		2	11	29	5	5	38
Native Richness Index		0.3	5.5	2.2	2.0	5.8	3.5
Mean Native Conservatism		0.0	2.5	2.0	1.6	2.3	
Mean Wetland Status		2.0	-0.6	-0.2	0.4	-1.9	

Table 14. South Point floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

RCG – Temporary flooded reed canary grass
TF – Temporary/seasonally flooded wetland
SF – Seasonally/semi permanently flooded wetland
C3 – Cool-season grassland
C3/L – Cool-season grass & legumes
RC – Row crop
TGP – Tallgrass prairie reconstruction
LW/F – Lowland woodland & forest
ESOF – Early successional old-field

Scientific Name	Common Name	ICC	WS	RCG*	TF*	SF*	C3	C3/L	RC	TGP	LWF	ESOF	CC%
Non-seed Plants													
Equisetum arvense	Common horsetail	0	0	--	p	--	--	--	--	--	--	--	11
Equisetum hymale	Common scouring-rush	1	-2	--	p	--	--	--	--	--	--	--	11
Graminoids													
Agrostis hyemalis	Ticklegrass	4	1	--	p	--	p	--	--	p	--	--	33
Andropogon gerardii	Big bluestem	4	1	--	p	--	p	--	--	--	--	--	22
Bouteloua curtipendula	Side-oats grama	6	5	--	--	--	--	--	--	p	--	--	11
Carex bebbii	Bebb's oval sedge	8	-5	--	p	--	--	--	--	--	--	--	11
Carex blanda	Common wood sedge	2	0	--	--	--	--	--	--	--	p	--	11
Carex cristatella	Crested oval sedge	5	-4	--	p	--	--	--	--	--	--	--	11
Carex grisea	Narrowleaf sedge	4	5	--	--	--	p	--	--	--	--	--	11
Carex hystericina	Porcupine sedge	5	-5	--	p	--	--	--	--	--	--	--	11
Carex scoparia	Lance-fruited oval sedge	5	-3	--	--	--	--	--	--	p	--	--	11
Carex tribuloides	Awl-fruited oval sedge	3	-4	--	p	--	--	--	--	--	--	--	11
Carex vulpinoidea	Brown fox sedge	3	-5	--	p	--	--	--	--	--	--	--	11
Carex sp.	Sedge	3	-3	--	--	--	--	--	--	--	p	--	11
Dichanthelium oligosanthes	Scribner's panic grass	5	3	--	--	--	--	--	--	p	--	--	11
Echinochloa muricata	Spiny barnyard grass	3	-5	--	p	--	--	--	--	p	--	--	22
Eleocharis obtusa	Blunt spike rush	3	-5	--	p	--	--	--	--	--	--	--	11
Eleocharis macrostachya	Spikerush	10	-5	--	p	--	--	--	--	--	--	--	11
Elymus canadensis	Canada wild rye	5	1	--	p	--	--	p	--	p	--	--	33
Elymus virginicus	Virginia wild rye	3	-2	p	--	--	--	--	--	p	--	--	22
Festuca obtusa	Nodding fescue	7	2	--	--	--	--	--	--	--	p	--	11
Glyceria grandis	American manna grass	6	-5	--	p	--	--	--	--	--	--	--	11
Glyceria striata	Fowl manna grass	5	-5	--	p	--	--	--	--	--	--	--	11

Scientific Name	Common Name	ICC	WS	RCG*	TF*	SF*	C3	C3/L	RC	TGP	LWF	ESOF	CC%
Hordeum jubatum	Squirrel-tail barley	0	-1	--	p	--	--	--	--	--	--	--	11
Juncus dudleyii	Dudley's rush	2	0	--	p	--	--	--	--	--	--	--	11
Juncus nodosus	Joint rush	4	-5	--	p	--	--	--	--	--	--	--	11
Juncus tenuis	Path rush	0	0	--	p	--	--	--	--	p	--	--	22
Leersia oryzoides	Rice cut-grass	2	-5	--	p	--	--	--	--	--	--	--	11
Panicum dichotomoflorum	Fall panicum	0	-2	--	p	--	--	--	--	--	--	--	11
Paspalum setaceum	Bead grass	4	0	--	--	--	--	--	--	p	--	--	11
Schizachyrium scoparium	Little bluestem	5	4	--	--	--	--	--	--	p	--	--	11
Scirpus atrovirens	Dark green bulrush	1	-5	p	p	--	--	--	--	--	--	--	22
Scirpus fluviatilis	River bulrush	5	-5	--	p	--	--	--	--	--	--	--	11
Scirpus validus	Soft-stemmed bulrush	3	-5	--	p	--	--	--	--	--	--	--	11
Sorghastrum nutans	Indian grass	4	2	--	p	--	--	--	--	--	--	--	11
Spartina pectinata	Prairie cord grass	4	-4	--	p	--	--	--	--	--	--	--	11
Sporobolus asper	Dropseed	3	5	--	--	--	--	--	--	p	--	--	11
Typha latifolia	Common cattail	1	-5	--	p	--	--	--	--	--	--	--	11
Aquatic													
Potamogeton pectinatus	Sago pondweed	3	-5	--	--	p	--	--	--	--	--	--	11
Potomogeton nodosus	American pondweed	7	-5	--	--	p	--	--	--	--	--	--	11
Lemna minor	Duckweed	3	-5	p	p	--	--	--	--	--	--	--	22
Forbs													
Acalyphya virginica	Three-seeded mercury	0	3	--	--	--	p	--	--	--	--	--	11
Alisma sp.	Water plantain	3	-5	--	p	--	--	--	--	--	--	--	11
Ambrosia artemisiifolia	Common ragweed	0	3	--	p	--	--	--	--	p	--	p	33
Ambrosia trifida	Giant ragweed	0	-1	p	p	--	p	--	--	p	p	p	67
Ammania coccinea	Toothcup	4	-5	--	p	--	--	--	--	--	--	--	11
Apocynum sibiricum	Indian hemp	1	-1	--	--	--	--	--	--	--	p	--	11
Artemisia ludoviciana	White sage	2	5	--	p	--	--	--	--	--	--	--	11
Asclepias incarnata	Swamp milkweed	4	-5	--	p	--	--	--	--	p	--	--	22
Asclepias syriaca	Common milkweed	0	5	p	--	--	p	--	--	p	--	--	33
Aster ericoides	Heath aster	3	4	--	--	--	--	--	--	p	--	--	11
Aster nova-angliae	New England aster	3	-3	p	p	--	--	p	--	p	--	--	44
Aster pilosus	Hairy aster	0	4	--	p	--	p	--	--	p	--	--	33
Aster sericeus	Silky aster	10	5	--	--	--	--	--	--	p	--	--	11
Astragalus canadensis	Canada milk vetch	4	-1	--	--	--	--	--	--	p	--	--	11
Bidens cernua	Nodding bur marigold	2	-5	--	p	--	--	--	--	--	--	--	11

Scientific Name	Common Name	ICC	WS	RCG*	TF*	SF*	C3	C3/L	RC	TGP	LWF	ESOF	CC%
Bidens frondosa	Beggar-ticks	3	-3	--	(p)	--	--	--	--	--	--	--	11
Calystegia sepium	American bindweed	0	0	p	p	--	--	--	--	p	--	--	33
Chamaecrista fasciculata	Partridge pea	1	4	p	p	--	--	--	--	p	--	--	33
Cirsium discolor	Field thistle	1	5	p	p	--	p	--	--	p	--	--	44
Conyza canadensis	Horseweed	0	1	--	p	--	p	--	--	p	--	--	33
Coreopsis palmata	Prairie coreopsis	7	5	--	--	--	--	--	--	p	--	--	11
Cryptotaenia canadensis	Honewort	4	0	--	--	--	--	--	--	--	p	--	11
Dalea purpurea	Purple prairie clover	8	5	--	p	--	--	--	--	p	--	--	22
Descurainia pinnata	Tansy mustard	1	5	--	--	--	--	--	--	p	--	--	11
Echinacea pallida	Pale purple coneflower	7	5	--	p	--	--	--	--	--	--	--	11
Ellisia nyctelea	Waterpod	1	-1	p	--	--	--	--	--	--	p	--	22
Erigernon annuus	Annual fleabane	0	1	p	p	--	p	--	--	p	--	--	44
Erechtites hieracifolia	Fireweed	0	3	--	p	--	p	--	--	--	--	p	33
Eupatorium perfoliatum	Boneset	6	-4	--	p	--	--	--	--	--	--	--	11
Euphorbia dentata	Toothed spurge	0	5	--	--	--	p	--	--	--	--	--	11
Euphorbia maculata	Carpet spurge	0	4	--	--	--	--	--	--	p	--	--	11
Galium aparine	Cleavers	1	3	p	--	--	--	--	--	p	p	--	33
Gentianna andrewsii	Bottle gentian	8	-3	--	p	--	--	--	--	--	--	--	11
Geum canadense	White avens	2	0	--	--	--	--	--	--	--	p	--	11
Gnaphalium obtusifolium	Everlasting	1	5	--	--	--	--	--	--	p	--	--	11
Hackelia virginica	Stickseed	0	1	--	p	--	--	--	--	--	p	--	22
Helenium autumnale	Sneezeweed	4	-4	--	p	--	--	--	--	--	--	--	11
Helianthus tuberosus	Jerusalem artichoke	0	0	p	p	--	--	--	--	--	p	--	33
Heliopsis helianthoides	Ox-eye	4	5	--	--	--	--	--	--	p	--	--	11
Lepidium densiflorum	Peppergrass	0	0	--	p	--	--	--	--	p	--	--	22
Lespedeza capitata	Round-headed bush clover	3	3	--	p	--	p	--	--	p	--	--	33
Liatris aspera	Rough blazing star	8	5	--	--	--	--	--	--	p	--	--	11
Lindernia dubia	False pimpernel	4	-5	--	p	--	--	--	--	--	--	--	11
Lobelia siphilitica	Great lobelia	3	-4	--	p	--	--	--	--	p	--	--	22
Lycopus asper	Rough water horehound	4	-5	--	p	--	--	--	--	--	--	--	11
Lythrum alatum	Winged loosestrife	3	-5	--	p	--	--	--	--	--	--	--	11
Monarda fistulosa	Wild bergamot	2	3	--	--	--	p	--	--	--	p	--	22
Oenothera biennis	Common evening primrose	0	3	--	p	--	p	--	--	p	--	--	33
Osmorhiza longistylis	Anise root	5	4	--	--	--	--	--	--	--	p	--	11
Oxalis stricta	Yellow wood sorrel	0	3	--	p	--	p	--	--	p	--	--	33
Phlox pilosa	Prairie phlox	7	1	--	--	--	--	--	--	p	--	--	11
Physalis heterophylla	Clammy ground cherry	2	5	--	--	--	p	--	--	--	--	--	11

Scientific Name	Common Name	ICC	WS	RCG*	TF*	SF*	C3	C3/L	RC	TGP	LWF	ESOF	CC%
Physalis longifolia	Tall ground cherry	3	3	--	--	--	p	--	--	--	--	--	11
Physostegia virginiana	False dragonhead	6	-3	--	p	--	--	--	--	--	--	--	11
Plantago rugelli	Rugel's plantain	0	0	--	p	--	--	--	--	--	p	--	22
Polygonum amphibium	Water smartweed	3	-5	--	p	--	--	--	--	--	--	--	11
Polygonum lapathifolium	Curttop lady's thumb	0	-4	--	p	--	--	--	--	--	--	--	11
Polygonum pennsylvanicum	Pinkweed	0	-4	--	--	--	--	--	--	p	--	--	11
Potentilla norvegica	Norwegian cinquefoil	2	0	p	p	--	p	--	--	(p)	--	--	44
Potentilla rivalis	Brook cinquefoil	4	-4	--	p	--	p	--	--	--	--	--	22
Pycnanthemum virginianum	Virginia mountain mint	4	-4	--	p	--	--	--	--	--	--	--	11
Ranunculus sceleratus	Cursed crowfoot	4	-5	--	p	--	--	--	--	--	--	--	11
Ratibida pinnata	Gray-headed coneflower	4	5	p	p	--	--	p	--	p	--	--	44
Rorippa palustris	Marsh cress	7	-5	--	p	--	--	--	--	p	--	--	22
Rorippa sessiliflora	Sessile-flowered cress	4	-5	--	p	--	--	--	--	--	--	--	11
Rudbeckia hirta	Black-eyed Susan	2	3	p	p	--	p	--	--	p	--	--	44
Rumex altissimus	Pale dock	0	4	p	p	--	--	--	--	p	--	--	33
Sagittaria latifolia	Common arrowhead	4	-5	--	p	--	--	--	--	--	--	--	11
Silphium laciniatum	Compass plant	7	4	--	--	--	--	--	--	p	--	--	11
Silphium perfoliatum	Cup plant	1	-2	p	--	--	--	--	--	--	p	--	22
Solanum carolinense	Horse nettle	0	4	--	p	--	p	--	--	p	--	--	33
Solidago canadensis	Canada goldenrod	0	3	--	p	--	--	--	--	p	--	--	22
Solidago gigantea	Giant goldenrod	3	-3	p	p	--	p	--	--	--	p	--	44
Solidago rigida	Stiff goldenrod	4	4	--	--	--	--	--	--	p	--	--	11
Stachys palustris	Woundwort	4	-5	(p)	--	--	--	--	--	--	--	--	11
Strophostyles helvula	Trailing wild bean	5	-1	--	--	--	p	--	--	p	--	--	22
Teucrium canadense	American germander	4	-2	p	p	--	p	--	--	--	p	--	44
Thalictrum dasycarpum	Purple meadow-rue	4	-2	--	--	--	--	--	--	p	--	--	11
Tradescantia ohioensis	Ohio spiderwort	4	2	--	--	--	--	--	--	p	--	--	11
Triosteum perfoliatum	Late horse gentian	4	5	--	p	--	--	--	--	--	--	--	11
Urtica dioica	Stinging nettle	0	-1	p	--	--	--	--	--	--	p	--	22
Verbena hastata	Blue vervain	3	-4	--	p	--	--	--	--	--	--	--	11
Verbena stricta	Hoary vervain	1	5	--	--	--	p	--	--	p	--	--	22
Verbena urticifolia	White vervain	2	-1	p	p	--	--	--	--	--	--	--	22
Verbesina alternifolia	Wingstem	4	-3	--	--	--	--	--	--	p	--	--	11
Veronica peregrina	Purslane speedwell	0	-4	--	p	--	--	--	--	p	--	--	22
Viola sororia	Common blue violet	1	1	--	p	--	--	--	--	--	--	--	11

Trees and Shrubs

Scientific Name	Common Name	ICC	WS	RCG*	TF*	SF*	C3	C3/L	RC	TGP	LWF	ESOF	CC%
Acer negundo	Box elder	0	-2	p	--	--	--	--	--	--	p	--	22
Acer saccharinum	Silver maple	1	-3	--	p	--	--	--	--	--	--	--	11
Cornus drummondii	Rough-leaved dogwood	6	0	--	--	--	p	--	--	--	--	--	11
Fraxinus pennsylvanicus	Green ash	1	-3	p	--	--	--	--	--	--	--	--	11
Gleditsia triacanthos	Honey locust	0	0	p	--	--	--	--	--	--	--	--	11
Parthenocissus quinquefolia	Virginia creeper	2	1	--	--	--	--	--	--	--	p	--	11
Populus deltoides	Cottonwood	1	-1	p	p	--	--	--	--	p	p	--	44
Ribes missouriense	Wild gooseberry	3	5	--	--	--	--	--	--	--	p	--	11
Rubus occidentalis	Black raspberry	1	5	p	--	--	--	--	--	--	--	--	11
Salix amygdaloides	Peach-leaved willow	1	-3	p	p	--	--	--	--	--	--	--	22
Salix exigua	Sandbar willow	0	-5	p	p	--	--	--	--	--	--	--	22
Salix nigra	Black willow	3	-5	p	--	--	--	--	--	--	p	--	22
Sambuccus canadensis	Elderberry	1	4	p	--	--	--	--	--	--	p	--	22
Smilax hispida	Greenbrier	4	0	--	--	--	--	--	--	--	p	--	11
Toxicodendron radicans	Poison ivy	0	-1	p	--	--	--	--	--	--	p	--	22
Vitis riparia	Riverbank grape	1	-2	p	--	--	--	--	--	p	p	--	33
Non-native													
Agropyron repens	Quack grass	*	3	--	p	--	--	p	--	p	--	--	33
Arctium minus	Common burdock	*	5	--	--	--	--	--	--	--	p	--	11
Barbarea vulgaris	Yellow rocket	*	0	--	p	--	--	--	--	p	--	--	22
Bromus commutatus	Hairy chess	*	5	p	--	--	--	--	--	p	--	--	22
Bromus inermis	Smooth brome	*	5	p	p	--	p	p	--	p	p	--	67
Canabis sativa	Hemp	*	0	--	--	--	--	--	--	p	--	--	11
Carduus nutans	Musk thistle	*	5	--	--	--	--	--	--	p	--	--	11
Chenopodium album	Lamb's quarters	*	1	--	--	--	--	--	--	p	--	--	11
Cirsium arvense	Canada thistle	*	3	--	--	--	--	--	--	p	--	--	11
Coreopsis tinctoria	Golden coreopsis	*	1	--	--	--	--	--	--	p	--	--	11
Dactylis glomerata	Orchard grass	*	3	--	--	--	p	--	--	--	--	--	11
Gailardia pulchella	Blanket flower	*	5	--	--	--	--	--	--	p	--	--	11
Lactuca seriola	Prickly lettuce	*	0	--	p	--	--	--	--	p	--	p	33
Lolium perenne	Perennial rye grass	*	3	--	--	--	--	--	--	p	--	--	11
Machaerantha tanacetifolia	Tansy aster	*	nr	--	--	--	--	--	--	p	--	--	11
Medicago lupulina	Black medic	*	1	--	--	--	--	--	--	p	--	--	11
Medicago sativa	Alfalfa	*	5	--	p	--	--	p	--	p	--	--	33
Melilotus alba	White sweet clover	*	3	--	p	--	--	--	--	p	--	--	22
Melilotus officinales	Yellow sweet clover	*	3	--	p	--	--	--	--	p	--	--	22

Scientific Name	Common Name	ICC	WS	RCG*	TF*	SF*	C3	C3/L	RC	TGP	LWF	ESOF	CC%
Morus alba	White mulberry	*	0	--	--	--	--	--	--	--	p	--	11
Nepeta cataria	Catnip	*	1	--	--	--	--	--	--	--	p	--	11
Pastinaca sativa	Wild parsnip	*	5	--	--	--	--	--	--	p	--	--	11
Phlaris arundinacea	Reed canary grass	*	-4	p	p	--	--	--	--	p	p	--	44
Phleum pratense	Timothy	*	3	--	p	--	--	--	--	--	--	--	11
Poa pratensis	Kentucky bluegrass	*	1	--	--	--	--	--	--	--	p	--	11
Polygonum (persicaria)	Lady's thumb	*	-3	--	p	--	--	--	--	--	--	--	11
Potentilla recta	Sulphur cinquefoil	*	5	--	--	--	p	--	--	--	--	--	11
Rumex crispus	Curly dock	*	-1	p	p	--	--	--	--	p	--	p	44
Setaria faberi	Giant foxtail	*	2	--	--	--	--	--	--	p	--	--	11
Setaria glauca	Yellow foxtail	*	0	--	--	--	--	--	--	p	--	--	11
Setaria viridis	Green foxtail	*	5	--	--	--	--	--	--	p	--	--	11
Silene pratensis	White campion	*	nr	p	--	--	--	--	--	--	p	--	22
Sonchus asper	Spiny-leaved sow thistle	*	0	--	--	--	--	--	--	p	--	--	11
Taraxacum officinale	Common dandelion	*	3	p	--	--	--	--	--	p	--	--	22
Thlaspi arvense	Penny cress	*	5	--	--	--	--	--	--	p	--	--	11
Trifolium pratense	Red clover	*	2	--	p	--	--	p	--	p	--	p	44
Trifolium repens	White clover	*	2	--	p	--	--	--	--	p	--	--	22
Verbascum thapsus	Common mullein	*	5	--	p	--	--	--	--	--	--	p	22
Xanthium strumarium	Cocklebur	*	0	--	p	--	--	--	--	p	--	--	22
Total Species Richness				40	101	2	30	7	no	86	34	7	183
Native Richness				34	86	2	27	3	data	57	27	3	144
Non-native Richness				6	15	0	3	4		29	7	4	39
Native Richness Index				5.0	5.4	3.0	7.0	0.8		1.9	3.5	0.8	3.6
Mean Native Conservatism				1.3	2.7	5.0	1.9	4.0		2.8	1.9	0.0	
Mean Wetland Status				-0.2	-1.1	-5.0	2.3	2.6		1.7	0.2	1.6	

Table 15. Doolittle floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

WMP – Wet mesic prairie
TF – Temporary/seasonally flooded wetland
NC3F – Wet-mesic cool-season grass & forb
ESS – Early successional shrubland

Scientific Name	Common Name	ICC	WS	WMP	TF*	NC3F	ESS	CC%
Seedless Plants								
Equisetum laevigatum	Smooth scouring-rush	6	-3	p	--	--	--	25
Graminoids								
Andropogon gerardii	Big bluestem	4	1	--	--	p	--	25
Calamgrostis canadensis	Bluejoint	5	-5	--	p	--	--	25
Carex annectans	Large yellow fox sedge	6	-3	p	--	--	--	25
Carex atherodes	Hairy-leaved lake sedge	8	-5	--	p	--	--	25
Carex bebbii	Bebb's oval sedge	8	-5	--	p	--	--	25
Carex bicknellii	Bicknell's sedge	10	1	p	--	--	--	25
Carex blanda	Common wood sedge	2	0	--	--	p	--	25
Carex cristatella	Crested oval sedge	5	-4	p	--	--	--	25
Carex festucacea	Fescue oval sedge	8	0	--	--	p	--	25
Carex laeviconica	Long-toothed lake sedge	6	-5	--	p	--	--	25
Carex lanuginosa	Wooly sedge	4	-5	p	--	--	--	25
Carex meadii	Mead's stiff sedge	9	0	p	--	--	--	25
Carex normalis	Spreading oval sedge	5	-3	p	--	--	--	25
Carex molesta	Field oval sedge	2	0	p	--	--	--	25
Carex scoparia	Lance-fruited oval sedge	5	-3	p	p	--	--	50
Carex tribuloides	Awl-fruited oval sedge	3	-4	--	p	--	--	25
Carex vesicaria	Tufted lake sedge	7	-5	--	p	--	--	25
Carex vulpinoidea	Brown fox sedge	3	-5	--	--	p	--	25
Dichanthelium acuminatum	Panic grass	3	0	p	--	--	--	25
Dichanthelium leibergii	Leiberg's panic grass	6	2	p	--	--	--	25
Dichanthelium oligosanthes	Scribner panic grass	5	3	p	--	p	--	50
Eleocharis erythropoda	Red-rooted spike rush	4	-5	--	p	--	--	25
Eleocharis macrostachya	Spikerush	10	-5	--	p	--	--	25
Elymus canadensis	Canada wild rye	5	1	p	--	--	--	25
Hordeum jubatum	Squirrel-tail barley	0	-1	--	p	p	--	50
Juncus dudleyii	Dudley's rush	2	0	--	--	p	--	25
Juncus tenuis	Path rush	0	0	--	--	p	--	25
Muhlenbergia sp.	Muhly grass	3	-1	p	--	--	--	25
Panicum virgatum	Switchgrass	5	-1	p	--	--	--	25
Scirpus fluviatilis	River bulrush	5	-5	--	--	p	--	25
Scirpus heterochaetus	Slender bulrush	10	-5	--	p	--	--	25
Schizachyrium scoparium	Little bluestem	5	4	p	--	--	--	25
Sorghastrum nutans	Indian grass	4	2	p	--	--	--	25
Spartina pectinata	Prairie cord grass	4	-4	p	p	p	--	75
Sphenopholis obtusa	Prairie wedge grass	8	0	p	--	--	--	25

Scientific Name	Common Name	ICC	WS	WMP	TF*	NC3F	ESS	CC%
Sporobolus asper	Dropseed	3	5	--	--	p	--	25
Sporobolus heterolepis	Prairie dropseed	9	4	p	--	--	--	25
Stipa spartea	Porcupine grass	6	5	--	--	p	--	25
Forbs								
Alisma trivale	Water plantain	3	-5	--	p	--	--	25
Ambrosia artemisiifolia	Common ragweed	0	3	p	--	p	--	50
Ambrosia trifida	Giant ragweed	0	-1	--	p	p	p	75
Amorpha canescens	Lead plant	8	5	p	--	--	--	25
Apocynum cannabinum	Indian hemp	1	0	--	p	--	--	25
Apocynum sibiricum	Dogbane	1	-1	p	p	p	--	75
Asclepias incarnata	Swamp milkweed	4	-5	--	p	--	--	25
Asclepias sullivantii	Prairie milkweed	7	5	p	p	p	--	75
Asclepias syriaca	Common milkweed	0	5	p	--	p	--	50
Asclepias tuberosa	Butterfly weed	6	5	p	--	--	--	25
Asclepias verticillata	Whorled milkweed	0	5	p	--	p	--	50
Aster ericoides	Heath aster	3	4	--	--	p	--	25
Aster laevis	Smooth blue aster	7	5	p	--	--	--	25
Aster lanceolatus	Panicled aster	4	-3	--	p	p	--	50
Aster pilosus	Hairy aster	0	4	--	p	--	--	25
Bidens vulgata	Tall beggar-ticks	1	-3	--	p	--	--	25
Cacalia plantaginea	Prairie Indian plaintain	7	0	p	--	--	--	25
Calystegia sepium	American bindweed	0	0	--	--	--	p	25
Cicuta maculata	Water hemlock	7	-5	p	p	--	--	50
Cirsium altissimum	Tall thistle	4	5	p	--	--	--	25
Cirsium discolor	Field thistle	1	5	p	--	p	--	50
Comandra umbellata	Bastard toadflax	6	3	p	--	p	--	50
Dalea purpurea	Purple prairie clover	8	5	p	--	--	--	25
Desmodium canadense	Showy tick-trefoil	6	1	p	--	--	--	25
Erigeron strigosus	Daisy fleabane	2	1	p	--	--	--	25
Eryngium yuccifolium	Rattlesnake master	8	-1	p	--	p	--	50
Fragaria virginiana	Wild strawberry	3	1	p	--	--	--	25
Galium obtusum	Wild madder	7	-4	p	--	p	--	50
Galium triflorum	Sweet-scented bedstraw	7	2	--	--	p	--	25
Geum canadense	White avens	2	0	--	--	p	p	50
Helenium autumnale	Sneezeweed	4	-4	--	p	p	--	50
Helianthus grosseserratus	Saw-tooth sunflower	4	-2	p	--	p	--	50
Helianthus rigidus	Prairie sunflower	8	5	p	--	--	--	25
Heliopsis helianthoides	Ox-eye	4	5	p	--	p	--	50
Hypoxis hirsuta	Yellow stargrass	7	0	p	--	--	--	25
Iris shrevei	Blue flag	6	-5	--	p	--	--	25
Lespedeza capitata	Round-headed bush clover	3	3	p	--	--	--	25
Liatris pycnostachya	Prairie blazing star	6	1	p	--	--	--	25
Lithospermum canescens	Hoary puccoon	7	5	p	--	--	--	25
Lycopus americanus	Water horehound	4	-5	--	p	--	--	25
Lysimachia quadriflora	Narrow-leaved loosestrife	7	5	p	--	--	--	25
Lythrum alatum	Winged loosestrife	3	-5	p	--	p	--	50
Monarda fistulosa	Wild bergamot	2	3	--	--	p	--	25
Oxypolis rigidior	Cowbane	8	-5	p	--	--	--	25
Pedicularis canadensis	Lousewort	7	2	p	--	--	--	25
Pediomelum argophyllum	Silvery scurf-pea	5	5	p	--	--	--	25

Scientific Name	Common Name	ICC	WS	WMP	TF*	NC3F	ESS	CC%
Penstemon digitalis	Foxglove penstemon	4	1	--	--	p	--	25
Penthorum sedoides	Ditch stonecrop	3	-5	--	p	--	--	25
Phlox pilosa	Prairie phlox	7	1	p	--	--	--	25
Phyla lanceolata	Fogfruit	3	-5	--	--	p	--	25
Physalis heterophylla	Clammy ground cherry	2	5	--	--	p	--	25
Polygonum amphibium	Water smartweed	3	-5	--	p	--	--	25
Potentilla arguta	Prairie cinquefoil	8	4	p	--	p	--	50
Potentilla simplex	Common cinquefoil	3	4	p	--	--	--	25
Pycnanthemum virginianum	Virginia mountain mint	4	-4	p	--	p	p	75
Ranunculus sceleratus	Cursed crowfoot	4	-5	--	(p)	--	--	25
Ratibida pinnata	Gray-headed coneflower	4	5	p	--	p	--	50
Rorippa palustris	Marsh cress	7	-5	--	p	--	--	25
Rudbeckia hirta	Black-eyed Susan	2	3	p	--	p	--	50
Sagitaria brevirostra	Short-beaked arrowleaf	4	-5	--	p	--	--	25
Sanicula canadensis	Black snakeroot	6	2	--	--	p	--	25
Sanicula gregaria	Common snakeroot	5	-1	--	--	p	--	25
Senecio pauperculus	Prairie ragwort	5	-1	p	--	--	--	25
Silphium laciniatum	Compass plant	7	4	p	--	p	--	50
Sisyrinchium campestre	Prairie blue-eyed grass	4	5	p	--	--	--	25
Sium suave	Water parsnip	8	-5	--	p	--	--	25
Solidago canadensis	Canada goldenrod	0	3	p	--	p	--	50
Solidago gigantea	Giant goldenrod	3	-3	p	--	--	--	25
Solidago rigida	Stiff goldenrod	4	4	p	--	p	--	50
Stachys palustris	Woundwort	4	-5	p	p	--	--	50
Thalictrum dasycarpum	Purple meadow-rue	4	-2	p	--	--	--	25
Vernonia fasciculata	Prairie ironweed	1	-3	--	p	--	--	25
Vicia americana	American vetch	8	0	p	--	--	--	25
Viola pedatifida	Prairie violet	8	4	p	--	--	--	25
Viola sororia	Common blue violet	1	1	p	--	p	--	50
Zizia aurea	Golden alexanders	6	-1	p	--	p	p	75
Trees and Shrubs								
Cornus drummondii	Rough-leaved dogwood	6	0	p	--	p	--	50
Gleditsia triacanthos	Honey locust	0	0	--	--	p	--	25
Juniperus virginia	Red cedar	1	3	--	--	p	--	25
Parthenocissus quinquefolia	Virginia creeper	2	1	--	--	p	p	50
Prunus serotina	Wild black cherry	3	3	--	--	p	--	25
Prunus virginiana	Choke cherry	2	1	--	--	p	--	25
Ribes americanum	Wild black currant	6	-3	p	--	--	--	25
Rosa arkansana	Prairie rose	4	5	p	--	p	--	50
Rubus occidentalis	Black raspberry	1	5	--	--	p	--	25
Salix petiolaris	Meadow willow	8	-5	p	--	--	--	25
Sambuccus canadensis	Elderberry	1	4	--	--	p	--	25
Toxicodendron radicans	Poison ivy	0	-1	p	--	p	--	50
Ulmus rubra	Red elm, slippery elm	2	0	--	--	p	--	25
Vitis riparia	Riverbank grape	1	-2	--	--	p	p	50
Zanthoxylem americanum	Prickly ash	3	5	--	--	p	--	25
Non-native								
Agropyron repens	Quack grass	*	3	p	--	--	--	25
Agrostis gigantea	Redtop	*	-3	p	--	--	--	25

Scientific Name	Common Name	ICC	WS	WMP	TF*	NC3F	ESS	CC%
Bromus japonicus	Japanese brome	*	3	--	--	p	--	25
Bromus inermis	Smooth brome	*	5	--	--	p	--	25
Chenopodium album	Lamb's quarters	*	1	--	--	p	--	25
Cirsium arvense	Canada thistle	*	3	--	p	p	--	50
Festuca arundinacea	Tall fescue	*	2	--	--	p	--	25
Leonurus cardiaca	Motherwort	*	5	--	--	p	--	25
Medicago sativa	Alfalfa	*	5	--	--	p	--	25
Melilotus alba	White sweet clover	*	3	p	--	--	--	25
Melilotus officinales	Yellow sweet clover	*	3	--	--	p	--	25
Pastinaca sativa	Wild parsnip	*	5	--	--	p	--	25
Phlaris arundinacea	Reed canary grass	*	-4	--	p	p	--	50
Poa compressa	Canadian bluegrass	*	2	--	--	p	--	25
Poa pratensis	Kentucky bluegrass	*	1	p	--	p	--	50
Rumex crispus	Curly dock	*	-1	--	p	--	--	25
Sonchus aspera	Spiny-leaved sow thistle	*	0	p	--	--	--	25
Taraxacum officinale	Common dandelion	*	3	p	--	--	--	25
Tragopogon dubius	Goat's-beard	*	5	--	--	p	--	25
Trifolium pratense	Red clover	*	2	--	--	p	--	25
Total Species Richness				79	35	71	6	150
Native Richness				73	32	57	6	130
Non-native Richness				6	3	14	0	20
Native Richness Index				10.6	8.3	3.9	7.0	6.2
Mean Native Conservatism				5.1	4.6	3.3	2.5	
Mean Wetland Status				1.0	-3.4	1.4	-1.2	

Table 16. Engledinger Marsh floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

SM – Sedge meadow
TF – Temporary/seasonally flooded wetland
SF – Semi-permanently flooded wetland/aquatic
CT – Temporary flooded cattail wetland
WMP – Wet mesic prairie
TFM – Tall forb meadow
TGP – Tallgrass prairie reconstruction
NC3F – Wet-mesic cool-season grass & forb
C3 – Cool-season grassland
RC – Row crop (no plant survey)

Scientific Name	Common Name	ICC	WS	SM*	TF*	SF*	CT*	WMP	TFM	TGP	NC3F	C3	CC%
Non-seed Plants													
Botrychium virginianum	Rattlesnake fern	6	3	--	--	--	--	p	--	--	--	--	11
Equisetum arvense	Common horsetail	0	0	--	--	--	--	p	--	--	p	--	22
Graminoids													
Andropogon gerardii	Big bluestem	4	1	--	--	--	--	--	--	--	--	p	11
Calamgrostis canadensis	Bluejoint	5	-5	p	p	p	--	p	--	--	--	--	44
Carex bebbii	Bebb's oval sedge	8	-5	--	p	--	--	p	--	--	--	--	22
Carex brevior	Plains oval sedge	4	0	--	--	--	--	p	--	--	p	--	22
Carex haydeni	Long-scaled tussock sedge	5	-5	p	--	--	--	--	--	--	--	--	11
Carex hystericina	Porcupine sedge	5	-5	--	--	--	--	--	--	--	p	--	11
Carex lacustris	Common lake sedge	7	-5	p	p	p	p	--	--	--	--	--	44
Carex lanuginosa	Wooly sedge	4	-5	--	--	--	--	--	--	--	p	--	11
Carex meadii	Mead's stiff sedge	9	0	--	--	--	--	--	--	--	p	--	11
Carex stricta	Common tussock sedge	6	-5	(p)	p	--	--	p	--	--	--	--	33
Carex suberecta	Wedge-fruited oval sedge	8	-5	p	--	--	--	p	--	--	p	--	33
Carex tribuloides	Awl-fruited oval sedge	3	-4	--	--	--	--	p	--	--	--	--	11
Carex vulpinoidea	Brown fox sedge	3	-5	--	--	--	--	p	p	--	--	--	22
Eleocharis erythropoda	Red-rooted spike rush	4	-5	--	p	--	--	--	--	--	--	--	11
Eleocharis	Spikerush	5	-4	--	--	p	--	--	--	--	p	--	22
Glyceria striata	Fowl manna grass	5	-5	p	p	--	--	p	--	--	--	--	33
Glyceria grandis	American manna grass	6	-5	--	p	p	--	--	--	--	--	--	22
Juncus dudleyii	Dudley's rush	2	0	--	--	--	--	p	--	--	--	--	11
Juncus torreyi	Torrey's rush	3	-3	--	p	--	--	p	--	--	p	--	33
Leersia oryzoides	Rice cut-grass	2	-5	p	--	p	--	--	--	--	--	--	22

Scientific Name	Common Name	ICC	WS	SM*	TF*	SF*	CT*	WMP	TFM	TGP	NC3F	C3	CC%
Poa (palustris)	Foul meadow grass	5	-4	p	--	--	--	--	--	--	--	--	11
Scirpus atrovirens	Dark green bulrush	1	-5	p	--	--	p	p	p	--	p	--	56
Sparganium eurycarpum	Common bur reed	6	-5	p	p	p	--	p	p	--	--	--	56
Spartina pectinata	Slough grass, cord grass	4	-4	p	p	--	--	p	--	--	--	--	33
Sphenopholis obtusata	Slender wedge grass	4	0	--	--	--	--	p	--	--	--	--	11
Sporobolus asper	Dropseed	3	5	--	--	--	--	--	--	--	--	p	11
Typha latifolia	Common cattail	1	-5	--	--	--	p	--	--	--	--	--	11
Aquatic													
Lemna minor	Duckweed	3	-5	p	--	--	--	--	--	--	--	--	11
Ranunculus flabellaris	Yellow water crowfoot	6	-5	--	p	--	--	--	--	--	--	--	11
Forbs													
Achillea millefolium	Western yarrow	0	3	--	--	--	--	--	p	p	--	p	33
Agrimonia parviflora	Swamp agrimony	3	-1	--	--	--	--	--	--	--	--	p	11
Ambrosia artemisiifolia	Common ragweed	0	3	--	--	--	--	--	--	p	--	--	11
Ambrosia trifida	Giant ragweed	0	-1	--	--	--	--	p	--	--	--	--	11
Anemone canadensis	Canada anemone	2	-3	--	--	--	--	p	--	--	--	--	11
Antennaria neglecta	Pussytoes	2	5	--	--	--	--	--	--	--	--	p	11
Apocynum sibiricum	Indian hemp	1	-1	p	--	--	--	p	--	--	p	p	44
Asclepias incarnata	Swamp milkweed	4	-5	p	p	p	--	--	--	--	p	--	44
Asclepias sullivantii	Prairie milkweed	7	5	--	--	--	--	p	--	--	--	--	11
Asclepias syriaca	Common milkweed	0	5	--	p	--	--	p	p	p	--	p	56
Aster ericoides	Heath aster	3	4	--	--	--	--	p	--	--	p	p	33
Aster lanceolatus	Panicled aster	4	-3	p	--	--	--	p	--	--	--	--	22
Aster nova-angliae	New England aster	3	-3	p	--	--	--	p	--	--	--	--	22
Aster pilosus	Hairy aster	0	4	--	--	--	--	--	--	p	--	--	11
Aster puniceus	Swamp aster	5	-5	--	p	--	--	p	--	--	--	--	22
Bidens (frondosa)	Beggar-ticks	3	-3	p	p	--	--	--	--	--	--	--	22
Bidens polylepis	Beggar-ticks	3	-3	--	--	--	--	--	--	p	--	--	11
Brickelia eupatoroides	False boneset	5	5	--	--	--	--	--	--	--	--	p	11
Cacalia plantaginea	Prairie Indian plaintain	7	0	p	--	--	--	p	--	--	p	--	33
Calystegia sepium	American bindweed	0	0	--	--	--	--	p	p	p	--	p	44
Chamaecrista fasciculata	Partridge pea	1	4	--	--	--	--	p	--	p	--	--	22
Cicuta maculata	Water hemlock	7	-5	p	--	--	--	--	--	--	p	--	22
Cirsium altissimum	Tall thistle	4	5	--	--	--	--	p	--	--	--	--	11
Cirsium discolor	Field thistle	1	5	--	--	--	--	p	p	p	--	p	44

Scientific Name	Common Name	ICC	WS	SM*	TF*	SF*	CT*	WMP	TFM	TGP	NC3F	C3	CC%
Dalea purpurea	Purple prairie clover	8	5	--	--	--	--	p	--	--	--	--	11
Desmodium canadense	Showy tick-trefoil	6	1	--	--	--	--	p	--	p	--	--	22
Epilobium coloratum	Cinnamon willowherb	3	-5	p	p	--	--	--	--	--	--	--	22
Erechtites hieracifolia	Fireweed	0	3	p	p	--	--	--	--	--	--	--	22
Erigernon annuus	Annual fleabane	0	1	--	--	--	--	p	p	p	--	--	33
Eupatorium perfoliatum	Boneset	6	-4	p	p	--	--	--	--	--	--	--	22
Euphorbia corollata	Flowering spurge	3	5	--	--	--	--	--	--	--	--	p	11
Fragaria virginiana	Wild strawberry	3	1	--	p	--	--	p	--	--	--	--	22
Galium aparine	Cleavers	1	3	--	p	--	--	--	p	p	p	p	56
Galium obtusum	Wild madder	7	-4	--	--	p	--	p	--	--	--	--	22
Geum canadense	White avens	2	0	--	--	--	--	p	--	--	--	--	11
Geum laciniatum	Rough avens	4	-3	--	--	--	--	p	p	--	--	--	22
Helenium autumnale	Sneezeweed	4	-4	--	--	--	--	p	--	--	--	--	11
Helianthus grosseserratus	Saw-tooth sunflower	4	-2	--	p	--	p	p	p	p	p	p	78
Heliopsis helianthoides	Ox-eye	4	5	--	--	--	--	p	p	--	--	--	22
Iris shrevei	Blue flag	6	-5	p	p	--	--	p	p	--	p	--	56
Lespedeza capitata	Round-headed bush clover	3	3	--	--	--	--	--	--	--	--	p	11
Ludwigia alternifolia	Seedbox	4	-5	--	p	p	--	--	--	--	--	--	22
Lycopus americanus	Water horehound	4	-5	--	--	--	--	p	p	--	p	--	33
Lycopus asper	Rough water horehound	4	-5	p	p	p	--	p	--	--	--	--	44
Lycopus uniflorus	Northern bugleweed	7	-5	p	p	--	--	--	--	--	--	--	22
Lysimachia ciliata	Fringed loosestrife	4	-3	--	--	--	--	p	--	--	--	--	11
Lysimachia thyrsiflora	Tufted loosestrife	7	-5	p	p	--	--	p	--	--	--	--	33
Lythrum alatum	Winged loosestrife	3	-5	p	--	--	--	p	--	--	--	--	22
Monarda fistulosa	Wild bergamot	2	3	--	--	--	--	p	--	p	--	p	33
Pedicularis lanceolatus	Lousewort	7	2	p	--	--	--	--	--	--	--	--	11
Phlox maculata	Marsh phlox	7	-5	p	--	--	--	--	--	--	--	--	11
Phlox pilosa	Prairie phlox	7	1	--	--	--	--	p	--	--	--	--	11
Physalis heterophylla	Clammy ground cherry	2	5	--	--	--	--	--	--	--	--	p	11
Polygonum amphibium	Water smartweed	3	-5	p	p	--	--	--	p	--	--	--	33
Polygonum scandens	Climbing false buckwheat	2	0	--	--	--	--	--	--	p	--	--	11
Prunella vulgaris	Self heal	0	0	--	--	--	--	p	--	--	--	--	11
Pycnanthemum virginianum	Virginia mountain mint	4	-4	p	--	--	p	p	p	p	p	--	67
Ratibida pinnata	Gray-headed coneflower	4	5	--	--	--	--	p	--	--	--	--	11
Rorippa sessiliflora	Sessile-flowered cress	4	-5	--	--	--	--	--	p	--	--	--	11
Rudbeckia hirta	Black-eyed Susan	2	3	--	--	--	--	p	--	p	--	--	22
Rudbeckia subtomentosa	Fragrant coneflower	4	-3	--	--	--	--	p	--	--	--	--	11

Scientific Name	Common Name	ICC	WS	SM*	TF*	SF*	CT*	WMP	TFM	TGP	NC3F	C3	CC%
Sagitaria latifolia	Common arrowhead	4	-5	p	p	p	p	--	--	--	--	--	44
Sanicula canadensis	Black snakeroot	6	2	--	--	--	--	p	--	--	--	--	11
Sanicula sp.	Snakeroot	4	0	--	--	--	--	--	--	--	p	--	11
Scutellaria galericulata	Marsh skullcap	6	-5	p	--	--	--	--	--	--	--	--	11
Scutellaria lateriflora	Mad-dog skullcap	6	-5	--	p	p	--	p	--	--	--	--	33
Senecio aureus	Golden ragwort	4	-3	--	--	--	--	p	--	p	p	--	33
Senecio pauperculus	Meadow ragwort	5	-1	--	--	--	--	--	--	--	p	--	11
Silphium laciniatum	Compass plant	7	4	--	p	--	--	p	--	--	--	--	22
Sium suave	Water parsnip	8	-5	p	p	--	--	--	--	--	--	--	22
Solanum carolinense	Horse nettle	0	4	--	--	--	--	--	--	--	--	p	11
Solidago canadensis	Canada goldenrod	0	3	--	--	--	--	p	p	p	p	p	56
Solidago gigantea	Giant goldenrod	3	-3	p	p	--	--	p	--	--	--	--	33
Solidago rigida	Stiff goldenrod	4	4	--	--	--	--	--	--	p	--	--	11
Stachys palustris	Woundwort	4	-5	p	p	--	--	p	--	--	--	--	33
Thalictrum dasycarpum	Purple meadow-rue	4	-2	--	p	--	--	p	--	--	--	--	22
Verbena hastata	Blue vervain	3	-4	p	--	--	--	--	p	--	--	--	22
Verbena stricta	Hoary vervain	1	5	--	--	--	--	--	--	--	--	p	11
Verbena urticifolia	White vervain	2	-1	--	--	--	--	p	p	--	--	--	22
Veronica peregrina	Purslane speedwell	0	-4	--	--	--	--	--	p	--	--	--	11
Veronicastrum virginicum	Culver's root	5	0	--	--	--	--	p	--	--	--	--	11
Viola sororia	Common blue violet	1	1	p	--	--	--	--	--	--	p	--	22
Zizia aurea	Golden alexanders	6	-1	--	p	--	--	--	--	--	p	--	22
Trees and Shrubs													
Acer saccharinum	Silver maple	1	-3	p	--	--	--	--	--	--	--	--	11
Cornus drummondii	Rough-leaved dogwood	6	0	--	--	--	--	p	--	--	--	p	22
Cornus foemina	Gray dogwood	1	-2	--	--	--	--	p	--	--	--	--	11
Cornus sp.	Dogwood	2	-2	--	--	--	--	--	p	--	--	--	11
Fraxinus pennsylvanicus	Green ash	1	-3	p	--	--	--	--	--	--	--	--	11
Juniperus virginia	Red cedar	1	3	--	--	--	--	--	--	--	--	p	11
Parthenocissus quinquefolia	Virginia creeper	2	1	--	--	--	--	--	p	--	--	p	22
Prunus americana	Wild plum	2	5	--	--	--	--	p	--	--	p	--	22
Prunus mexicana	Big-tree plum	2	5	--	--	--	--	--	p	--	--	--	11
Prunus serotina	Black cherry	3	3	--	--	--	--	--	--	--	--	p	11
Prunus virginiana	Choke cherry	2	1	--	--	--	--	p	--	--	--	--	11
Rosa arkansana	Prairie rose	4	5	--	--	--	--	p	--	--	--	p	22
Rosa blanda	Smooth wild rose	4	3	--	--	--	--	--	--	--	--	p	11

Scientific Name	Common Name	ICC	WS	SM*	TF*	SF*	CT*	WMP	TFM	TGP	NC3F	C3	CC%
Rubus occidentalis	Black raspberry	1	5	--	--	--	--	--	--	p	--	--	11
Salix exigua	Sandbar willow	0	-5	--	--	--	--	--	--	p	--	--	11
Salix nigra	Black willow	3	-5	--	p	--	--	--	--	--	--	--	11
Salix sp.	Willow	2	-3	--	--	--	--	--	--	--	p	--	11
Sambuccus canadensis	Elderberry	1	4	--	--	--	--	p	p	--	--	--	22
Ulmus americana	American elm	2	-2	p	--	--	--	--	--	--	--	--	11
Ulmus rubra	Red elm	2	0	--	--	--	--	--	--	--	--	p	11
Vitis riparia	Riverbank grape	1	-2	--	--	--	--	p	p	--	p	p	44
Non-native													
Agropyron repens	Quack grass	*	3	--	--	--	--	--	--	--	p	--	11
Agrostis gigantea	Redtop	*	-3	--	--	--	--	p	p	--	p	--	33
Bromus japonicus	Japanese brome	*	3	--	--	--	--	p	--	--	--	--	11
Bromus inermis	Smooth brome	*	5	--	--	--	--	--	p	--	p	p	33
Canabis sativa	Hemp	*	0	--	--	--	--	--	p	--	--	--	11
Cirsium arvense	Canada thistle	*	3	--	--	--	--	--	p	--	p	p	33
Daucus carota	Queen Anne's lace	*	5	--	--	--	--	p	--	p	--	--	22
Elaeagnus angustifolia	Russian olive	*	4	--	--	--	--	p	--	--	--	p	22
Melilotus alba	White sweet clover	*	3	--	--	--	--	--	p	--	--	--	11
Melilotus officinales	Yellow sweet clover	*	3	--	--	--	--	--	--	p	--	p	22
Morus alba	White mulberry	*	0	--	--	--	--	--	--	--	--	p	11
Nepeta cataria	Catnip	*	1	--	--	--	--	--	p	--	--	--	11
Pastinaca sativa	Wild parsnip	*	5	--	--	--	--	p	p	p	p	p	56
Phalaris arundinacea	Reed canary grass	*	-4	--	p	p	--	--	--	--	--	--	22
Poa pratensis	Kentucky bluegrass	*	1	--	--	--	--	--	p	--	p	p	33
Rhamnus cathartica	Common buckthorn	*	3	--	--	--	--	p	--	--	--	--	11
Rosa multiflora	Multiflora rose	*	3	--	--	--	--	p	p	--	--	--	22
Rumex crispus	Curly dock	*	-1	--	--	--	--	p	--	--	--	--	11
Sonchus asper	Spiny-leaved sow thistle	*	0	--	--	--	--	--	--	p	--	--	11
Sonchus sp.	Sow thistle	*	1.5	p	--	--	--	--	--	--	--	--	11
Ulmus pumila	Siberian elm	*	5	p	--	--	--	--	--	p	--	--	22
Verbascum thapsis	Common mullein	*	5	--	--	--	--	--	--	--	--	p	11
Total Species Richness				43	37	13	6	78	35	26	34	36	157
Native Richness				41	36	12	6	70	26	21	28	28	135
Non-native Richness				2	1	1	0	8	9	5	6	8	22

Scientific Name	Common Name	ICC WS	SM*	TF*	SF*	CT*	WMP	TFM	TGP	NC3F	C3	CC%
Native Richness Index			14.0	18.5	6.5	7.0	7.9	2.7	3.7	4.1	3.2	5.9
Mean Native Conservatism			4.3	4.6	5.0	3.5	3.7	2.2	1.7	3.8	2.2	
Mean Wetland Status			-3.5	-3.4	-4.8	-4.3	-0.5	-0.1	1.8	-1.0	2.8	

Table 17. Hay-Buhr floristic inventory. Iowa Coefficient of Conservatism (ICC) and Wetland Status (WS) are given for each species. Plant community codes are given; those indicated with an (*) were considered to be wetland communities. Use of ( ) indicates a probable identification. Community constancy (CC%) is the percentage of communities in which a species is present.

TGP – Tallgrass prairie reconstruction
TF – Temporary/seasonally flooded wetland
SF – Semi-permanently flooded wetland/aquatic
SM – Sedge meadow
SMS – Sedge meadow/shrubland
TFW – Temporary flooded woodland
TFDF – Temporary flooded deciduous forest
RCG – Temporary flooded reed canary grass
WS/W – Wet shrubland -willow
RC – Row crop (no plant data collected)

Scientific Name	Common Name	ICC	WS	TGP	TF*	SF*	SM*	SMS*	TFW*	TFDF*	RCG*	WS/W*	HF(%)
Non-seed Plants													
Equisetum arvense	Common horsetail	0	0	p	--	--	--	p	p	--	--	--	33
Equisetum hymale	Common scouring-rush	1	-2	p	--	--	--	--	--	--	--	--	11
Onoclea sensibilis	Sensitive fern	6	-3	--	p	--	p	p	p	p	p	--	67
Thelypteris palustris	Marsh fern	6	-5	--	--	--	p	p	--	--	--	--	22
Graminoids													
Acorus calamus	Sweetflag	8	-5	--	p	--	--	--	--	--	--	--	11
Andropogon gerardii	Big bluestem	4	1	p	--	--	--	--	--	--	--	--	11
Calamagrostis canadensis	Bluejoint	5	-5	--	p	--	p	p	--	--	p	--	44
Carex blanda	Common wood sedge	2	0	--	--	--	--	--	--	p	--	--	11
Carex annectens	Large yellow fox sedge	6	-3	--	--	--	p	--	--	--	--	--	11
Carex brevior	Plains oval sedge	4	0	--	--	--	p	--	--	--	--	--	11
Carex crawei	Early fen sedge	8	-5	--	--	--	p	--	--	--	--	--	11
Carex davisii	Awned graceful sedge	4	-1	--	--	--	--	--	--	p	--	--	11
Carex amphibola	Gray sedge	4	5	--	--	--	--	--	--	p	--	--	11
Carex haydenii	Long-scaled tussock sedge	5	-5	--	p	--	p	--	--	--	--	--	22
Carex interior	Prairie star sedge	7	-5	--	--	--	p	--	--	--	--	--	11
Carex lacustris	Common lake sedge	7	-5	--	p	--	--	--	--	--	--	--	11
Carex laeviconica	Long-toothed lake sedge	6	-5	--	--	--	p	p	--	--	p	--	33
Carex molesta	Field oval sedge	2	0	--	--	--	p	--	--	--	--	--	11
Carex normalis	Spreading oval sedge	5	-3	--	--	--	--	p	p	--	--	--	22
Carex lanuginosa	Wooly sedge	4	-5	--	--	--	p	p	--	--	--	--	22
Carex projecta	Loose-headed oval sedge	5	-4	--	--	--	p	--	--	--	--	--	11
Carex rosea	Curly-styled wood sedge	7	5	--	--	--	--	--	p	--	--	--	11
Carex scoparia	Lance-fruited oval sedge	5	-3	--	--	--	p	--	--	--	--	--	11

Scientific Name	Common Name	ICC	WS	TGP	TF*	SF*	SM*	SMS*	TFW*	TFDF*	RCG*	WS/W*	HF(%)
Carex sprengelii	Long-beaked sedge	4	0	--	--	--	--	--	--	p	--	--	11
Carex stricta	Common tussock sedge	6	-5	--	p	--	p	p	--	--	p	--	44
Carex tribuloides	Awl-fruited oval sedge	3	-4	--	p	--	p	--	--	--	--	--	22
Carex vesicaria	Tufted lake sedge	7	-5	--	p	--	p	p	--	--	--	--	33
Carex vulpinoidea	Brown fox sedge	3	-5	p	--	--	--	p	--	p	--	--	33
Eleocharis macrostachya	Spikerush	10	-5	--	p	--	--	--	--	--	--	--	11
Elymus canadensis	Canada wild rye	5	1	--	--	--	p	--	--	--	--	--	11
Elymus virginicus	Virginia wild rye	3	-2	--	--	--	p	--	--	--	--	--	11
Juncus dudleyii	Dudley's rush	2	0	p	--	--	--	--	--	--	--	--	11
Juncus tenuis	Path rush	0	0	p	--	--	--	--	--	--	--	--	11
Leersia oryzoides	Rice cut-grass	2	-5	--	p	--	p	--	--	--	--	--	22
Muhlenbergia sp.	Muhly grass	3	-1	--	--	--	p	--	--	--	--	--	11
Panicum virgatum	Switchgrass	5	-1	p	--	--	--	--	--	--	--	--	11
Scirpus cyperinus	Wooly bulrush	4	-5	--	p	--	p	--	--	--	--	--	22
Scirpus fluviatilis	River bulrush	5	-5	--	p	--	p	--	--	--	--	--	22
Scirpus validus	Soft-stemmed bulrush	3	-5	--	p	--	--	--	--	--	--	--	11
Sorghastrum nutans	Indian grass	4	2	p	--	--	--	--	--	--	--	--	11
Sparganium eurycarpum	Common bur reed	6	-5	--	p	--	p	--	--	--	--	--	22
Spartina pectinata	Slough grass, cord grass	4	-4	--	p	--	p	p	p	--	--	--	44
Typha angustifolia	Narrow-leaved cattail	1	-5	--	p	--	p	--	--	--	--	--	22
Zizania aquatica	Wild rice	7	-5	--	--	p	--	--	--	--	--	--	11
Aquatic													
Ceratophyllum demersum	Coontail, hornwort	0	-5	--	--	p	--	--	--	--	--	--	11
Elodea nuttallii	Slender waterweed	10	-5	--	--	p	--	--	--	--	--	--	11
Lemna minor	Duckweed	3	-5	--	p	p	--	--	--	p	--	--	33
Nuphar luteum	Yellow water lily	4	-5	--	--	p	--	--	--	--	--	--	11
Nymphaea tuberosa	White water lily	4	-5	--	--	p	--	--	--	--	--	--	11
Spirodela polyrhiza	Greater duckweed	6	-5	--	p	--	--	--	--	--	--	--	11
Forbs													
Acalypha virginica	Three-seeded mercury	0	3	--	--	--	p	--	--	--	--	--	11
Achillea millefolium	Western yarrow	0	3	p	--	--	--	p	--	--	--	--	22
Agalinus tenuifolia	Slender false foxglove	4	-3	p	--	--	--	--	--	--	--	--	11
Agrimonia striata	Britton's agrimony	5	1	p	--	--	p	p	p	p	--	--	56
Allium canadense	Wild onion	6	3	--	--	--	--	--	--	--	p	--	11
Ambrosia artemisiifolia	Common ragweed	0	3	p	--	--	--	--	--	--	--	--	11

Scientific Name	Common Name	ICC	WS	TGP	TF*	SF*	SM*	SMS*	TFW*	TFDF*	RCG*	WS/W*	HF(%)
Ambrosia trifida	Giant ragweed	0	-1	--	--	--	p	p	p	--	p	--	44
Anemone canadensis	Canada anemone	2	-3	--	p	--	p	p	p	p	p	--	67
Apocynum sibiricum	Indian hemp	1	-1	p	--	--	--	p	--	--	--	--	22
Asclepias incarnata	Swamp milkweed	4	-5	--	p	--	p	p	p	--	p	--	56
Asclepias syriaca	Common milkweed	0	5	--	--	--	p	p	p	--	--	--	33
Aster lanceolatus	Panicled aster	4	-3	--	p	--	p	--	--	p	--	--	33
Aster ontarionsis	Ontario aster	3	0	--	--	--	--	--	--	p	--	--	11
Aster praealtus	Willow aster	5	-5	--	p	--	--	--	--	--	--	--	11
Aster puniceus	Swamp aster	5	-5	--	--	--	p	--	--	--	--	--	11
Boehmeria cylindrica	Bog hemp	5	-5	--	p	--	p	--	--	p	p	--	44
Calystegia sepium	American bindweed	0	0	--	--	--	--	--	p	--	--	--	11
Campanula aparanoides	Marsh bellflower	10	-5	--	--	--	p	--	--	--	--	--	11
Cardamine parviflora	Small-flowered bitter cress	4	0	--	p	--	--	--	--	--	--	--	11
Chamaecrista fasciculata	Partridge pea	1	4	p	--	--	--	--	--	--	--	--	11
Cicuta bulbifera	Bulblet water hemlock	9	-5	--	--	--	p	--	--	--	--	--	11
Cicuta maculata	Water hemlock	7	-5	--	--	--	p	p	--	--	--	--	22
Circaea lutetiana	Enchanter's nightshade	5	3	--	--	--	--	--	--	p	--	--	11
Cirsium altissimum	Tall thistle	4	5	p	--	--	p	--	--	--	--	--	22
Cirsium discolor	Field thistle	1	5	p	--	--	p	p	p	--	p	--	56
Dalea purpurea	Purple prairie clover	8	5	p	--	--	--	--	--	--	--	--	11
Erigernon annuus	Annual fleabane	0	1	p	--	--	--	--	--	--	--	--	11
Eupatorium perfoliatum	Boneset	6	-4	--	--	--	p	--	--	--	--	--	11
Euthamia graminifolia	Grass-leaved goldenrod	5	-2	p	--	--	p	--	--	--	--	--	22
Fragaria virginiana	Wild strawberry	3	1	p	--	--	--	p	--	--	--	--	22
Galium aparine	Cleavers	1	3	--	--	--	--	--	p	p	--	--	22
Galium obtusum	Wild madder	7	-4	--	--	--	p	p	--	--	p	--	33
Galium tinctorium	Stiff bedstraw	7	-5	--	--	p	--	--	--	--	--	--	11
Galium triflorum	Sweet-scented bedstraw	7	2	--	--	--	--	--	--	p	--	--	11
Gentiana andrewsii	Bottle gentian	8	-3	--	--	--	p	--	--	--	--	--	11
Geum canadense	White avens	2	0	--	--	--	--	--	--	p	--	--	11
Geum laciniatum	Rough avens	4	-3	p	--	--	p	p	p	p	--	--	56
Hackelia virginiana	Stickseed	0	1	--	--	--	--	--	--	p	--	--	11
Helenium autumnale	Sneezeweed	4	-4	--	--	--	p	p	--	--	--	--	22
Helianthus grosseserratus	Saw-tooth sunflower	4	-2	p	--	--	p	p	p	--	p	--	56
Helianthus tuberosus	Jerusalem artichoke	0	0	--	--	--	--	--	p	--	--	--	11
Hypericum punctatum	Spotted St. John's wort	5	-1	--	--	--	p	--	--	--	--	--	11
Hypericum pyramidatum	Giant St. John's wort	6	-1	--	--	--	p	p	p	--	--	--	33

Scientific Name	Common Name	ICC	WS	TGP	TF*	SF*	SM*	SMS*	TFW*	TFDF*	RCG*	WS/W*	HF(%)
Impatiens capensis	Orange touch-me-not	3	-3	--	--	--	--	(p)	(p)	p	p	(p)	56
Iris shrevei	Blue flag	6	-5	p	p	--	p	p	p	p	p	--	78
Lactuca canadensis	Yellow lettuce	1	2	p	--	--	p	--	--	--	--	--	22
Laportea canadensis	Wood nettle	3	-3	--	--	--	p	--	p	p	p	--	44
Lathyrus palustris	Marsh vetchling	7	-3	--	--	--	--	p	--	--	--	--	11
Lilium michiganense	Michigan lily	6	-1	--	--	--	p	--	--	--	--	--	11
Lobelia siphilitica	Great lobelia	3	-4	--	--	--	p	--	--	--	--	--	11
Lycopus uniflorus	Northern bugleweed	7	-5	--	p	--	--	--	--	--	--	--	11
Lysimachia ciliata	Fringed loosestrife	4	-3	--	--	--	p	--	--	--	--	--	11
Lysimachia hybrida	Loosestrife	6	-5	--	p	--	--	--	--	--	--	--	11
Lysimachia terrestris	Swamp loosestrife	7	-5	--	--	--	p	--	--	--	--	--	11
Lysimachia thrysiflora	Tufted loosestrife	7	-5	--	p	--	--	--	--	--	--	--	11
Lythrum alatum	Winged loosestrife	3	-5	--	--	--	p	--	--	--	--	--	11
Mentha arvensis	Marsh mint	4	-3	--	--	--	p	--	p	--	--	--	22
Mimulus ringens	Monkey flower	3	-5	--	p	--	--	--	--	--	--	--	11
Monarda fistulosa	Wild bergamot	2	3	p	--	--	--	--	p	--	--	--	22
Oxalis stricta	Yellow wood sorrel	0	3	--	--	--	--	--	p	p	--	--	22
Penthorum sedoides	Ditch stonecrop	3	-5	--	p	--	--	--	--	p	--	--	22
Phlox maculata	Marsh phlox	7	-5	--	--	--	p	p	--	--	--	--	22
Physalis heterophylla	Clammy ground cherry	2	5	p	--	--	--	--	--	--	--	--	11
Physostegia parviflora	Obedient plant	6	-3	--	p	--	--	--	--	--	--	--	11
Physostegia virginiana	False dragonhead	6	-3	--	--	--	p	--	--	--	--	--	11
Plantago rugelii	Rugel's plantain	0	0	--	--	--	--	--	--	p	--	--	11
Polygonum punctatum	Dotted smartweed	4	-5	--	--	p	--	--	--	--	--	--	11
Polygonum amphibium	Water smartweed	3	-5	--	p	--	p	p	--	p	p	--	56
Polygonum lapathifolium	Stout smartweed	0	-4	--	p	--	--	--	--	--	--	--	11
Polygonum sagittatum	Tearthumb	4	-5	--	p	--	p	--	--	--	--	--	22
Pontedaria cordata	Pickerel-weed	7	-5	--	p	--	--	--	--	--	--	--	11
Potentilla norvegica	Norwegian cinquefoil	2	0	--	p	--	--	--	--	--	--	--	11
Potentilla simplex	Common cinquefoil	3	4	--	--	--	p	p	--	--	--	--	22
Prunella vulgaris	Self heal	0	0	--	--	--	p	--	--	--	--	--	11
Pycnanthemum virginianum	Virginia mountain mint	4	-4	p	--	--	p	p	p	--	--	--	44
Ranunculus abortivus	Small-flowered crowfoot	0	-4	--	--	--	--	--	p	p	--	--	22
Ranunculus septentrionalis	Swamp buttercup	6	-4	--	--	--	p	--	p	p	--	--	33
Ratibida pinnata	Gray-headed coneflower	4	5	p	--	--	--	--	--	--	--	--	11
Rorippa palustris	Marsh cress	7	-5	--	--	p	--	--	--	--	--	--	11
Rudbeckia hirta	Black-eyed Susan	2	3	p	--	--	--	--	--	--	--	--	11

Scientific Name	Common Name	ICC	WS	TGP	TF*	SF*	SM*	SMS*	TFW*	TFDF*	RCG*	WS/W*	HF(%)
Rumex altissimus	Pale dock	0	4	--	p	--	--	p	--	--	p	--	33
Rumex orbiculatus	Great water dock	7	-5	--	p	--	p	--	--	--	--	--	22
Rumex verticillata	Swamp dock	4	-5	--	p	--	--	p	--	--	--	--	22
Sagitaria latifolia	Common arrowhead	4	-5	--	p	--	p	p	--	p	--	--	44
Sagitaria rigida	Stiff arrowhead	5	-5	--	p	--	--	--	--	--	--	--	11
Sanicula canadensis	Black snakeroot	6	2	--	--	--	--	--	p	--	--	--	11
Sanicula gregaria	Common snakeroot	5	-1	--	--	--	--	--	--	p	--	--	11
Saxifraga pennsylvanica	Swamp saxifrage	7	-5	--	--	--	--	p	--	--	--	--	11
Scutellaria galericulata	Marsh skullcap	6	-5	--	p	--	p	--	--	--	--	--	22
Scutellaria lateriflora	Mad-dog skullcap	6	-5	--	p	--	--	--	--	--	--	--	11
Senecio aureus	Golden ragwort	4	-3	p	p	--	p	--	--	--	--	--	33
Senecio pauperculus	Meadow ragwort	5	-1	--	--	--	p	p	--	--	--	--	22
Sium suave	Water parsnip	8	-5	--	p	--	--	p	--	p	--	--	33
Smilacina stellata	Starry false Solomon's seal	5	1	--	--	--	--	--	--	p	--	--	11
Solidago canadensis	Canada goldenrod	0	3	p	--	--	p	p	--	p	p	--	56
Solidago gigantea	Giant goldenrod	3	-3	p	p	--	p	p	p	p	p	--	78
Stachys palustris	Woundwort	4	-5	--	p	--	p	p	--	--	p	--	44
Stachys tenuiflora	Smooth hedge nettle	5	-5	--	--	--	--	--	p	p	--	--	22
Stellaria longifolia	Stitchwort	6	-4	--	--	--	p	p	--	p	p	--	44
Teucrium canadense	American germander	4	-2	--	--	--	--	--	p	p	--	--	22
Thalictrum dasycarpum	Purple meadow-rue	4	-2	--	p	--	p	p	p	--	--	--	44
Triadenum fraseri	Marsh St. John's wort	7	-5	--	--	--	p	--	--	--	--	--	11
Verbena hastata	Blue vervain	3	-4	--	p	--	p	p	--	--	--	--	33
Vernonia fasciculata	Prairie ironweed	1	-3	--	p	--	p	p	p	--	--	--	44
Veronicastrum virginicum	Culver's root	5	0	--	--	--	p	p	p	--	--	--	33
Viola sororia	Common blue violet	1	1	--	--	--	--	--	p	p	--	--	22
Zizia aurea	Golden alexanders	6	-1	--	p	--	p	p	p	p	--	--	56
Trees and Shrubs													
Acer saccharinum	Silver maple	1	-3	--	p	--	--	p	p	p	--	--	44
Betula nigra	River birch	6	-3	p	--	--	--	p	--	p	--	--	33
Fraxinus pennsylvanica	Green ash	1	-3	--	--	--	p	p	p	p	--	--	44
Cornus amomum	Silky dogwood	6	-4	--	--	--	--	--	p	--	--	--	11
Cornus foemina	Gray dogwood	1	-2	p	--	--	p	p	p	p	p	--	67
Cornus rugosa	Speckled dogwood	10	5	--	--	--	p	--	p	p	--	--	33
Cornus stolonifera	Red-osier dogwood	7	-3	--	--	--	p	p	--	--	--	--	22
Crataegus sp.	Hawthorn	3	1	--	--	--	--	--	--	p	--	--	11

Scientific Name	Common Name	ICC	WS	TGP	TF*	SF*	SM*	SMS*	TFW*	TFDF*	RCG*	WS/W*	HF(%)
Parthenocissus quinquefolia	Virginia creeper	2	1	--	--	--	--	--	p	p	--	--	22
Populus deltoides	Cottonwood	1	-1	--	--	--	--	--	p	--	--	--	11
Prunus americana	Wild plum	2	5	--	--	--	--	--	p	--	--	--	11
Prunus mexicana	Big-tree plum	2	5	--	--	--	--	--	p	--	--	--	11
Prunus serotina	Black cherry	3	3	p	--	--	--	--	p	p	--	--	33
Prunus sp.		2	4	--	--	--	p	p	p	p	p	--	56
Quercus velutina	Black oak	4	5	--	--	--	--	--	p	--	--	--	11
Rosa arkansana	Prairie rose	4	5	--	--	--	--	p	p	p	--	--	33
Rosa blanda	Smooth wild rose	4	3	--	--	--	p	p	p	--	--	--	33
Rubus frondosus	Yankee blackberry	4	-2	--	--	--	--	p	--	--	--	--	11
Rubus allegheniensis	Common blackberry	2	2	--	--	--	--	p	--	--	--	--	11
Rubus occidentalis	Black raspberry	1	5	p	--	--	--	--	p	p	--	--	33
Salix discolor	Pussy willow	3	-3	p	--	--	--	--	--	p	--	--	22
Salix amygdaloides	Peach-leaved willow	1	-3	--	--	--	--	p	--	--	--	--	11
Salix exigua	Sandbar willow	0	-5	p	p	--	--	--	--	p	p	p	56
Salix nigra	Black willow	3	-5	--	--	--	--	--	p	p	--	--	22
Salix petiolaris	Meadow willow	8	-5	--	--	--	p	--	--	--	--	--	11
Sambuccus canadensis	Elderberry	1	4	--	--	--	--	--	p	p	p	--	33
Spiraea alba	Meadowsweet	5	-4	--	p	--	p	p	--	--	--	--	33
Toxicodendron radicans	Poison ivy	0	-1	p	--	--	p	p	p	p	--	--	56
Ulmus americana	American elm	2	-2	--	--	--	--	--	--	p	--	--	11
Viburnum lentago	Nannyberry	6	-1	--	--	--	--	p	--	--	--	--	11
Vitis riparia	Riverbank grape	1	-2	--	--	--	p	p	p	p	--	--	44
Non-native													
Agropyron repens	Quack grass	*	3	--	--	--	p	--	--	--	--	--	11
Agrostis gigantea	Redtop	*	-3	p	--	--	p	p	--	--	--	--	33
Cirsium arvense	Canada thistle	*	3	--	--	--	p	--	p	--	--	--	22
Lonicera tartarica	Tartarian honeysuckle	*	3	--	--	--	--	--	--	p	--	--	11
Melilotus alba	White sweet clover	*	3	--	--	--	--	p	--	--	--	--	11
Nepeta cataria	Catnip	*	1	--	--	--	--	--	p	--	--	--	11
Phalaris arundinacea	Reed canary grass	*	-4	--	p	--	p	p	p	p	p	p	78
Phleum pratense	Timothy	*	3	--	--	--	p	--	--	--	--	--	11
Poa pratensis	Kentucky bluegrass	*	1	p	--	--	--	p	p	--	--	--	33
Polygonum persicaria	Lady's thumb	*	-3	--	p	--	--	--	--	--	--	--	11
Rosa multiflora	Multiflora rose	*	3	p	--	--	--	--	--	p	--	--	22
Rumex crispus	Curly dock	*	-1	p	--	--	p	--	--	p	--	--	33

Scientific Name	Common Name	ICC	WS	TGP	TF*	SF*	SM*	SMS*	TFW*	TFDF*	RCG*	WS/W*	HF(%)
Sonchus asper	Spiny-leaved sow thistle	*	0	p	--	--	--	--	--	--	--	--	11
Taraxacum officinale	Common dandelion	*	3	p	--	--	--	--	--	--	--	--	11
Trifolium hybridum	Alsike clover	*	1	p	--	--	--	--	--	--	--	--	11
Trifolium repens	White clover	*	2	p	--	--	--	--	--	--	--	--	11
Verbascum thapsus	Common mullein	*	5	p	--	--	--	--	--	--	--	--	11
Malus sylvestris	Apple	*		p	--	--	--	p	--	--	--	--	22
Rhamnus cathartica	Common buckthorn	*	3	--	--	--	--	--	--	p	--	--	11
Total Species Richness				49	56	9	96	68	58	61	26	3	207
Native Richness				39	54	9	90	63	54	56	25	2	188
Non-native Richness				10	2	0	6	5	4	5	1	1	19
Native Richness Index				3.6	18.3	10.0	13.0	10.7	11.0	9.5	13.0	1.5	9.5
Mean Native Conservatism				2.6	4.4	5.1	4.4	3.8	3.0	3.2	3.4	1.5	
Mean Wetland Status				0.5	-4.1	-5.0	-2.4	-1.9	-0.2	-0.9	-2.1	-4.0	

Table 18. Quality assessment of study sites using floristic data. Native richness index (NRI), weighted mean native conservatism (Nat CC), and weighted mean wetland status (Wet Stat) are given for each site and compared between reconstructed and natural sites. Means or medians with different letter letters are significantly different at $p<0.05$. Quality Index (QI) integrates native conservatism and wetland status. Quality Rank (QR) is a letter grade that corresponds to the quality index.

Study Site	Size	Age	NRI	Nat CC	Wet Stat	QI	QR
Reconstructed:							
Boevers	S	1	3.9	2.83	-2.70	21.8	B
Mink Creek	S	8	3.8	2.99	-2.37	22.0	B
Palisades	S	5	2.4	2.41	-1.35	15.3	C
Pleasantville	S	3	3.9	3.01	-2.23	21.8	B
Brush Creek	M	8	3.4	2.28	-0.83	13.3	D
Grooms	M	1	3.3	1.90	-1.00	11.4	D
New Hampton	M	3	3.2	3.38	-2.29	24.6	B
Wickiup Hill	M	6	4.8	2.95	-1.54	19.3	C
Badger Creek	L	6	4.5	2.33	-1.03	14.0	D
Dike	L	7	3.3	2.26	-0.05	11.4	D
Jarvis	L	2	3.5	2.21	-1.08	13.4	D
South Point	L	1	3.6	2.34	-0.92	13.9	D
Natural:							
Doolittle	S	--	6.2	4.40	-3.30	36.5	A
Engledinger	M	--	5.9	4.44	-3.65	38.4	A
Hay-Buhr	L	--	9.5	3.82	-2.06	27.0	A
Mean or median*							
Reconstructed	n=12		3.55* a	2.57 a	-1.45 a		
Natural	n=3		6.20* b	4.22 b	-3.00 b		
p-values			0.011	<0.001	0.01		

Table 19. Effect of size on quality assessment among the reconstructed sites. Size class means for native richness index (NRI), weighted mean native conservatism (Nat CC), and weighted mean wetland status (Wet Stat) are given and compared. Means or medians(*) with different letter letters are significantly different at $p<0.05$.

Size Class	NRI	Nat CC	Wet Stat
S	3.50 a	2.91* a	-2.16 a
M	3.68 a	2.62* a	-1.14 ab
L	3.73 a	2.30* a	-0.77 b
p-value	0.89	0.15	0.024

Table 20. Boevers transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Wet-mesic cool-season grass & forb			Temporary/seasonally flooded wetland		
	Species Scientific Name	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%
	Acalyphya virginica	6.3	35.71	1.72	2.9	34.96	1.49
	Agropyron repens	109.5	20.24	9.05	0.0	0.72	0.03
	Agrostis gigantea	--	--	--	0.2	1.81	0.08
	Agrostis hyemalis	0.0	2.38	0.08	--	--	--
*	Alisma triviale	--	--	--	8.2	40.04	2.03
*	Amaranthus tuberculatus	3.2	20.24	0.95	28.9	74.09	4.70
	Ambrosia artemisiifolia	38.3	86.31	5.92	7.7	48.01	2.29
	Ambrosia trifida	5.0	30.36	1.43	0.6	17.39	0.68
*	Ammania coccinea	--	--	--	0.2	2.54	0.11
*	Anemone canadensis	6.7	23.21	1.32	0.1	1.63	0.06
	Apocynum sibiricum	5.7	55.36	2.36	0.6	9.78	0.40
*	Asclepias incarnata	0.4	5.95	0.24	0.5	9.24	0.37
	Asclepias syriaca	--	--	--	0.1	0.91	0.04
*	Aster lanceolatus	3.0	26.79	1.16	1.0	8.15	0.37
	Aster pilosus	1.7	15.48	0.67	0.3	5.25	0.22
	Avena sativa	0.0	2.38	0.08	--	--	--
	Barbarea vulgaris	4.6	35.12	1.57	0.6	4.89	0.22
*	Bidens frondosa	0.2	5.36	0.20	0.2	7.07	0.27
*	Bidens tripartia	2.1	21.43	0.91	1.9	25.00	1.05
	Calystegia sepium	1.7	25.60	1.02	0.2	2.72	0.12
*	Carex tribuloides	1.1	2.98	0.19	--	--	--
*	Carex sp.	22.1	41.67	3.13	109.2	76.99	10.27
	Chenopodium album	0.2	2.98	0.12	0.1	3.80	0.14
	Cirsium arvense	0.6	5.95	0.25	--	--	--
	Conyza canadensis	2.3	16.07	0.73	0.4	5.43	0.23
	Cuscuta sp.	--	--	--	0.0	0.72	0.03
*	Cyperus strigosus	0.4	5.95	0.24	1.9	18.30	0.81
	Dactylis glomerata	1.0	2.98	0.18	--	--	--
	Digitaria ischaemum	--	--	--	0.6	0.91	0.07
*	Echinochloa muricata	3.6	24.40	1.12	55.3	68.84	6.30
*	Eleocharis sp.	--	--	--	5.8	1.63	0.45
	Elymus virginicus	4.8	9.52	0.69	0.5	1.81	0.10
	Eragrostis pectinacea	--	--	--	0.3	3.80	0.16
	Eragrostis spectabilis	--	--	--	0.0	0.72	0.03
	Erigernon annuus	0.4	5.95	0.24	0.2	4.17	0.17
*	Eupatorium perfoliatum	--	--	--	0.4	5.07	0.22
	Festuca arundinacea	34.7	21.43	3.39	--	--	--
*	Gratiola neglecta	--	--	--	0.3	5.98	0.24
*	Helenium autumnale	1.7	10.71	0.50	0.9	10.33	0.44
	Hordeum jubatum	0.0	2.38	0.08	0.1	0.91	0.04

	Species Scientific Name	Wet-mesic cool-season grass & forb M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%
*	Hypericum majus	--	--	--	3.8	24.28	1.15
	Juncus dudleyii	0.0	2.38	0.08	1.4	1.81	0.17
	Juncus tenuis	3.6	6.55	0.50	0.8	1.81	0.12
*	Leersia oryzoides	3.2	14.29	0.74	59.8	62.86	6.39
*	Lindernia dubia	--	--	--	5.3	28.26	1.40
*	Ludwigia polycarpa	--	--	--	0.0	0.72	0.03
*	Lycopus americanus	--	--	--	0.0	0.72	0.03
	Melilotus sp.	0.0	2.38	0.08	--	--	--
	Mollugo verticillata	0.2	2.98	0.12	0.5	4.89	0.22
*	Muhlenbergia frondosa	0.4	2.98	0.13	--	--	--
	Muhlenbergia schreberi	1.0	2.98	0.18	--	--	--
	Oenothera biennis	0.0	2.38	0.08	--	--	--
	Oxalis stricta	9.5	51.19	2.51	0.4	6.88	0.28
	Panicum capillare	--	--	--	0.8	9.60	0.41
	Panicum dichotomoflorum	36.2	39.29	4.12	122.2	82.43	11.35
	Phlaris arundinacea	27.2	44.05	3.61	2.1	9.96	0.51
	Phleum pratense	16.8	20.24	1.98	11.1	7.97	1.05
*	Physostegia (virginiana)	--	--	--	0.0	0.72	0.03
	Plantago lanceolata	--	--	--	0.0	0.72	0.03
	Plantago major	--	--	--	0.1	1.81	0.07
	Poa pratensis	101.9	27.98	8.74	0.7	1.63	0.11
*	Polygonum amphibium	9.7	56.55	2.71	7.4	39.49	1.96
*	Polygonum pennsylvanicum	12.4	61.31	3.08	35.2	68.30	4.92
	Polygonum persicaria	--	--	--	3.0	20.47	0.96
	Polygonum ramosissimum	1.5	15.48	0.65	2.7	30.62	1.31
	Populus tremuloides	--	--	--	0.9	1.45	0.11
	Potentilla norvegica	12.2	60.71	3.04	26.4	65.40	4.21
	Potentilla simplex	6.3	24.40	1.33	0.2	1.81	0.08
*	Rorippa palustris	0.4	5.95	0.24	1.6	27.36	1.12
	Rudbeckia hirta	5.0	28.57	1.37	0.1	0.91	0.04
	Rumex altissimus	2.5	32.74	1.33	4.5	43.30	1.90
	Rumex crispus	3.0	36.31	1.50	1.2	14.49	0.62
*	Salix sp.	0.0	2.38	0.08	6.0	24.64	1.32
*	Scirpus sp.	--	--	--	8.6	20.47	1.34
	Setaria faberii	84.8	80.95	9.28	167.2	81.34	14.37
	Setaria glauca	11.8	32.14	2.02	14.7	48.01	2.77
	Setaria viridis	1.1	5.95	0.29	--	--	--
	Solidago canadensis	1.1	2.98	0.19	--	--	--
*	Solidago gigantea	8.0	39.88	2.00	0.2	2.54	0.11
	Taraxacum officinale	4.6	40.48	1.76	5.3	35.69	1.68
	Trifolium hybridum	0.0	2.38	0.08	--	--	--
	Trifolium repens	1.1	14.88	0.60	0.1	4.71	0.18
*	Verbena hastata	6.9	44.05	2.05	5.7	43.48	1.99
	Verbena stricta	0.0	2.38	0.08	0.1	0.91	0.04
*	Veronica peregrina	22.5	62.50	3.89	5.9	26.99	1.40
	Total Ramet Density(#/m^2)	656			736		

Species Scientific Name	Wet-mesic cool-season grass & forb M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%
Total Frequency (%)	1438			1353		
Shannon Diversity	3.50			3.23		
Total Richness	63			72		
Evenness	0.85			0.76		
Rel Impt Natives (%)	54.1			76.8		
Rel Impt Exotics (%)	45.9			23.2		
Rel Impt Wet Indicators (%)	21.7			40.6		
Rel Impt Carex (%)	0.2			0.0		
Number of 1x1 m Samples	21			69		
Woody Layers	ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)	
	0	0		0	0	
	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
	0	0	0	0	0	0

Table 21. Mink Creek transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Tallgrass prairie reconstruction			Wet cool-season grass and forb			Temporary/seasonally flooded wetland		
	Species Scientific Name	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%
	Abutilon theophrasti	0.3	4.17	0.25	0.6	7.24	0.37	--	--	--
	Acalyphya virginica	6.4	25.00	1.74	4.4	23.68	1.26	0.3	2.2	0.26
	Agropyron repens	237.6	60.00	15.05	2.1	6.58	0.37	--	--	--
	Agrostis gigantea	8.5	10.83	1.04	415.2	59.21	13.82	2.5	4.7	0.62
*	Alisma trivale	--	--	--	1.1	7.24	0.38	7.1	33.9	4.07
	Amaranthus	--	--	--	--	--	--	0.0	0.9	0.10
	Ambrosia artemisiifolia	2.9	13.33	0.91	1.9	17.11	0.87	0.2	1.3	0.16
	Ambrosia trifida	2.1	14.17	0.92	--	--	--	--	--	--
	Andropogon gerardii	142.1	45.83	9.58	13.7	7.24	0.71	--	--	--
*	Asclepias incarnata	--	--	--	0.4	3.29	0.17	--	--	--
	Asclepias syriaca	1.6	13.33	0.84	0.6	7.24	0.37	0.1	2.2	0.26
*	Aster lanceolatus	12.8	20.00	1.77	28.6	59.21	3.61	3.4	5.1	0.70
*	Aster novae-angliae	0.3	4.17	0.25	0.8	10.53	0.53	--	--	--
	Aster pilosus	34.1	60.00	5.10	5.1	33.55	1.75	0.5	2.5	0.29
	Barbarea vulgaris	1.1	19.17	1.15	0.2	3.29	0.16	0.1	1.1	0.13
*	Bidens cernua	--	--	--	0.6	6.58	0.33	19.8	35.9	4.75
*	Bidens frondosa	0.3	4.17	0.25	0.4	6.58	0.33	0.1	1.1	0.13
*	Boltonia asteroides	--	--	--	0.4	6.58	0.33	--	--	--
	Calystegia sepium	--	--	--	0.2	3.29	0.16	--	--	--
*	Carex cristatella	--	--	--	1.1	3.29	0.19	0.0	1.8	0.20
*	Carex sp.	1.9	5.00	0.38	268.8	81.58	11.03	6.8	8.5	1.20
	Cirsium altissimum	0.5	11.67	0.69	--	--	--	--	--	--
	Cirsium arvense	9.6	50.83	3.38	5.3	51.97	2.64	0.3	3.6	0.41
	Conyza canadensis	0.8	15.83	0.95	0.2	3.29	0.16	--	--	--
	Dactylis glomerata	24.0	28.33	2.80	--	--	--	--	--	--
	Echinacea purpurea	3.5	10.00	0.74	--	--	--	--	--	--
*	Echinochloa muricata	--	--	--	--	--	--	1.9	7.4	0.90

	Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Wet cool-season grass and forb M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%
*	Eleocharis acicularis	--	--	--	--	--	--	91.1	5.8	3.88
*	Eleocharis sp.	--	--	--	588.8	68.42	18.85	1159	72.1	49.21
	Elymus canadensis	1.1	8.33	0.53	--	--	--	--	--	--
*	Epilobium coloratum	2.7	9.17	0.66	0.0	5.26	0.25	--	--	--
	Equisetum arvense	--	--	--	0.6	3.29	0.18	--	--	--
	Erigeron annuus	0.0	3.33	0.19	0.2	3.29	0.16	0.0	0.9	0.10
	Festuca arundinacea	159.7	67.50	11.68	10.1	19.74	1.22	--	--	--
*	Geum lacinatum	--	--	--	0.6	3.29	0.18	--	--	--
	Juncus dudleyii	--	--	--	12.6	13.16	0.97	0.0	0.9	0.10
*	Juncus nodosus	--	--	--	0.6	3.29	0.18	0.2	2.0	0.23
	Juncus tenuis	--	--	--	0.4	3.29	0.17	--	--	--
*	Juncus torreyii	--	--	--	0.2	3.29	0.16	--	--	--
	Lactuca seriola	0.8	9.17	0.56	1.3	6.58	0.35	--	--	--
*	Leersia oryzoides	--	--	--	21.1	21.05	1.57	27.1	37.9	5.23
*	Lindernia dubia	--	--	--	0.0	2.63	0.13	0.9	5.1	0.61
*	Lycopus americanus	--	--	--	1.9	13.82	0.72	0.0	0.9	0.10
*	Lycopus asper	--	--	--	11.6	23.68	1.45	0.6	5.1	0.60
*	Lythrum alatum	--	--	--	--	--	--	0.5	2.5	0.29
	Medicago lupulina	--	--	--	1.3	7.89	0.41	0.9	1.3	0.18
	Melilotus sp.	--	--	--	--	--	--	0.7	1.3	0.18
*	Mentha arvensis	--	--	--	0.2	3.29	0.16	--	--	--
*	Mimulus ringens	--	--	--	--	--	--	0.3	1.1	0.14
	Oenothera biennis	--	--	--	0.0	2.63	0.13	--	--	--
	Oxalis stricta	--	--	--	3.4	15.79	0.85	--	--	--
	Phalaris arundinacea	--	--	--	211.8	89.47	9.90	8.6	12.3	1.69
	Phleum pratense	3.7	12.50	0.90	--	--	--	--	--	--
*	Physostegia sp.	0.3	4.17	0.25	6.9	11.18	0.72	--	--	--
	Plantago rugelli	2.1	9.17	0.63	--	--	--	--	--	--
	Poa pratensis	281.6	52.50	16.78	207.8	74.34	9.07	28.6	5.1	1.59
*	Polygonum amphibium	--	--	--	1.3	5.26	0.29	--	--	--
*	Polygonum hydropiper	3.5	10.00	0.74	1.5	13.82	0.70	0.0	0.9	0.10
*	Polygonum pennsylvanicum	--	--	--	3.2	13.16	0.72	--	--	--
	Polygonum persicaria	0.3	4.17	0.25	3.4	7.24	0.44	0.0	0.9	0.10

	Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Wet cool-season grass and forb M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%
	Potentilla norvegica	--	--	--	5.1	17.11	0.96	--	--	--
	Prunella vulgaris	--	--	--	1.3	5.92	0.32	--	--	--
	Ratibida pinnata	26.9	64.17	4.99	3.4	12.50	0.69	0.0	0.9	0.10
	Rudbeckia hirta	1.3	20.00	1.21	0.2	3.29	0.16	--	--	--
	Rumex acetosella	1.9	9.17	0.62	--	--	--	--	--	--
	Rumex altissimum	0.3	4.17	0.25	0.4	6.58	0.33	--	--	--
	Rumex crispus	0.0	3.33	0.19	0.0	2.63	0.13	--	--	--
*	Sagittaria cuneata	--	--	--	1.1	10.53	0.54	1.9	18.1	2.10
*	Scirpus atrovirens	--	--	--	6.3	17.76	1.02	5.4	6.5	0.92
*	Scirpus sp.	--	--	--	--	--	--	8.2	15.4	2.02
*	Scutellaria lateriflora	--	--	--	--	--	--	0.2	1.3	0.16
	Setaria faberii	0.3	4.17	0.25	0.8	6.58	0.34	--	--	--
	Setaria glauca	15.2	47.50	3.46	19.2	26.97	1.81	0.1	1.1	0.13
	Solidago canadensis	--	--	--	--	--	--	0.1	1.1	0.13
	Sorghastrum nutans	21.9	27.50	2.64	--	--	--	0.0	0.0	0.00
	Taraxacum officinale	4.0	38.33	2.39	1.3	10.53	0.54	0.1	1.1	0.13
	Trifolium pratense	0.5	11.67	0.69	--	--	--	--	--	--
	Trifolium repens	0.5	8.33	0.50	0.2	3.29	0.16	0.1	1.1	0.13
*	Typha angustifolia	--	--	--	1.1	7.24	0.38	2.6	16.1	1.90
*	Verbena hastata	2.7	20.83	1.32	3.4	25.66	1.33	0.0	1.8	0.20
	Verbena stricta	--	--	--	2.7	7.89	0.45	--	--	--
	Viola sororia	0.8	8.33	0.52	4.4	19.74	1.07	0.6	2.5	0.30
		Mean Cover %			Mean Cover %			Mean Cover %		
*	Certophyllum demersum	--	--	--	--	--	--	0.2	1.12	0.13
*	Elodea nuttallii	--	--	--	--	--	--	0.60	1.8	0.22
*	Lemna minor	--	--	--	0.3	6.58	0.33	13.81	77.7	9.23
*	Najas guadalupensis	--	--	--	--	--	--	14.54	21.7	2.95
*	Spirodela polyrhiza	--	--	--	--	--	--	0.06	6.5	0.73
	Total Ramet Density(#/m^2)	1022.4			1893.3			1380.7		
	Total Frequency (%)	873.3			1037.5			444.2		

Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Wet cool-season grass and forb M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%
Shannon Diversity	2.90			3.03			2.22		
Total Richness	43			64			49		
Evenness	0.77			0.73			0.57		
Rel Impt Natives (%)	38.3			58.7			94.7		
Rel Impt Exotics (%)	61.7			41.3			5.3		
Rel Impt Wet Indicators (%)	5.6			46.5			92.9		
Rel Impt Carex (%)	0.4			11.2			1.4		
Number of 1x1 m Samples	15			19			56		
Woody Layers	ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)	
Populus deltoides	0	0		0	0		0.9	0.04	
Salix amygdaloides	0	0		0	0		0	0.14	
Salix exigua	0	0		0	0		12.1	0.11	
Salix nigra	0	0		0	0		0.2	0.04	
Totals	0.0	0.0		0.0	0.0		13.2	0.3	
	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
Salix nigra	0	0	0	0	0	0	14.3	0.071	100

Table 22. Palisades transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Tallgrass prairie reconstruction			Temporary/seasonally flooded wetland			Semi-permanently flooded wetland/aquatic			Cool-season grassland		
	Species Scientific Name	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%
	Abutilon theophrasti	--	--	--	0.0	1.32	0.19	--	--	--	--	--	--
*	Acer saccharinum	--	--	--	0.1	1.64	0.25	--	--	--	--	--	--
	Amaranthus sp.	--	--	--	0.0	1.32	0.19	--	--	--	--	--	--
	Ambrosia artemisiifolia	3.3	13.6	1.28	5.2	16.78	2.97	--	--	--	--	--	--
	Ambrosia trifida	0.1	3.4	0.28	--	--	--	--	--	--	0.0	16.67	2.33
	Andropogon gerardii	133.6	51.5	11.43	2.6	1.97	0.58	--	--	--	--	--	--
	Aster laevis	0.4	5.7	0.48	--	--	--	--	--	--	--	--	--
*	Aster lanceolatus	0.4	1.9	0.17	4.9	9.87	1.97	--	--	--	--	--	--
*	Aster nova-angliae	0.6	9.1	0.77	0.6	8.22	1.24	--	--	--	--	--	--
	Aster pilosus	28.7	49.2	5.53	18.5	20.72	5.07	--	--	--	1.3	20.83	3.05
*	Bidens cernua	--	--	--	9.1	17.11	3.47	--	--	--	--	--	--
*	Bidens con/tri	--	--	--	0.1	4.28	0.62	--	--	--	--	--	--
*	Bidens frondosa	--	--	--	0.4	4.93	0.75	--	--	--	--	--	--
*	Boltonia asteroides	--	--	--	0.8	1.64	0.33	--	--	--	--	--	--
	Bromus inermis	1.6	2.7	0.30	--	--	--	--	--	--	--	--	--
*	Carex sp.	1.5	8.0	0.72	16.4	20.39	4.78	--	--	--	--	--	--
*	Carex vulpinoidea	--	--	--	2.6	4.61	0.96	--	--	--	--	--	--
	Cirsium arvense	0.5	4.2	0.36	--	--	--	--	--	--	--	--	--
	Cirsium discolor	0.0	3.0	0.24	--	--	--	--	--	--	--	--	--
	Coreopsis tinctoria	--	--	--	0.0	1.32	0.19	--	--	--	--	--	--
	Coronilla varia	2.9	6.8	0.71	--	--	--	--	--	--	20.0	54.17	9.66
*	Cyperus strigosus	0.1	3.4	0.28	3.6	15.46	2.60	--	--	--	--	--	--
	Dactylis glomerata	128.0	55.3	11.43	--	--	--	--	--	--	--	--	--
	Daucus carota	1.0	4.2	0.39	--	--	--	--	--	--	--	--	--
	Echinacea purpurea	0.7	14.0	1.17	--	--	--	--	--	--	--	--	--
	Echinochloa crusgalli	--	--	--	162.6	41.45	24.60	--	--	--	--	--	--
*	Eleocharis obtusa	0.5	1.9	0.18	35.8	5.26	4.87	--	--	--	--	--	--
*	Epilobium coloratum	--	--	--	1.7	3.29	0.66	--	--	--	--	--	--

Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%	Cool-season grassland M Ram Den(m^2)	Mean Freq (%)	IV-%
Erigernon annuus	1.5	17.8	1.51	0.2	3.29	0.49	--	--	--	--	--	--
Festuca arundinacea	84.1	56.8	9.16	14.8	8.55	2.92	--	--	--	100.0	25.00	14.02
Juncus dudleyii	4.2	7.2	0.81	0.0	1.32	0.19	--	--	--	--	--	--
Juncus tenuis	1.8	3.4	0.37	4.0	4.93	1.16	--	--	--	--	--	--
Lactuca canadensis	0.0	1.5	0.12	--	--	--	--	--	--	--	--	--
Lotus corniculatus	--	--	--	--	--	--	--	--	--	0.0	16.67	2.33
Melilotus officinalis	1.2	3.4	0.34	0.0	1.32	0.19	--	--	--	--	--	--
Panicum virgatum	2.2	13.6	1.22	1.1	5.59	0.91	--	--	--	--	--	--
Parthenocissus quinquefolia	--	--	--	0.0	1.32	0.19	--	--	--	--	--	--
Pastinaca sativa	0.1	3.4	0.28	--	--	--	--	--	--	--	--	--
* Penthorum sediodes	--	--	--	2.6	6.91	1.28	--	--	--	--	--	--
Phalaris arundinacea	--	--	--	14.8	9.21	3.01	--	--	--	--	--	--
Phleum pratense	30.3	64.8	6.87	42.8	23.03	8.20	--	--	--	4.0	41.67	6.24
Poa pratensis	452.8	81.1	31.21	71.7	11.51	9.88	--	--	--	340.0	87.50	48.02
* Polygonum pennsylvanicum	--	--	--	0.1	1.64	0.25	--	--	--	--	--	--
Polygonum persicaria	--	--	--	1.1	2.96	0.54	--	--	--	--	--	--
* Ranunculus abortivus	--	--	--	0.2	1.64	0.26	--	--	--	--	--	--
Ratibida pinnata	2.4	28.4	2.42	0.0	1.32	0.19	--	--	--	--	--	--
Rudbeckia hirta	7.0	17.8	1.82	0.0	1.32	0.19	--	--	--	--	--	--
Rumex crispus	0.1	3.4	0.28	0.0	1.32	0.19	--	--	--	1.3	20.83	3.05
* Salix exigua	--	--	--	0.5	2.96	0.48	--	--	--	--	--	--
* Salix nigra	--	--	--	0.0	1.32	0.19	--	--	--	--	--	--
Schizochyrium scoparium	1.0	3.8	0.36	--	--	--	--	--	--	--	--	--
* Scirpus atrovirens	4.2	5.7	0.69	0.5	1.64	0.29	--	--	--	--	--	--
Setaria faberi	--	--	--	0.1	1.64	0.25	--	--	--	--	--	--
Solidago canadensis	0.4	9.8	0.81	2.9	11.84	2.02	--	--	--	6.7	37.50	5.93
* Solidago gigantea	1.3	5.7	0.53	--	--	--	--	--	--	--	--	--
Sorghastrum nutans	13.7	18.6	2.24	0.1	1.64	0.25	--	--	--	--	--	--
Taraxacum officinale	1.3	17.0	1.45	0.6	5.59	0.87	--	--	--	--	--	--
Triflolium hybridum	1.8	3.8	0.40	--	--	--	--	--	--	--	--	--
Trifolium pratense	1.8	2.3	0.28	--	--	--	--	--	--	--	--	--
Trifolium repens	0.2	9.8	0.81	1.6	7.57	1.25	--	--	--	--	--	--
Typha latifolia	--	--	--	6.5	20.39	3.64	1.75	6.25	5.23	1.3	37.50	5.37

Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%	Cool-season grassland M Ram Den(m^2)	Mean Freq (%)	IV-%
* Verbena hastata	--	--	--	0.0	1.32	0.19	--	--	--	--	--	--
	Mean Cover %			Mean Cover %			Mean Cover %			Mean Cover %		
Bryophyta	0.04	1.9	0.15	0.79	7.24	1.12	--	--	--	--	--	--
* Lemna minor	--	--	--	0.20	9.21	1.33	0.20	12.50	6.40	--	--	--
* Potomogeton foliosus	--	--	--	0.78	5.92	0.93	38.77	82.81	88.37	--	--	--
Total Ramet Density(#/m^2)	917.5			431.6			1.8			474.7		
Total Frequency (%)	618.9			347.0			101.6			358.3		
Shannon Diversity	2.55			2.97			0.44			1.74		
Total Richness	40			49			3			10		
Evenness	0.69			0.76			0.40			0.76		
Rel Impt Natives (%)	35.7			72.3			100.0			16.7		
Rel Impt Exotics (%)	64.3			27.7			0.0			83.3		
Rel Impt Wet Indicators (%)	3.3			27.7			94.8			0.0		
Rel Impt Carex (%)	0.72			5.74			0.00			0.00		
Number of 1x1 m Samples	33			38			16			3		
Woody Layers	ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)	
Fraxinus pennsylvanicus	0	0		0.53	0		0	0		0	0	
Populus deltoides	3.33	0.79		5.79	0.32		0	0		3.33	2.7	
Quercus bicolor	1.21	0		0	0		0	0		0	0	
Quercus macrocarpa	0.30	0		0	0		0	0		0	0	
Salix amygdaloides	1.21	0.36		5.26	2.58		0	0		0	10.0	
Salix exigua	0.30	0.55		6.05	0.37		0	0		0	1.3	
Salix nigra	0.61	0.55		1.84	3.68		0	0		23.33	18.7	
Totals	7.0	2.2		19.5	6.9		0.0	0.0		26.7	32.7	
	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
Populus deltoides	12.1	0.04	100	0	0	0	0	0	0	0	0	0

Table 23. Pleasantville transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Semi-permanently flooded wetland/aquatic			Temporary/seasonally flooded wetland			Tallgrass prairie reconstruction		
	Species Scientific Name	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%
*	Acer saccharinum	--	--	--	0.00	3.85	0.33	0.07	1.94	0.19
	Agrostis gigantea	--	--	--	12.62	25.96	3.03	349.79	84.91	40.84
*	Alisma subcordatum	--	--	--	18.46	31.73	3.90	--	--	--
	Ambrosia artemisiifolia	--	--	--	--	--	--	0.48	2.37	0.28
*	Ammania coccinea	0.08	2.30	0.82	1.85	7.69	0.78	--	--	--
	Andropogon gerardii	--	--	--	--	--	--	19.24	36.42	5.33
*	Asclepias incarnata	--	--	--	0.00	3.85	0.33	--	--	--
	Asclepias syriaca	--	--	--	--	--	--	0.00	0.86	0.08
*	Aster laneceolatus	--	--	--	--	--	--	0.07	1.08	0.11
	Aster pilosus	--	--	--	6.46	18.27	1.98	40.14	61.85	9.75
*	Bacopa rotundifolia	2.53	4.59	2.91	0.92	1.92	0.22	--	--	--
*	Bidens cernua	--	--	--	15.08	11.54	1.95	--	--	--
*	Boltonia asteroides	--	--	--	15.08	37.50	4.18	4.21	16.16	1.96
	Bouteloua curtipendula	--	--	--	--	--	--	0.34	1.08	0.14
	Bromis inermis	--	--	--	--	--	--	2.55	5.60	0.78
*	Carex comosa	--	--	--	2.77	10.58	1.09	--	--	--
*	Carex vulpinoidea	--	--	--	65.23	38.46	7.43	8.48	7.76	1.54
*	Carex sp.	--	--	--	--	--	--	0.14	1.08	0.12
	Cirsium sp.	--	--	--	--	--	--	0.14	2.16	0.22
	Conyza canadensis	--	--	--	--	--	--	1.38	12.28	1.32
	Daucus carota	--	--	--	--	--	--	0.07	1.08	0.11
*	Echinochloa muricata	--	--	--	6.15	14.42	1.63	--	--	--
*	Eleocharis obtusa	--	--	--	492.62	59.62	36.24	0.00	0.86	0.08
	Elymus canadensis	--	--	--	--	--	--	2.83	12.50	1.48
	Erigeron annuus	--	--	--	0.00	3.85	0.33	1.45	24.14	2.48
	Eupatorium altissimum	--	--	--	--	--	--	0.00	0.86	0.08
*	Eupatorium perfoliatum	--	--	--	--	--	--	0.00	0.86	0.08

	Species Scientific Name	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%
*	Helenium autumnale	--	--	--	6.77	23.08	2.41	0.55	8.62	0.89
	Juncus dudleyi	--	--	--	1.54	8.65	0.84	6.90	5.17	1.14
	Juncus tenuis	--	--	--	0.92	4.81	0.47	3.79	7.76	1.11
	Lactuca canadensis	--	--	--	--	--	--	0.00	0.86	0.08
	Lactuca seriola	--	--	--	--	--	--	0.00	2.59	0.25
	Lepidium campestre	--	--	--	--	--	--	0.00	0.86	0.08
	Lotus corniculatus	--	--	--	--	--	--	0.90	2.37	0.31
*	Ludwigia alternifolia	--	--	--	0.31	4.81	0.43	--	--	--
	Medicago lupulina	--	--	--	0.31	4.81	0.43	--	--	--
*	Mimulus ringens	--	--	--	0.31	4.81	0.43	--	--	--
	Oxalis stricta	--	--	--	0.00	3.85	0.33	--	--	--
	Panicum virgatum	--	--	--	4.62	5.77	0.79	8.97	25.86	3.35
	Penstemon digitalis	--	--	--	--	--	--	0.00	2.59	0.25
	Phalaris arundinacea	3.67	1.53	2.49	93.23	38.46	9.20	3.10	5.60	0.83
	Phleum pratense	--	--	--	--	--	--	0.00	0.86	0.08
	Poa pratensis	--	--	--	4.62	4.81	0.71	1.03	1.08	0.20
*	Polygonum amphibium	0.16	1.28	0.52	0.00	3.85	0.33	0.34	7.33	0.74
	Potentilla recta	--	--	--	0.31	4.81	0.43	--	--	--
	Ratibida pinnata	--	--	--	0.31	4.81	0.43	--	--	--
	Rudbeckia hirta	--	--	--	--	--	--	4.34	18.32	2.18
*	Rudbeckia subtomentosa	--	--	--	4.62	17.31	1.78	0.34	6.90	0.70
*	Sagittaria brevirostra	7.67	9.95	7.48	6.15	16.35	1.80	--	--	--
	Schizachyrium scoparium	--	--	--	0.31	4.81	0.43	18.48	43.10	5.91
*	Scirpus (acutis)	--	--	--	2.46	9.62	0.98	--	--	--
*	Scirpus atrovirens	--	--	--	7.38	24.04	2.54	0.76	2.16	0.28
*	Scirpus validus	--	--	--	3.38	5.77	0.71	--	--	--
*	Scutellaria lateriflora	--	--	--	0.31	4.81	0.43	--	--	--
	Secale cereale	--	--	--	--	--	--	0.69	1.08	0.17
	Setaria faberi	--	--	--	2.15	10.58	1.05	0.69	1.08	0.17
	Solidago canadensis	--	--	--	--	--	--	5.10	26.08	3.01
*	Solidago gigantea	--	--	--	--	--	--	0.14	2.16	0.22
	Sorghastrum nutans	--	--	--	0.92	4.81	0.47	46.97	46.77	8.92
	Sporobolus asper	--	--	--	--	--	--	0.41	4.09	0.44

	Semi-permanently flooded wetland/aquatic			Temporary/seasonally flooded wetland			Tallgrass prairie reconstruction		
Species Scientific Name	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%
Taraxacum officinale	--	--	--	--	--	--	0.00	0.86	0.08
* Typha angustifolia	--	--	--	0.62	12.50	1.12	--	--	--
Ulmus sp.	--	--	--	--	--	--	0.00	1.72	0.17
* Verbena hastata	--	--	--	1.54	18.27	1.67	0.07	1.08	0.11
Verbena stricta	--	--	--	1.23	5.77	0.57	--	--	--
Verbena urticifolia	--	--	--	--	--	--	0.14	1.08	0.12
* Vernonia fasciculata	--	--	--	1.54	10.58	1.01	1.31	10.13	1.11
	Mean Cover %			Mean Cover %			Mean Cover %		
* Ceratophyllum demersum	0.005	1.28	0.43	1.63	10.58	1.01	--	--	--
* Najas guadalupensis	69.11	90.82	67.81	--	--	--	--	--	--
* Potomogeton nodosus	9.95	29.85	15.44	5.92	25.00	2.53	--	--	--
* Lemna minuta	0.03	6.12	2.09	1.44	18.27	1.66	--	--	--
Total Ramet Density(#/m^2)	14.1			783.1			536.4		
Total Frequency (%)	147.7			585.6			514.0		
Shannon Diversity	1.11			2.75			2.41		
Total Richness	9			43			48		
Evenness	0.51			0.73			0.62		
Rel Impt Natives (%)	97.5			85.2			55.9		
Rel Impt Exotics (%)	2.5			14.8			44.1		
Rel Impt Wet Indicators (%)	97.5			78.9			8.1		
Rel Impt Carex (%)	0.00			8.52			1.66		
Number of 1x1 m Samples	49			13			58		
Woody Layers	ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)	
	0	0		0	0		0	0	
	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
	0	0	0	0	0	0	0	0	0

Table 24. Brush Creek transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Cool-season grassland			Temporary flooded reed canary grass			Semi-permanently flooded wetland/aquatic		
	Species Scientific Name	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%
	Abutilon theophrasti	--	--	--	--	--	--	--	--	--
*	Acer saccarhinum	--	--	--	--	--	--	--	--	--
	Amaranthus sp.	--	--	--	0.3	4.46	0.88	--	--	--
	Andropogon gerardii	--	--	--	--	--	--	--	--	--
	Asclepias syriaca	--	--	--	0.0	3.57	0.68	--	--	--
*	Aster lanceolatus	--	--	--	--	--	--	--	--	--
	Aster pilosus	0.4	8.75	1.43	--	--	--	--	--	--
*	Bidens cernua	--	--	--	0.0	3.57	0.68	--	--	--
*	Bidens frondosa	--	--	--	--	--	--	--	--	--
*	Bidens tripartita	--	--	--	--	--	--	--	--	--
	Bromus inermis	560.2	100.00	55.63	284.0	47.32	33.84	--	--	--
	Calystegia sepium	1.6	11.25	1.91	0.0	7.14	1.36	--	--	--
*	Carex cristatella	--	--	--	--	--	--	--	--	--
	Carex gravida	1.0	3.13	0.57	--	--	--	--	--	--
*	Carex vulpinoidea	--	--	--	--	--	--	--	--	--
*	Carex sp.	0.4	3.13	0.53	--	--	--	--	--	--
	Cirsium altissimum	--	--	--	--	--	--	--	--	--
	Cirsium arvense	--	--	--	--	--	--	--	--	--
	Cirsium discolor	--	--	--	--	--	--	--	--	--
	Conyza canadensis	--	--	--	--	--	--	--	--	--
	Cornus amomum	--	--	--	0.9	16.07	3.14	--	--	--
	Daucus carota	--	--	--	--	--	--	--	--	--
	Digitaria ischaemum	--	--	--	--	--	--	--	--	--
	Echinochloa crusgalli	--	--	--	15.7	5.36	2.39	--	--	--
*	Eleocharis sp.	--	--	--	--	--	--	--	--	--
*	Epilobium coloratum	--	--	--	--	--	--	--	--	--
	Erechtites hieracifolia	--	--	--	--	--	--	--	--	--
	Erigeron annuus	0.4	6.25	1.03	--	--	--	--	--	--
	Euphorbia corollata	0.0	5.00	0.80	--	--	--	--	--	--
	Festuca arundinacea	12.8	25.00	4.90	2.3	8.04	1.73	--	--	--
	Geum canadense	--	--	--	--	--	--	--	--	--
*	Geum laciniatum	--	--	--	--	--	--	--	--	--
	Helianthus tuberosus	0.0	2.50	0.40	--	--	--	--	--	--
	Hypericum perforatum	--	--	--	--	--	--	--	--	--
	Juncus dudleyii	--	--	--	--	--	--	--	--	--
	Juncus tenuis	--	--	--	--	--	--	--	--	--
	Lactuca canadensis	--	--	--	--	--	--	--	--	--
	Lactuca seriola	--	--	--	--	--	--	--	--	--
*	Leersia oryzoides	--	--	--	1.4	4.46	0.98	--	--	--
*	Lycopus americanus	--	--	--	--	--	--	--	--	--
*	Lythrum alatum	--	--	--	--	--	--	--	--	--
*	Mimulus ringens	--	--	--	--	--	--	--	--	--
	Monarda fistulosa	--	--	--	--	--	--	--	--	--

Species Scientific Name	Cool-season grassland M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary flooded reed canary grass M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%
Oenothera biennis	--	--	--	--	--	--	--	--	--
Oxalis stricta	0.0	5.00	0.80	--	--	--	--	--	--
Pastinaca sativa	10.0	51.88	8.99	15.4	46.43	10.19	--	--	--
Phalaris arundinacea	0.2	3.13	0.51	218.0	75.00	33.34	--	--	--
Physalis heterophylla	0.2	3.13	0.51	--	--	--	--	--	--
Physalis virginana	0.0	5.00	0.80	--	--	--	--	--	--
Plantago major	--	--	--	--	--	--	--	--	--
Plantago rugellii	--	--	--	--	--	--	--	--	--
Poa pratensis	117.8	56.25	17.32	34.0	33.93	9.43	--	--	--
* Polygonum amphibium	--	--	--	--	--	--	--	--	--
* Polygonum hydropiper	--	--	--	--	--	--	--	--	--
* Polygonum lapathifolium	--	--	--	--	--	--	--	--	--
* Polygonum pennsylvanicum	--	--	--	--	--	--	--	--	--
Populus deltoides	--	--	--	--	--	--	--	--	--
Potentilla norvegica	--	--	--	--	--	--	--	--	--
Prunella vulgaris	--	--	--	--	--	--	--	--	--
Ratibida pinnata	--	--	--	--	--	--	--	--	--
* Sagittaria calycina	--	--	--	--	--	--	--	--	--
Sanicula sp.	--	--	--	--	--	--	--	--	--
* Scirpus atrovirens	--	--	--	--	--	--	--	--	--
Setaria faberi	--	--	--	--	--	--	--	--	--
Setaria glauca	--	--	--	--	--	--	--	--	--
Silphium perfoliatum	0.0	2.50	0.40	--	--	--	--	--	--
Solanum americanum	0.4	6.25	1.03	--	--	--	--	--	--
Solanum carolinense	0.2	3.13	0.51	--	--	--	--	--	--
Solidago canadensis	0.0	2.50	0.40	--	--	--	--	--	--
* Solidago gigantea	--	--	--	--	--	--	--	--	--
Sorghastrum nutans	--	--	--	--	--	--	--	--	--
Taraxacum officinale	0.4	6.25	1.03	--	--	--	--	--	--
Trifolium pratense	0.2	3.13	0.51	--	--	--	--	--	--
Ulmus sp.	--	--	--	--	--	--	--	--	--
* Verbena hastata	--	--	--	--	--	--	--	--	--
Viburnum opulus	--	--	--	0.0	7.14	1.36	--	--	--
	Mean Cover %			Mean Cover %			Mean Cover %		
* Ceratophyllum demersum	--	--	--	--	--	--	0	22.2	8.3
* Lemna minor	--	--	--	--	--	--	67.8	88.9	83.3
* Potamogeton foliosus	--	--	--	--	--	--	0	22.2	8.3
Total Ramet Density(#/m^2)	706.2			572.0			0.0		
Total Frequency (%)	313.1			262.5			133.3		
Shannon Diversity	1.62			1.69			0.57		
Total Richness	21			13			3		
Evenness	0.53			0.66			0.52		
Rel Impt Natives (%)	11.1			6.8			100.0		
Rel Impt Exotics (%)	88.9			93.2			0.0		
Rel Impt Wet Indicators (%)	0.5			1.7			91.7		
Rel Impt Carex (%)	1.1			0.0			0.0		

Species Scientific Name	Cool-season grassland M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary flooded reed canary grass M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%
Number of 1x1 m Samples	20			16			9		
Woody Layers	ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)	
Cornus amomum	0	0		118.8	1.5		0	0	
Fraxinus pennsylvanicus	7.5	0.8		0	0		0	0	
Juniperus virginiana	0.5	0		0	0		0	0	
Populus deltoides	0	0		0	0		0	0	
Quercus bicolor	3.0	0		0	0		0	0	
Quercus macrocarpa	1.0	0		1.0	0		0	0	
Quercus borealis	2.0	0		0	0		0	0	
Rubus occidentalis	0	0		0	0		0	0	
Salix sp.	0	0		0	0		0	0	
Viburnum opulus	2.0	0		53.1	2.0		0	0	
Totals	16.0	0.8		172.9	3.5		0.0	0	
	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
	0	0	0	0	0	0	0	0	0

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5x25 cm and 1x1 m plots), an
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V) are given for species in th

Species Scientific Name	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Wet cool-season grassland M Ram Den(m^2)	Mean Freq (%)	IV-%	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%
Abutilon theophrasti	0.2	2.72	0.33	--	--	--	--	--	--
Acer saccarhinum	0.0	2.17	0.25	--	--	--	--	--	--
Amaranthus sp.	2.4	13.04	1.72	--	--	--	--	--	--
Andropogon gerardii	--	--	--	0.0	3.33	0.27	175.4	62.50	22.34
Asclepias syriaca	--	--	--	--	--	--	--	--	--
Aster lanceolatus	--	--	--	--	--	--	0.6	8.93	0.66
Aster pilosus	2.1	5.98	0.87	22.7	53.33	6.05	20.6	73.21	7.06
Bidens cernua	6.4	17.93	2.64	--	--	--	--	--	--
Bidens frondosa	1.2	5.98	0.80	0.3	4.17	0.36	--	--	--
Bidens tripartita	2.6	6.52	0.98	--	--	--	--	--	--
Bromus inermis	--	--	--	--	--	--	--	--	--
Calystegia sepium	--	--	--	--	--	--	--	--	--
Carex cristatella	--	--	--	0.0	3.33	0.27	--	--	--
Carex gravida	--	--	--	--	--	--	--	--	--
Carex vulpinoidea	--	--	--	144.5	67.50	16.40	15.4	44.64	4.61
Carex sp.	9.7	7.07	1.68	0.5	8.33	0.72	0.0	7.14	0.48
Cirsium altissimum	--	--	--	0.0	6.67	0.54	0.6	8.93	0.66
Cirsium arvense	--	--	--	0.3	4.17	0.36	--	--	--
Cirsium discolor	--	--	--	0.0	3.33	0.27	2.9	26.79	2.10
Conyza canadensis	0.2	2.72	0.33	0.5	8.33	0.72	--	--	--
Cornus amomum	--	--	--	0.3	4.17	0.36	0.6	16.07	1.14
Daucus carota	--	--	--	2.1	10.83	1.04	--	--	--
Digitaria ischaemum	--	--	--	8.0	9.17	1.35	--	--	--
Echinochloa crusgalli	226.8	32.07	23.85	--	--	--	--	--	--
Eleocharis sp.	5.2	5.43	1.09	--	--	--	--	--	--
Epilobium coloratum	0.7	5.43	0.69	0.0	3.33	0.27	--	--	--
Erechtites hieracifolia	6.4	7.61	1.45	1.3	17.50	1.53	--	--	--
Erigeron annuus	--	--	--	1.6	13.33	1.21	0.0	7.14	0.48
Euphorbia corollata	--	--	--	--	--	--	--	--	--
Festuca arundinacea	--	--	--	3.5	5.00	0.67	22.9	17.86	3.57
Geum canadense	--	--	--	1.3	5.83	0.58	2.3	10.71	0.96
Geum laciniatum	--	--	--	1.1	8.33	0.76	2.3	16.07	1.32
Helianthus tuberosus	--	--	--	--	--	--	--	--	--
Hypericum perforatum	--	--	--	0.0	3.33	0.27	--	--	--
Juncus dudleyii	--	--	--	9.3	7.50	1.31	1.7	8.93	0.78
Juncus tenuis	--	--	--	336.8	69.17	31.04	23.4	37.50	4.95
Lactuca canadensis	--	--	--	4.8	33.33	3.08	1.1	39.29	2.77
Lactuca seriola	0.2	2.72	0.33	0.8	12.50	1.08	0.6	8.93	0.66
Leersia oryzoides	106.1	25.54	12.37	26.7	12.50	3.03	--	--	--
Lycopus americanus	0.7	5.43	0.69	1.9	9.17	0.89	--	--	--
Lythrum alatum	--	--	--	1.6	4.17	0.46	--	--	--
Mimulus ringens	0.0	4.35	0.50	--	--	--	--	--	--
Monarda fistulosa	--	--	--	--	--	--	0.6	8.93	0.66

Species Scientific Name	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Wet cool-season grassland M Ram Den(m^2)	Mean Freq (%)	IV-%	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%
Oenothera biennis	--	--	--	0.0	6.67	0.54	0.6	8.93	0.66
Oxalis stricta	--	--	--	1.1	16.67	1.44	1.1	8.93	0.72
Pastinaca sativa	--	--	--	0.3	4.17	0.36	11.4	21.43	2.63
Phalaris arundinacea	0.9	2.72	0.39	40.8	35.00	5.93	--	--	--
Physalis heterophylla	--	--	--	--	--	--	--	--	--
Physalis virginana	--	--	--	--	--	--	--	--	--
Plantago major	--	--	--	0.0	3.33	0.27	--	--	--
Plantago rugellii	--	--	--	0.5	4.17	0.38	--	--	--
Poa pratensis	--	--	--	27.2	21.67	3.82	54.9	37.50	8.20
Polygonum amphibium	0.5	3.26	0.42	--	--	--	--	--	--
Polygonum hydropiper	43.3	20.65	6.23	--	--	--	--	--	--
Polygonum lapathifolium	8.7	19.57	3.03	--	--	--	--	--	--
Polygonum pennsylvanicum	0.0	4.35	0.50	--	--	--	--	--	--
Populus deltoides	0.5	3.26	0.42	--	--	--	--	--	--
Potentilla norvegica	--	--	--	--	--	--	0.6	8.93	0.66
Prunella vulgaris	--	--	--	0.3	4.17	0.36	--	--	--
Ratibida pinnata	--	--	--	--	--	--	0.6	23.21	1.63
Sagittaria calycina	71.5	59.78	13.24	--	--	--	--	--	--
Sanicula sp.	--	--	--	0.0	3.33	0.27	--	--	--
Scirpus atrovirens	2.1	2.72	0.50	0.3	4.17	0.36	--	--	--
Setaria faberi	--	--	--	1.9	20.00	1.77	5.1	12.50	1.37
Setaria glauca	--	--	--	0.3	4.17	0.36	--	--	--
Silphium perfoliatum	--	--	--	--	--	--	--	--	--
Solanum americanum	--	--	--	--	--	--	--	--	--
Solanum carolinense	--	--	--	--	--	--	--	--	--
Solidago canadensis	--	--	--	13.1	33.33	3.70	4.0	35.71	2.82
Solidago gigantea	--	--	--	--	--	--	13.7	21.43	2.86
Sorghastrum nutans	--	--	--	0.5	4.17	0.38	98.3	64.29	14.49
Taraxacum officinale	0.2	2.72	0.33	4.0	26.67	2.47	22.9	80.36	7.78
Trifolium pratense	--	--	--	--	--	--	--	--	--
Ulmus sp.	--	--	--	--	--	--	0.0	14.29	0.96
Verbena hastata	0.0	2.17	0.25	2.1	26.67	2.33	--	--	--
Viburnum opulus	--	--	--	--	--	--	--	--	--
	Mean Cover %			Mean Cover %			Mean Cover %		
Ceratophyllum demersum	8.4	46.20	6.06	--	--	--	--	--	--
Lemna minor	47.2	67.93	12.01	--	--	--	--	--	--
Potamogeton foliosus	8.4	46.20	6.06	--	--	--	--	--	--
Total Ramet Density(#/m^2)	498.6			662.1			484.0		
Total Frequency (%)	434.2			610.0			741.1		
Shannon Diversity	2.53			2.69			2.62		
Total Richness	30			43			29		
Evenness	0.74			0.71			0.78		
Rel Impt Natives (%)	73.1			80.3			75.8		
Rel Impt Exotics (%)	26.9			19.7			24.2		
Rel Impt Wet Indicators (%)	63.9			25.8			9.9		
Rel Impt Carex (%)	1.7			17.4			5.1		

Species Scientific Name	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Wet cool-season grassland M Ram Den(m^2)	Mean Freq (%)	IV-%	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%
Number of 1x1 m Samples	23			15			7		
Woody Layers	ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)	
Cornus amomum	22.6	0		35.3	0		0	0	
Fraxinus pennsylvanicus	1.5	0.4		0	1.5		9.3	4.0	
Juniperus virginiana	0	0		0	0		0	0	
Populus deltoides	0	0		5.7	0		0.7	0	
Quercus bicolor	0	0		2	0.3		1.4	1.4	
Quercus macrocarpa	0	0		0	0		7.1	0	
Quercus borealis	0	0		1.5	0.2		10	1.9	
Rubus occidentalis	0	0		0	0		1.4	0	
Salix sp.	0.4	0		1.3	0		0	0	
Viburnum opulus	22.2	0.3		8.7	0		0	0	
Totals	46.7	0.8		54.5	1.9		30.0	7.3	
	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
	0	0	0	0	0	0	0	0	0

Table 25. Grooms transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Wet-mesic cool-season grass & forb			Temporary/seasonally flooded wetland		
	Species Scientific Name	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%
	Acalypha virginica	0.8	6.53	0.53	0.2	2.72	0.27
*	Acer saccharinum	--	--	--	0.0	2.17	0.20
	Agrostis gigantea	561.5	95.15	36.89	287.8	72.28	41.43
	Amaranthus hybridus	--	--	--	0.3	5.43	0.54
	Ambrosia artemisiifolia	14.1	46.27	4.21	6.6	43.48	4.77
	Ambrosia trifida	0.0	0.75	0.06	--	--	--
	Andropogon gerardii	1.8	7.65	0.67	11.8	19.57	3.22
	Aster pilosus	3.2	33.77	2.70	--	--	--
*	Betula nigra	0.1	1.87	0.15	--	--	--
*	Bidens sp.	0.0	0.75	0.06	0.0	2.17	0.20
*	Boltonia asteroides	--	--	--	0.0	2.17	0.20
	Bromus commutatus	1.3	2.05	0.22	1.9	8.15	0.98
	Calystegia sepium	0.3	6.90	0.53	0.3	2.72	0.29
*	Carex sp.	5.0	20.52	1.80	16.0	25.54	4.27
	Dactylis glomerata	4.6	15.86	1.43	--	--	--
	Daucus carota	0.1	1.68	0.13	--	--	--
*	Echinochloa muricata	--	--	--	1.0	7.61	0.82
	Elymus virginicus	1.2	7.28	0.61	10.1	25.00	3.50
	Equisetum arvense	0.1	0.93	0.07	--	--	--
	Erigeron annuus	1.7	19.40	1.55	0.0	2.17	0.20
	Festuca arundinacea	245.4	85.45	19.41	17.4	25.54	4.44
	Gaura biennis	0.2	6.53	0.50	0.0	2.17	0.20
	Helianthus tuberosa	--	--	--	0.0	2.17	0.20
	Hibiscus trionum	--	--	--	1.2	16.30	1.64
	Juncus tenuis	--	--	--	0.0	2.17	0.20
	Lepidium virginicum	--	--	--	0.0	2.17	0.20
*	Lindernia dubia	0.0	0.75	0.06	--	--	--
	Lotus corniculatus	0.6	0.93	0.10	0.0	2.17	0.20
	Melilotus sp.	3.4	33.40	2.68	0.3	7.61	0.74
	Oxalis stricta	--	--	--	0.0	2.17	0.20
	Panicum dichotomiflorum	--	--	--	16.3	30.98	4.81
	Panicum virgatum	0.1	0.93	0.08	--	--	--
*	Penthorum sedoides	--	--	--	0.2	4.89	0.47
	Phalaris arundinacea	0.7	1.87	0.17	--	--	--
	Phleum pratense	0.3	3.36	0.27	--	--	--
	Plantago rugelii	1.2	18.10	1.42	0.5	5.98	0.61
*	Polygonum pennsylvanicum	0.1	0.93	0.07	2.4	23.37	2.43
	Polygonum ramosissimum	--	--	--	0.2	2.72	0.27
	Potentilla norvegica	30.5	61.01	6.19	0.9	17.93	1.74
	Ratibida pinnata	0.5	6.34	0.50	--	--	--

	Species Scientific Name	Wet-mesic cool-season grass & forb M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%
	Rudbeckia hirta	1.0	5.04	0.43	1.2	13.04	1.34
	Rumex altissimus	0.1	2.61	0.20	--	--	--
	Rumex crispus	2.1	34.51	2.70	0.3	7.61	0.74
	Setaria glauca	0.1	0.93	0.07	4.0	16.85	2.02
	Solanum carolinense	0.2	3.54	0.28	0.0	4.35	0.40
	Solanum americanum	--	--	--	0.0	2.17	0.20
	Solidago canadensis	0.1	0.93	0.07	--	--	--
	Sporobolus asper	--	--	--	1.7	2.72	0.46
	Trifolium hybridum	44.5	61.01	6.93	21.9	56.52	7.82
	Trifolium pratense	13.7	50.19	4.48	3.3	26.09	2.78
	Trifolium repens	2.1	12.31	1.03	3.1	7.61	1.07
	Ulmus sp.	0.1	0.93	0.07	--	--	--
*	Verbena hastata	0.6	6.72	0.53	0.3	14.13	1.33
*	Vernonia fasciculata	0.0	0.75	0.06	1.4	23.91	2.35
*	Veronica peregrina	--	--	--	0.2	2.72	0.27
	Total Ramet Density(#/m^2)	943			413		
	Total Frequency (%)	666			547		
	Shannon Diversity	2.28			2.50		
	Total Richness	40			41		
	Evenness	0.62			0.67		
	Rel Impt Natives (%)	23.5			35.6		
	Rel Impt Exotics (%)	76.5			64.4		
	Rel Impt Wet Indicators (%)	2.7			12.5		
	Rel Impt Carex (%)	1.8			4.3		
	Number of 1x1 m Samples	67			23		

Woody Layers	ShrubD (st/are)	SapD (st/are)	ShrubD (st/are)	SapD (st/are)
Acer saccharinum	0	0.66	0	0
Betula nigra	0	0.09	0	0
Cephalanthes occidentalis	5.22	0.00	0	0
Fraxinus pennsylvanicus	0	0.63	0	0.09
Quercus bicolor	0	0.36	0	0
Sambuccus canadensis	0	0.00	0	2.61
Viburnum lentago	2.24	0.00	0	0
Totals	7.46	1.74	0.00	2.70

TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
0	0	0	0	0	0

Table 26. New Hampton transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Cool-season grassland			Temporary/seasonally flooded wetland			Semi-permanently flooded wetland/aquatic		
	Species Scientific Name	M Ram Den(m2)	Mean Freq (%)	IV-%	M Ram Den(m2)	Mean Freq (%)	IV-%	M Ram Den(m2)	Mean Freq (%)	IV-%
	Abutilon theophrasti	9.9	26.32	3.72	--	--	--	--	--	--
	Agropyron repens	222.1	42.76	16.65	97.1	18.75	4.30	--	--	--
	Agrostis gigantea	--	--	--	0.3	4.46	0.48	--	--	--
*	Aster lanceolatus	--	--	--	6.0	15.18	1.77	--	--	--
	Aster pilosus	0.0	2.63	0.32	2.9	21.43	2.36	--	--	--
*	Bidens connata	--	--	--	57.4	18.75	3.36	0.00	4.76	1.64
*	Bidens (frondosa)	--	--	--	0.0	3.57	0.38	--	--	--
	Bromus inermis	5.3	4.61	0.83	--	--	--	--	--	--
	Calystegia sepium	--	--	--	0.3	4.46	0.48	--	--	--
*	Carex bebbii	--	--	--	20.0	4.46	0.95	--	--	--
*	Carex frankii	--	--	--	4.3	4.46	0.58	--	--	--
*	Carex hystericina	--	--	--	10.3	5.36	0.82	--	--	--
*	Carex lacustris	--	--	--	1.7	4.46	0.52	--	--	--
*	Carex vulpinoidea	--	--	--	10.9	8.93	1.21	--	--	--
	Cerastium (vulgare)	0.2	3.29	0.41	--	--	--	--	--	--
	Cirsium arvense	7.2	53.95	6.96	--	--	--	--	--	--
	Cirsium vulgare	0.2	3.29	0.41	--	--	--	--	--	--
	Conyza canadensis	0.6	6.58	0.84	--	--	--	--	--	--
	Cornus racemosa	0.0	2.63	0.32	--	--	--	--	--	--
*	Echinochloa muricata	--	--	--	9.4	15.18	1.85	0.38	2.98	2.52
*	Eleocharis erythropoda	--	--	--	1425.7	42.86	38.21	0.57	2.98	3.27
*	Galium obtusum	--	--	--	0.3	4.46	0.48	--	--	--
*	Geum laciniatum	--	--	--	0.0	3.57	0.38	--	--	--
	Juncus dudleyii	--	--	--	10.0	9.82	1.29	--	--	--
	Juncus tenuis	5.7	9.87	1.50	11.7	17.86	2.19	--	--	--
*	Leersia oryzoides	--	--	--	91.1	40.18	6.45	--	--	--
*	Lycopus americanus	--	--	--	0.9	8.04	0.88	--	--	--

Species Scientific Name	Cool-season grassland M Ram Den(m2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m2)	Mean Freq (%)	IV-%
* Mimulus ringens	--	--	--	0.0	3.57	0.38	--	--	--
Muhlenbergia sp.	1.3	3.29	0.47	--	--	--	--	--	--
Oxalis stricta	0.6	14.47	1.80	--	--	--	--	--	--
Parthenocissus quinquefolia	--	--	--	0.9	8.93	0.98	--	--	--
Pastinaca sativa	--	--	--	0.3	4.46	0.48	--	--	--
* Penthroum sedoides	--	--	--	0.9	4.46	0.50	--	--	--
Phalaris arundinacea	1.3	3.29	0.47	77.4	41.07	6.22	7.43	12.50	33.46
Phleum pratense	351.6	75.00	27.24	30.3	33.04	4.25	--	--	--
Plantago major	2.9	11.18	1.52	--	--	--	--	--	--
Poa pratensis	322.1	44.08	21.95	70.0	16.96	3.47	--	--	--
* Polygonum lapathifolium	0.4	3.29	0.42	--	--	--	--	--	--
Polygonum persicaria	1.5	7.24	0.96	176.9	49.11	9.43	--	--	--
* Polygonum sagitatum	--	--	--	0.0	3.57	0.38	--	--	--
Rudbeckia hirta	--	--	--	0.3	4.46	0.48	--	--	--
Rumex crispus	--	--	--	0.3	4.46	0.48	--	--	--
* Sagittaria latifolia	--	--	--	0.3	4.46	0.48	--	--	--
Sambuccus canadensis	0.2	3.29	0.41	--	--	--	--	--	--
Setaria faberii	19.2	26.97	4.28	0.9	4.46	0.50	--	--	--
Setaria glauca	7.6	20.39	2.88	--	--	--	--	--	--
Sonchus asper	10.7	10.53	1.84	--	--	--	--	--	--
Taraxacum officinale	0.2	5.92	0.73	0.3	4.46	0.48	--	--	--
* Verbena hastata	0.0	2.63	0.32	--	--	--	--	--	--
Xanthium strumarium	--	--	--	0.0	3.57	0.38	--	--	--
	Mean Cover %			Mean Cover %			Mean Cover %		
Bryophyta	1.6	21.71	2.74	1.4	14.29	1.56	--	--	--
* Lemna minor	--	--	--	0.1	5.36	0.58	1.15	82.14	32.81
* Najas sp.	--	--	--	--	--	--	3.20	39.88	26.30
Total Ramet Density(#/m^2)	970.7			2118.9			8.4		
Total Frequency (%)	409.2			467.0			145.2		
Shannon Diversity	2.26			2.55			1.36		
Total Richness	25			37			6		

Species Scientific Name	Cool-season grassland M Ram Den(m2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m2)	Mean Freq (%)	IV-%
Evenness	0.70			0.71			0.76		
Rel Impt Natives (%)	9.1			69.5			66.5		
Rel Impt Exotics (%)	90.9			30.5			33.5		
Rel Impt Wet Indicators (%)	0.7			60.2			66.5		
Rel Impt Carex (%)	0.0			4.1			0.0		
Number of 1x1 m Samples	19			14			21		
Woody Layers	ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)	
Salix exigua	0	0		0.71	0		66.7	0.2	
	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
	0	0	0	0	0	0	0	0	0

Table 27. Wickiup Hill transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Tallgrass prairie reconstruction			Wet-mesic cool-season grass & forb			Temporary flooded reed canary grass		
	Species Scientific Name	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%
	Abutilon theophrastii	--	--	--	--	--	--	--	--	--
	Acalyphya virginica	--	--	--	--	--	--	--	--	--
*	Acer saccharinum	--	--	--	--	--	--	--	--	--
	Agropyron repens	73.1	22.92	7.09	309.3	100.00	15.91	13.3	6.25	2.22
	Agrostis gigantea	2.4	7.64	0.83	17.3	37.50	2.53	--	--	--
	Alliaria petiolata	--	--	--	--	--	--	0.1	1.74	0.28
	Ambrosia artemisiifolia	--	--	--	0.0	16.67	0.85	--	--	--
	Ambrosia trifida	0.4	3.47	0.33	0.0	16.67	0.85	0.0	1.39	0.22
	Andropogon gerardii	80.7	59.03	10.75	0.0	16.67	0.85	1.1	6.60	1.13
*	Apios americana	--	--	--	--	--	--	1.4	10.07	1.69
	Apocynum sibiricum	--	--	--	--	--	--	--	--	--
*	Asclepias incarnata	0.0	2.78	0.24	--	--	--	0.1	3.13	0.49
	Asclepias syriaca	0.4	6.94	0.63	--	--	--	0.0	4.17	0.65
*	Aster (lanceolatus)	--	--	--	--	--	--	--	--	--
	Aster pilosus	--	--	--	--	--	--	--	--	--
	Barbarea vulgaris	--	--	--	--	--	--	0.9	3.13	0.57
*	Bidens cernua	--	--	--	--	--	--	--	--	--
*	Bidens frondosa	--	--	--	--	--	--	--	--	--
*	Bidens tripartita	--	--	--	--	--	--	--	--	--
*	Boltonia asteroides	--	--	--	--	--	--	--	--	--
	Bouteloua curtipendula	8.7	8.33	1.33	6.7	29.17	1.73	--	--	--
	Bromus commutatus	2.2	7.64	0.82	--	--	--	--	--	--
	Bromus inermis	--	--	--	1.3	20.83	1.11	8.3	5.90	1.70
	Calystegia sepium	0.9	9.72	0.90	2.7	20.83	1.16	0.2	3.47	0.56
	Carex blanda	0.4	4.17	0.39	0.0	16.67	0.85	0.1	3.13	0.49
*	Carex conjuncta	0.0	2.78	0.24	0.0	16.67	0.85	--	--	--
*	Carex cristatella	--	--	--	--	--	--	--	--	--
*	Carex laeviconica	--	--	--	--	--	--	8.1	7.29	1.89
*	Carex lupulina	--	--	--	--	--	--	--	--	--
	Carex molesta	2.7	3.47	0.49	21.3	20.83	1.81	--	--	--
*	Carex vulpinoidea	1.3	4.17	0.45	--	--	--	--	--	--
*	Carex sp.	0.4	6.94	0.63	65.3	62.50	5.48	0.2	3.47	0.56
	Chamaecrista fasciculata	1.1	13.19	1.22	--	--	--	0.0	1.39	0.22
	Chenopodium album	--	--	--	--	--	--	0.0	2.78	0.43
*	Cicuta maculata	--	--	--	--	--	--	0.0	1.39	0.22
	Cirsium arvense	--	--	--	--	--	--	--	--	--
	Conyza canadensis	--	--	--	--	--	--	0.1	1.74	0.28
	Cornus racemosus	--	--	--	--	--	--	--	--	--
*	Cyperus sp.	--	--	--	--	--	--	--	--	--
	Desmanthus illinoensis	0.2	3.47	0.32	--	--	--	--	--	--
	Desmodium canadense	2.2	9.72	1.00	--	--	--	0.0	1.39	0.22
	Echinochloa crusgalli	--	--	--	--	--	--	--	--	--

Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Wet-mesic cool-season grass & forb M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary flooded reed canary grass M Ram Den(m^2)	Mean Freq (%)	IV-%
* Eleocharis sp.	--	--	--	--	--	--	--	--	--
Elymus canadensis	4.2	22.22	2.22	--	--	--	0.2	3.13	0.50
* Epilobium leptophyllum	--	--	--	--	--	--	--	--	--
Erigernon annuus	--	--	--	--	--	--	0.1	1.74	0.28
* Eupatorium perfoliatum	--	--	--	--	--	--	--	--	--
Festuca arundinacea	7.8	11.11	1.51	62.7	41.67	4.32	1.1	1.74	0.37
Fraxinus pennsylvanicus	--	--	--	--	--	--	--	--	--
Hackelia virginica	--	--	--	--	--	--	--	--	--
* Helenium autumnale	--	--	--	--	--	--	--	--	--
Helianthus tuberosus	13.6	38.19	4.26	9.3	45.83	2.68	9.0	31.25	5.68
Heliopsis helianthoides	1.3	7.64	0.76	--	--	--	0.0	2.78	0.43
* Iris shrevei	--	--	--	--	--	--	--	--	--
Juncus tenuis	--	--	--	--	--	--	--	--	--
Lactuca seriola	--	--	--	--	--	--	--	--	--
* Laportea canadensis	--	--	--	--	--	--	0.0	1.39	0.22
* Leersia oryzoides	--	--	--	--	--	--	--	--	--
* Lycopus americanus	--	--	--	--	--	--	--	--	--
Lysimachia nummularia	--	--	--	--	--	--	--	--	--
Medicago lupulina	--	--	--	36.0	62.50	4.46	--	--	--
Melilotus alba	1.3	4.17	0.45	16.0	20.83	1.63	--	--	--
Mentha arvensis	--	--	--	--	--	--	--	--	--
* Mimulus ringens	--	--	--	--	--	--	--	--	--
Monarda fistulosa	0.4	3.47	0.33	--	--	--	--	--	--
Morus alba	--	--	--	--	--	--	--	--	--
Muhlenbergia sp.	0.0	2.78	0.24	--	--	--	0.9	3.47	0.62
Oxalis stricta	0.2	3.47	0.32	--	--	--	0.7	10.07	1.62
Panicum capillare	--	--	--	--	--	--	--	--	--
* Penthorum sedoides	--	--	--	--	--	--	--	--	--
Phalaris arundinacea	272.9	95.83	27.37	52.0	83.33	6.09	429.7	98.96	55.66
* Phyla lanceolata	--	--	--	--	--	--	--	--	--
* Physostegia sp.	--	--	--	--	--	--	--	--	--
Plantago major	--	--	--	--	--	--	--	--	--
Plantago rugelli	--	--	--	--	--	--	--	--	--
Poa compressa	7.6	6.94	1.13	--	--	--	--	--	--
Poa pratensis	160.0	59.03	16.29	786.7	100.00	32.54	25.0	15.63	4.77
* Polygonum amphibium	--	--	--	--	--	--	--	--	--
* Polygonum lapathifolium	--	--	--	--	--	--	--	--	--
* Polygonum punctatum	--	--	--	--	--	--	0.2	1.74	0.29
Populus deltoides	--	--	--	--	--	--	--	--	--
Populus tremuloides	--	--	--	--	--	--	--	--	--
Potentilla norvegica	--	--	--	--	--	--	--	--	--
Prunella vulgaris	--	--	--	--	--	--	--	--	--
Prunus serotina	--	--	--	--	--	--	0.1	1.74	0.28
Ratibida pinnata	2.0	10.42	1.04	--	--	--	--	--	--
Rudbeckia hirta	0.2	3.47	0.32	2.7	41.67	2.23	--	--	--
Rumex altissimus	--	--	--	--	--	--	0.0	2.78	0.43
Rumex crispus	0.2	6.25	0.56	2.7	25.00	1.37	0.2	3.47	0.56
* Salix amygdaloides	--	--	--	--	--	--	--	--	--

Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Wet-mesic cool-season grass & forb M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary flooded reed canary grass M Ram Den(m^2)	Mean Freq (%)	IV-%
* Salix exigua	--	--	--	--	--	--	0.0	1.39	0.22
* Salix sp.	--	--	--	--	--	--	--	--	--
* Scirpus atrovirens	--	--	--	--	--	--	--	--	--
* Scutellaria lateriflora	--	--	--	--	--	--	--	--	--
Setaria faberii	--	--	--	--	--	--	0.0	1.39	0.22
Silphium integrifolium	1.1	3.47	0.38	--	--	--	--	--	--
Solanum americanum	--	--	--	--	--	--	0.1	1.74	0.28
Solidago canadensis	0.9	6.94	0.66	--	--	--	0.2	1.74	0.29
* Solidago gigantea	10.0	32.64	3.53	16.0	75.00	4.40	1.4	7.64	1.32
Sonchus asper	--	--	--	--	--	--	--	--	--
Sorghastrum nutans	46.4	28.47	5.71	4.0	20.83	1.21	1.2	3.47	0.65
* Stachys tenuiflora	6.7	20.14	2.21	--	--	--	25.7	44.79	9.35
Taraxacum officinale	0.2	6.25	0.56	--	--	--	--	--	--
Teucrium canadense	0.2	6.25	0.56	--	--	--	0.6	2.08	0.37
Toxicodendron radicans	0.2	6.25	0.56	--	--	--	0.9	3.82	0.67
Tradescantia ohioensis	0.0	2.78	0.24	--	--	--	--	--	--
Tragopogon dubius	--	--	--	--	--	--	--	--	--
Trifolium hybridum	--	--	--	0.0	16.67	0.85	0.4	1.74	0.31
Trifolium pratense	--	--	--	18.7	25.00	1.93	--	--	--
Trifolium repens	--	--	--	4.0	41.67	2.28	--	--	--
Ulmus sp.	--	--	--	--	--	--	--	--	--
Urtica dioica	--	--	--	--	--	--	0.6	1.74	0.32
Verbascum thapsis	--	--	--	--	--	--	0.1	1.74	0.28
* Verbena hastata	0.4	3.47	0.33	--	--	--	--	--	--
Verbena urticifolia	0.2	3.47	0.32	--	--	--	0.0	1.39	0.22
* Vernonia fasciculata	0.0	2.78	0.24	--	--	--	--	--	--
* Veronica peregrina	--	--	--	--	--	--	--	--	--
Vitis vulpina	--	--	--	--	--	--	--	--	--
Zizia aurea	0.0	2.78	0.24	--	--	--	--	--	--
Total Ramet Density(#/m^2)	716			1435			533		
Total Frequency (%)	577			975			323		
Shannon Diversity	2.69			2.50			2.04		
Total Richness	44			25			45		
Evenness	0.71			0.78			0.54		
Rel Impt Natives (%)	43.4			25.0			32.6		
Rel Impt Exotics (%)	56.6			75.0			67.4		
Rel Impt Wet Indicators (%)	7.9			10.7			16.2		
Rel Impt Carex (%)	1.6			3.5			2.4		
Number of 1x1 m Samples	18			3			36		

Woody Layers	ShrubD (st/are)	SapD (st/are)	ShrubD (st/are)	SapD (st/are)	ShrubD (st/are)	SapD (st/are)
Fraxinus pennsylvanicus	1.1	0	0	0	1.7	0
Populus deltoides	0	0	0	2.7	0	0.14

Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Wet-mesic cool-season grass & forb M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary flooded reed canary grass M Ram Den(m^2)	Mean Freq (%)	IV-%
Rubus occidentalis	0	0		0	0.0		0	0	
Salix amygdaloides	0	0		0	1.3		5.6	0	
Salix exigua	13.9	0.9		70	33.3		28.3	35.4	
Vitis riparia	0.56	0		0	0.0		0.56	0	
Totals	15.6	0.9		70.0	37.3		36.1	35.5	

	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
Populus deltoides	0	0	0	0	0	0	5.5	0.23	54.7
Salix amygdaloides	0	0	0	0	0	0	5.5	0.16	45.3
Totals	0	0.0		0	0.0		11	0.38	

able 27. Wickiup Hill transec
equency (in 25x25 cm and 1x
n (*) indicates a wetland indi
3A) and importance values (I

Species Scientific Name	Wet shrubland-willow M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%
Abutilon theophrastii	0.2	3.65	0.44	1.1	8.33	0.72
Acalyphya virginica	0.3	5.99	0.72	2.1	9.17	0.89
Acer saccharinum	0.0	3.13	0.35	0.8	15.83	1.26
Agropyron repens	3.3	4.95	1.14	--	--	--
Agrostis gigantea	0.4	2.34	0.34	--	--	--
Alliaria petiolata	--	--	--	--	--	--
Ambrosia artemisiifolia	0.8	5.99	0.80	--	--	--
Ambrosia trifida	0.1	3.39	0.40	--	--	--
Andropogon gerardii	--	--	--	--	--	--
Apios americana	--	--	--	--	--	--
Apocynum sibiricum	0.2	1.30	0.18	--	--	--
Asclepias incarnata	0.0	1.04	0.12	0.8	31.67	2.45
Asclepias syriaca	--	--	--	--	--	--
Aster (lanceolatus)	32.9	51.30	11.53	0.8	15.83	1.26
Aster pilosus	--	--	--	1.1	9.17	0.79
Barbarea vulgaris	0.1	1.30	0.16	--	--	--
Bidens cernua	--	--	--	40.8	25.83	5.73
Bidens frondosa	1.1	9.38	1.24	--	--	--
Bidens tripartita	2.7	3.39	0.85	165.1	77.50	21.16
Boltonia asteroides	3.6	16.41	2.47	1.3	16.67	1.38
Bouteloua curtipendula	--	--	--	--	--	--
Bromus commutatus	--	--	--	1.9	4.17	0.49
Bromus inermis	--	--	--	--	--	--
Calystegia sepium	--	--	--	--	--	--
Carex blanda	0.0	2.08	0.23	--	--	--
Carex conjuncta	0.4	1.30	0.22	--	--	--
Carex cristatella	2.1	3.65	0.77	--	--	--
Carex laeviconica	0.3	1.30	0.19	--	--	--
Carex lupulina	0.4	1.30	0.22	--	--	--
Carex molesta	1.7	2.34	0.56	--	--	--
Carex vulpinoidea	0.0	2.08	0.23	--	--	--
Carex sp.	3.3	13.28	2.08	5.9	31.67	2.92
Chamaecrista fasciculata	--	--	--	--	--	--
Chenopodium album	0.2	1.56	0.20	--	--	--
Cicuta maculata	--	--	--	--	--	--
Cirsium arvense	0.0	1.04	0.12	--	--	--
Conyza canadensis	1.2	11.20	1.46	2.1	16.67	1.45
Cornus racemosus	0.2	1.56	0.20	--	--	--
Cyperus sp.	0.2	3.39	0.41	--	--	--
Desmanthus illinoensis	--	--	--	--	--	--
Desmodium canadense	--	--	--	--	--	--
Echinochloa crusgalli	--	--	--	36.5	34.17	5.96

Species Scientific Name	Wet shrubland-willow M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%
Eleocharis sp.	39.0	7.29	7.64	--	--	--
Elymus canadensis	--	--	--	--	--	--
Epilobium leptophyllum	0.2	3.65	0.44	--	--	--
Erigernon annuus	0.0	3.13	0.35	1.9	18.33	1.55
Eupatorium perfoliatum	0.2	1.30	0.18	0.0	3.33	0.25
Festuca arundinacea	--	--	--	--	--	--
Fraxinus pennsylvanicus	0.0	2.08	0.23	--	--	--
Hackelia virginica	0.8	12.24	1.51	--	--	--
Helenium autumnale	--	--	--	0.0	3.33	0.25
Helianthus tuberosus	--	--	--	--	--	--
Heliopsis helianthoides	--	--	--	--	--	--
Iris shrevei	0.1	1.30	0.16	--	--	--
Juncus tenuis	0.0	1.04	0.12	--	--	--
Lactuca seriola	0.2	2.60	0.32	--	--	--
Laportea canadensis	--	--	--	--	--	--
Leersia oryzoides	1.2	4.17	0.67	15.2	32.50	3.85
Lycopus americanus	1.1	8.59	1.16	0.0	3.33	0.25
Lysimachia nummularia	11.1	6.25	2.64	--	--	--
Medicago lupulina	1.0	1.56	0.35	--	--	--
Melilotus alba	0.1	1.30	0.16	--	--	--
Mentha arvensis	0.5	4.95	0.64	1.3	4.17	0.44
Mimulus ringens	0.6	4.95	0.66	1.3	24.17	1.94
Monarda fistulosa	--	--	--	--	--	--
Morus alba	--	--	--	0.3	4.17	0.34
Muhlenbergia sp.	--	--	--	--	--	--
Oxalis stricta	--	--	--	--	--	--
Panicum capillare	--	--	--	2.7	4.17	0.56
Penthorum sedoides	0.0	1.04	0.12	--	--	--
Phalaris arundinacea	126.6	83.85	31.58	200.0	85.00	24.97
Phyla lanceolata	6.4	16.67	3.00	0.5	4.17	0.36
Physostegia sp.	0.3	2.86	0.37	--	--	--
Plantago major	0.1	1.30	0.16	--	--	--
Plantago rugelli	0.1	3.39	0.40	--	--	--
Poa compressa	--	--	--	--	--	--
Poa pratensis	27.5	12.24	6.19	--	--	--
Polygonum amphibium	1.5	4.95	0.82	0.8	5.00	0.45
Polygonum lapathifolium	0.8	8.07	1.05	13.3	39.17	4.18
Polygonum punctatum	0.2	2.60	0.32	0.0	3.33	0.25
Populus deltoides	0.1	4.43	0.51	0.3	7.50	0.59
Populus tremuloides	--	--	--	0.0	3.33	0.25
Potentilla norvegica	0.1	1.30	0.16	0.0	3.33	0.25
Prunella vulgaris	0.1	1.30	0.16	--	--	--
Prunus serotina	0.1	7.55	0.86	--	--	--
Ratibida pinnata	0.2	2.60	0.32	--	--	--
Rudbeckia hirta	0.5	2.86	0.41	--	--	--
Rumex altissimus	0.2	2.60	0.32	--	--	--
Rumex crispus	0.1	3.39	0.40	--	--	--
Salix amygdaloides	0.1	2.34	0.28	0.8	8.33	0.70

Species Scientific Name	Wet shrubland-willow M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%
Salix exigua	0.0	1.04	0.12	16.0	18.33	2.86
Salix sp.	0.2	5.73	0.67	17.6	42.50	4.83
Scirpus atrovirens	0.0	1.04	0.12	--	--	--
Scutellaria lateriflora	0.1	1.30	0.16	--	--	--
Setaria faberii	0.1	1.30	0.16	--	--	--
Silphium integrifolium	--	--	--	--	--	--
Solanum americanum	--	--	--	--	--	--
Solidago canadensis	1.0	3.65	0.58	0.0	3.33	0.25
Solidago gigantea	2.3	8.59	1.37	--	--	--
Sonchus asper	0.1	1.30	0.16	--	--	--
Sorghastrum nutans	--	--	--	--	--	--
Stachys tenuiflora	1.6	7.03	1.07	--	--	--
Taraxacum officinale	0.2	2.60	0.32	0.3	4.17	0.34
Teucrium canadense	--	--	--	--	--	--
Toxicodendron radicans	--	--	--	--	--	--
Tradescantia ohioensis	--	--	--	--	--	--
Tragopogon dubius	--	--	--	0.0	3.33	0.25
Trifolium hybridum	0.0	1.04	0.12	--	--	--
Trifolium pratense	0.1	1.30	0.16	--	--	--
Trifolium repens	3.3	3.39	0.96	1.3	9.17	0.81
Ulmus sp.	0.1	1.30	0.16	--	--	--
Urtica dioica	0.2	3.39	0.41	--	--	--
Verbascum thapsis	--	--	--	--	--	--
Verbena hastata	0.0	3.13	0.35	2.7	15.83	1.44
Verbena urticifolia	--	--	--	0.0	3.33	0.25
Vernonia fasciculata	0.5	3.91	0.53	--	--	--
Veronica peregrina	0.2	1.30	0.18	1.6	12.50	1.09
Vitis vulpina	0.0	1.04	0.12	--	--	--
Zizia aurea	--	--	--	--	--	--
Total Ramet Density(#/m^2)	286			538		
Total Frequency (%)	445			666		
Shannon Diversity	3.04			2.71		
Total Richness	81			40		
Evenness	0.69			0.73		
Rel Impt Natives (%)	53.9			66.1		
Rel Impt Exotics (%)	46.1			33.9		
Rel Impt Wet Indicators (%)	42.1			58.9		
Rel Impt Carex (%)	2.4			0.0		
Number of 1x1 m Samples	48			15		

Woody Layers	ShrubD (st/are)	SapD (st/are)	ShrubD (st/are)	SapD (st/are)
Fraxinus pennsylvanicus	0.42	0	0	0
Populus deltoides	19.8	15.7	15.3	0

Species Scientific Name	Wet shrubland-willow M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%
Rubus occidentalis	0.42	0		0	0	
Salix amygdaloides	6.9	0.63		81.3	0	
Salix exigua	52.5	245.2		465.3	80	
Vitis riparia	0	0		0	0	
Totals	80.0	261.6		562.0	80.0	

	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
Populus deltoides	0	0	0	39.9	0.10	100
Salix amygdaloides	0	0	0	0	0	0
Totals	0	0.0		39.9	0.10	

Table 28. Badger Creek transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Tallgrass prairie reconstruction			Temporary/seasonally flooded wetland			Wet cool-season grass & forb		
	Species Scientific Name	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%
	Abutilom theophrastii	0.3	3.91	0.21	--	--	--	--	--	--
*	Acer saccharinum	--	--	--	0.1	2.74	0.20	1.3	20.83	1.48
*	Alisma subcordatum	--	--	--	1.1	9.45	0.74	--	--	--
	Amaranthus sp.	--	--	--	11.3	32.01	2.90	--	--	--
	Ambrosia artemisiifolia	3.5	12.50	0.80	0.0	1.22	0.09	--	--	--
	Ambrosia trifida	0.5	3.91	0.22	--	--	--	2.7	37.50	2.68
*	Ammania coccinea	--	--	--	9.3	27.44	2.47	--	--	--
	Andropogon gerardii	70.5	46.88	5.89	--	--	--	--	--	--
*	Asclepias incarnata	--	--	--	0.3	3.05	0.24	--	--	--
	Asclepias sullivantii	0.3	3.91	0.21	--	--	--	--	--	--
	Asclepias tuberosa	0.0	6.25	0.31	--	--	--	--	--	--
	Asclepias verticillata	1.0	4.69	0.28	--	--	--	--	--	--
*	Aster lanceolatus	1.0	7.81	0.44	1.3	14.63	1.13	84.0	58.33	10.00
	Aster pilosus	15.8	43.75	2.97	20.7	42.68	4.16	40.0	83.33	8.44
	Baptisia lactea	0.5	20.31	1.03	--	--	--	--	--	--
*	Bidens cernua	--	--	--	1.2	4.88	0.41	--	--	--
*	Bidens tripartita	--	--	--	1.0	10.06	0.78	36.0	33.33	4.84
	Bouteloua curtipendula	26.5	33.59	3.01	--	--	--	--	--	--
	Bromus tectorum	104.8	48.44	7.70	--	--	--	--	--	--
	Carex blanda	1.8	10.94	0.63	0.5	1.52	0.14	--	--	--
	Carex brevior	--	--	--	--	--	--	0.0	16.67	1.10
*	Carex cristatella	--	--	--	0.0	1.22	0.09	--	--	--
*	Carex normalis	0.0	3.13	0.15	3.4	1.83	0.31	--	--	--
*	Carex vulpinoidea	--	--	--	1.5	1.52	0.19	66.7	25.00	6.52
*	Carex sp.	--	--	--	16.1	24.70	2.61	--	--	--
	Chamaecrista fasciculata	13.5	32.81	2.31	1.3	3.66	0.33	--	--	--
	Conyza canadensis	0.3	3.91	0.21	0.1	1.52	0.12	--	--	--

	Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Wet cool-season grass & forb M Ram Den(m^2)	Mean Freq (%)	IV-%
	Cornus	0.0	3.13	0.15	--	--	--	--	--	--
*	Cyperus acuminatus	--	--	--	46.6	51.52	6.12	--	--	--
	Daucus carota	17.5	57.81	3.75	0.1	2.74	0.20	--	--	--
	Echinacea pallida	0.5	7.81	0.41	--	--	--	--	--	--
	Echinochloa crusgalli	1.3	3.91	0.26	147.9	80.79	13.41	4.0	20.83	1.67
*	Eleocharis obtusa	--	--	--	542.6	67.68	32.57	--	--	--
*	Eleocharis sp.	--	--	--	29.8	5.49	1.91	--	--	--
	Elymus canadensis	50.8	77.34	6.40	0.0	2.44	0.18	--	--	--
	Elymus virginicus	--	--	--	0.0	1.22	0.09	--	--	--
	Erigeron annuus	0.3	3.91	0.21	0.3	4.57	0.35	--	--	--
	Eriochloa villosa	3.8	13.28	0.85	--	--	--	--	--	--
	Eryngium yuccifolium	0.0	3.13	0.15	--	--	--	--	--	--
	Euphorbia maculata	--	--	--	0.0	1.22	0.09	--	--	--
	Euphorbia nutans	1.5	11.72	0.66	--	--	--	--	--	--
	Hackelia virginiana	--	--	--	0.1	1.52	0.12	--	--	--
	Heliopsis helianthoides	8.5	24.22	1.63	--	--	--	--	--	--
	Hibiscus trionum	--	--	--	--	--	--	8.0	25.00	2.24
	Hordeum jubatum	0.8	3.91	0.23	1.7	3.05	0.31	--	--	--
	Juncus dudleyii	11.8	9.38	1.06	0.2	1.52	0.12	--	--	--
	Juncus tenuis	--	--	--	0.4	3.05	0.24	--	--	--
	Lactuca seriola	0.5	10.94	0.57	0.1	1.52	0.12	5.3	45.83	3.43
*	Leersia oryzoides	--	--	--	8.0	11.59	1.25	69.3	50.00	8.37
	Lepidium virginicum	0.8	4.69	0.27	--	--	--	--	--	--
	Liatris pycnostachya	0.0	3.13	0.15	--	--	--	--	--	--
*	Lindernia dubia	--	--	--	31.4	54.88	5.59	--	--	--
*	Ludwigia polycarpa	--	--	--	16.5	45.12	4.12	--	--	--
*	Lycopus americanus	0.5	4.69	0.26	4.4	14.33	1.26	14.7	50.00	4.38
*	Lythrum alatum	1.3	3.91	0.26	0.0	1.22	0.09	--	--	--
	Medicago lupulina	0.0	3.13	0.15	--	--	--	--	--	--
	Melilotus sp.	1.0	8.59	0.48	--	--	--	--	--	--
*	Mimulus ringens	--	--	--	0.0	2.44	0.18	--	--	--
	Muhlenbergia sp.	--	--	--	5.4	1.52	0.38	--	--	--
	Onosmodium molle	0.0	6.25	0.31	--	--	--	--	--	--

	Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Wet cool-season grass & forb M Ram Den(m^2)	Mean Freq (%)	IV-%
	Oxalis stricta	4.8	28.13	1.63	--	--	--	--	--	--
	Panicum dichotomoflorum	--	--	--	0.5	1.52	0.14	--	--	--
	Penstemon digitalis	8.3	25.00	1.66	--	--	--	--	--	--
*	Penthorum sedoides	--	--	--	1.2	9.15	0.72	--	--	--
	Phalaris arundinacea	--	--	--	5.7	5.18	0.66	14.7	25.00	2.73
	Poa pratensis	104.3	41.41	7.32	7.5	4.57	0.72	--	--	--
*	Polygonum pennsylvanicum	1.0	14.84	0.79	48.2	50.91	6.16	28.0	29.17	3.98
	Polygonum persicaria	--	--	--	4.2	4.88	0.57	21.3	20.83	2.94
	Polygonum ramosissimum	--	--	--	0.1	2.74	0.20	--	--	--
	Populus deltoides	--	--	--	0.3	9.45	0.70	--	--	--
	Potentilla norvegica	11.3	14.84	1.30	0.2	1.83	0.14	--	--	--
	Ratibida pinnata	19.3	24.22	2.17	--	--	--	--	--	--
	Rudbeckia hirta	0.5	4.69	0.26	--	--	--	--	--	--
	Rumex altissimus	--	--	--	0.1	1.52	0.12	--	--	--
	Rumex crispus	--	--	--	0.1	1.52	0.12	--	--	--
*	Sagitaria graminea	--	--	--	1.6	6.71	0.57	--	--	--
*	Salix amygdaloides	--	--	--	0.0	1.22	0.09	--	--	--
*	Salix exigua	--	--	--	1.0	17.07	1.29	--	--	--
*	Salix nigra	--	--	--	0.2	1.52	0.12	--	--	--
*	Salix rigida	33.0	11.72	2.25	0.0	3.66	0.27	--	--	--
	Schizachyrium scoparium	17.5	7.03	1.23	--	--	--	--	--	--
	Setaria faberii	7.3	28.91	1.80	--	--	--	1.3	20.83	1.48
	Setaria glauca	23.5	22.66	2.31	--	--	--	1.3	20.83	1.48
	Solidago canadensis	3.5	21.88	1.26	0.9	3.05	0.27	6.7	45.83	3.53
*	Solidago gigantea	75.0	21.09	4.84	--	--	--	21.3	29.17	3.49
	Solidago rigida	0.0	3.13	0.15	--	--	--	--	--	--
	Sorghastrum nutans	54.0	32.81	4.36	--	--	--	--	--	--
	Taraxacum officinale	1.0	14.06	0.75	0.0	1.22	0.09	2.7	20.83	1.58
	Tradescantia ohioensis	0.0	3.13	0.15	--	--	--	--	--	--
	Trifolium hybridum	8.8	13.28	1.10	0.0	1.22	0.09	0.0	16.67	1.10
	Trifolium pratense	113.8	57.03	8.58	--	--	--	--	--	--
	Trifolium repens	160.3	51.56	10.66	3.9	5.18	0.58	256.0	58.33	22.54
	Verbena stricta	--	--	--	0.0	1.22	0.09	--	--	--

Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Wet cool-season grass & forb M Ram Den(m^2)	Mean Freq (%)	IV-%
* Veronica peregrina	0.0	3.13	0.15	1.3	7.62	0.62	--	--	--
Viola sororia	1.5	12.50	0.70	0.1	1.52	0.12	--	--	--
Total Ramet Density(#/m^2)	988.8			981.3			685.3		
Total Frequency (%)	1008.6			688.1			754.2		
Shannon Diversity	3.37			2.71			2.73		
Total Richness	58			61			22		
Evenness	0.83			0.66			0.88		
Rel Impt Natives (%)	53.5			80.6			58.8		
Rel Impt Exotics (%)	46.5			19.4			41.2		
Rel Impt Wet Indicators (%)	9.1			72.1			43.1		
Rel Impt Carex (%)	0.8			3.3			7.6		
Number of 1x1 m Samples	16			41			3		
Woody Layers	ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)	
Populus deltoides	0	0		72.7	0.05		0	0	
Salix amygdaloides	0	0		67.3	2.24		0	0	
Salix exigua	1.88	0.13		205.4	6.59		0	0	
Salix nigra	0	0.25		2.9	0.83		0	0	
Salix rigida	5.63	0		45.9	0		0	0	
Vitis riparia	2.50	0		2.0	0		0	0	
Totals	10.0	0.38		396.1	9.71		0.0	0.00	
	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
	0	0	0	0	0	0	0	0	0

Table 29. Dike transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Wet-mesic cool-season grass & forb			Temporary/seasonally flooded wetland			Semi-permanently flooded wetland/aquatic		
	Species Scientific Name	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%
	Abutilon theophrastii	0.1	3.63	0.19	--	--	--	--	--	--
	Acalyphya rhomboidea	--	--	--	1.8	4.72	0.93	--	--	--
	Acalyphya virginica	1.2	10.08	0.56	0.5	3.30	0.55	--	--	--
	Agropyron repens	38.1	56.45	5.04	0.2	1.18	0.20	--	--	--
	Agrostis gigantea	0.8	2.02	0.15	1.2	3.54	0.68	--	--	--
*	Alisma sp.	--	--	--	0.2	1.18	0.20	--	--	--
	Ambrosia artemisiifolia	8.3	46.37	2.77	0.2	2.12	0.34	--	--	--
	Ambrosia trifida	1.7	17.74	0.97	0.1	1.18	0.18	--	--	--
	Andropogon gerardii	0.0	1.61	0.08	--	--	--	--	--	--
	Apocynum sibiricum	1.0	14.11	0.75	0.0	0.94	0.14	--	--	--
	Asclepias syriaca	0.4	9.27	0.48	0.3	1.42	0.25	--	--	--
*	Aster lanceolatus	22.3	44.35	3.51	6.4	9.20	2.19	--	--	--
	Aster pilosus	94.8	88.71	10.02	0.6	2.59	0.46	--	--	--
*	Bidens cernua	--	--	--	0.2	4.25	0.65	--	--	--
	Bromus inermis	48.4	36.69	4.69	--	--	--	--	--	--
*	Carex cristatella	3.2	2.02	0.29	--	--	--	--	--	--
*	Carex tribuloides	3.2	2.02	0.29	0.0	0.94	0.14	--	--	--
*	Carex vulpinoidea	--	--	--	2.6	1.18	0.52	--	--	--
*	Carex sp.	0.9	6.05	0.35	24.2	12.74	5.03	--	--	--
	Cerastium nutans	0.4	2.42	0.14	--	--	--	--	--	--
	Cirsium altissimum	2.1	26.21	1.41	0.0	0.94	0.14	--	--	--
	Cirsium arvense	17.7	63.31	4.16	0.1	1.18	0.18	--	--	--
	Cirsium discolor	0.1	2.02	0.11	--	--	--	--	--	--
	Conyza canadensis	0.5	2.02	0.13	--	--	--	--	--	--
	Cornus racemosa	0.4	5.24	0.28	--	--	--	--	--	--
	Daucus carota	92.0	91.13	9.97	1.3	6.84	1.17	--	--	--
*	Epilobium coloratum	0.8	4.03	0.24	--	--	--	--	--	--
	Erigernon annuus	2.8	28.63	1.57	--	--	--	--	--	--

	Species Scientific Name	Wet-mesic cool-season grass & forb M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%
	Eriochloa villosa	0.1	2.02	0.11	--	--	--	--	--	--
*	Geum laciniatum	4.6	25.81	1.54	1.2	4.48	0.82	--	--	--
*	Helenium autumnale	0.8	3.63	0.22	0.3	1.42	0.25	--	--	--
	Juncus dudleyii	11.7	9.68	1.18	5.3	4.25	1.31	--	--	--
	Juncus tenuis	0.8	4.03	0.24	--	--	--	--	--	--
	Juniperus virginiana	--	--	--	0.0	0.94	0.14	--	--	--
*	Leersia oryzoides	3.2	5.24	0.45	27.5	21.46	6.76	--	--	--
	Lepidium campestre	0.0	1.61	0.08	--	--	--	--	--	--
*	Lycopus americanus	2.1	12.10	0.72	0.2	2.59	0.41	--	--	--
	Medicago lupulina	1.3	6.05	0.37	--	--	--	--	--	--
	Melilotus alba	0.6	4.03	0.24	3.5	1.89	0.74	--	--	--
	Monarda fistulosa	0.0	1.61	0.08	--	--	--	--	--	--
	Oenothera biennis	0.1	2.02	0.11	--	--	--	--	--	--
	Oxalis stricta	0.8	12.10	0.64	0.1	1.18	0.18	--	--	--
	Panicum dichotomoflorum	1.3	6.05	0.37	--	--	--	--	--	--
	Parthenocissus quinquefolia	0.0	1.61	0.08	--	--	--	--	--	--
	Pastinaca sativa	0.6	2.82	0.18	--	--	--	--	--	--
	Phlaris arundinacea	0.4	2.02	0.12	249.1	83.25	44.85	--	--	--
	Phleum pratense	7.5	18.15	1.34	2.1	3.07	0.73	--	--	--
	Physalis heterophylla	0.0	1.61	0.08	--	--	--	--	--	--
	Plantago major	0.0	1.61	0.08	--	--	--	--	--	--
	Poa comressa	--	--	--	0.0	0.94	0.14	--	--	--
	Poa pratensis	315.4	56.45	21.60	0.8	1.18	0.27	--	--	--
*	Polygonum amphibium	7.0	27.02	1.74	9.5	40.57	7.19	--	--	--
*	Polygonum hydropiper	--	--	--	0.2	1.18	0.20	--	--	--
*	Polygonum punctatum	--	--	--	0.0	0.94	0.14	--	--	--
*	Polygonum sagitatum	--	--	--	5.4	3.07	1.16	--	--	--
*	Polygonum sp.	--	--	--	0.8	1.89	0.38	--	--	--
	Populus deltoides	0.0	1.61	0.08	--	--	--	--	--	--
	Potentilla norvegica	0.0	3.23	0.16	0.2	3.54	0.55	--	--	--
	Rubus occidentalis	0.0	1.61	0.08	--	--	--	--	--	--
	Rumex crispus	0.0	1.61	0.08	0.0	0.94	0.14	--	--	--
*	Sagittaria (latifolia)	--	--	--	0.7	4.48	0.75	--	--	--
	Schizachyrium scoparium	0.1	2.02	0.11	--	--	--	--	--	--

	Species Scientific Name	Wet-mesic cool-season grass & forb M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%
*	Scirpus atrovirens	1.2	3.63	0.25	0.9	2.59	0.50	--	--	--
*	Scirpus fluviatilis	--	--	--	3.1	8.25	1.62	--	--	--
*	Scirpus validus	--	--	--	0.4	1.18	0.22	--	--	--
	Senecio pauperculus	0.9	2.02	0.15	--	--	--	--	--	--
	Setaria faberii	7.2	25.40	1.68	--	--	--	--	--	--
	Setaria glauca	0.4	7.66	0.40	--	--	--	--	--	--
	Solanum americanum	0.1	2.02	0.11	--	--	--	--	--	--
*	Solidago gigantea	23.0	42.74	3.47	4.7	10.85	2.20	--	--	--
	Sorghastrum nutans	9.3	4.84	0.79	--	--	--	--	--	--
	Taraxacum officinale	67.2	89.52	8.41	3.3	5.42	1.23	--	--	--
	Trifolium hybridum	9.7	24.60	1.79	1.0	1.89	0.41	--	--	--
	Trifolium pratense	0.6	4.03	0.24	--	--	--	--	--	--
	Trifolium repens	18.1	20.16	2.07	2.1	2.83	0.69	--	--	--
*	Typha sp.	--	--	--	0.1	1.18	0.18	--	--	--
*	Verbena hastata	0.1	8.47	0.42	0.0	0.94	0.14	--	--	--
	Xanthium strumarium	--	--	--	0.0	0.94	0.14	--	--	--
		Mean Cover %			Mean Cover %			Mean Cover %		
*	Lemna minor	--	--	--	18.9	62.26	11.61	--	--	--
	Total Ramet Density(#/m^2)	837			362			0		
	Total Frequency (%)	1019			341			0		
	Shannon Diversity	3.03			2.31			0		
	Total Richness	63			49			0		
	Evenness	0.73			0.59			0		
	Rel Impt Natives (%)	37.0			48.4			0		
	Rel Impt Exotics (%)	63.0			51.6			0		
	Rel Impt Wet Indicators (%)	13.5			43.3			0		
	Rel Impt Carex (%)	0.9			5.7			0		
	Number of 1x1 m Samples	31			53			6		
	Woody Layers	ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)	
	Cornus racemosus	59.7	0		0	0		0	0	

Species Scientific Name	Wet-mesic cool-season grass & forb M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%
Morus alba	0.3	0		0	0		0	0	
Quercus bicolor	1.0	0		0	0		0	0	
Quercus borealis	1.0	0		0	0		0	0	
Rubus occidentalis	4.5	0		0	0		0	0	
Salix exigua	0	0		1.1	4.9		0	0	
Totals	66.5	0.0		1.1	4.9		0.0	0.0	
	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
	0	0	0	0	0	0	0	0	0

Table 30. Jarvis transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Early successional old-field			Temporary/seasonally flooded wetland			Cool-season grassland		
	Species Scientific Name	M Ram Den(m2)	Mean Freq (%)	IV-%	M Ram Den(m2)	Mean Freq (%)	IV-%	M Ram Den(m2)	Mean Freq (%)	IV-%
	Abutilon theophrastii	0.3	3.63	0.41	--	--	--	--	--	--
*	Acer saccharinum	--	--	--	0.1	5.08	0.50	--	--	--
	Agropyron repens	0.2	0.73	0.11	--	--	--	--	--	--
	Agrostis gigantea	4.5	2.76	0.88	269.6	76.17	38.59	670.0	100.0	57.87
	Amaranthus hybridus	4.0	28.78	3.48	0.6	3.91	0.45	--	--	--
	Ambrosia trifida	0.0	1.31	0.14	0.0	1.56	0.15	--	--	--
	Apocynum cannabinum	1.0	14.39	1.60	--	--	--	--	--	--
	Apocynum sibiricum	0.1	1.45	0.16	--	--	--	--	--	--
*	Aster lanceolatus	0.0	0.58	0.06	1.0	9.38	1.01	0.0	25.0	2.47
	Aster ontarionsis	0.0	1.31	0.14	--	--	--	--	--	--
*	Bidens frondosa	0.0	0.58	0.06	--	--	--	--	--	--
*	Boltonia asteroides	1.9	3.78	0.63	33.9	70.31	10.67	6.0	68.8	7.22
*	Carex cristatella	0.5	0.73	0.14	--	--	--	--	--	--
*	Carex sp.	64.9	70.78	15.88	7.5	19.53	2.74	4.0	31.3	3.37
	Chenopodium album	1.2	9.16	1.10	0.1	1.95	0.20	--	--	--
	Conyza canadensis	5.9	18.75	2.71	3.4	43.75	4.59	--	--	--
	Cynachum laeve	3.6	46.80	5.28	9.9	66.80	7.55	6.0	68.8	7.22
*	Cyperus esculentus	0.0	1.16	0.12	--	--	--	--	--	--
	Elymus canadensis	0.5	0.73	0.14	--	--	--	--	--	--
	Equisetum arvense	--	--	--	0.0	1.56	0.15	--	--	--
	Erichtites hieracifolia	0.4	9.45	1.02	0.0	1.56	0.15	--	--	--
	Erigeron annuus	0.0	0.58	0.06	0.3	5.47	0.55	--	--	--
	Eupatorium serotinum	11.4	41.42	5.76	3.3	20.70	2.36	2.0	56.3	5.70
*	Helenium autumnale	0.0	0.58	0.06	0.4	5.47	0.57	2.0	56.3	5.70
	Lactuca seriola	0.2	4.65	0.50	0.1	5.08	0.50	--	--	--
*	Leersia oryzoides	0.0	0.73	0.08	--	--	--	--	--	--
	Leonurus marrubiastrum	0.3	0.73	0.11	--	--	--	--	--	--

Species Scientific Name	Early successional old-field M Ram Den(m2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m2)	Mean Freq (%)	IV-%	Cool-season grassland M Ram Den(m2)	Mean Freq (%)	IV-%
* Lindernia dubia	0.1	0.73	0.09	--	--	--	--	--	--
Morus alba	0.1	0.73	0.09	0.6	14.06	1.42	--	--	--
Panicum virgatum	3.4	9.16	1.40	2.3	7.81	1.01	--	--	--
Phalaris arundinacea	3.8	3.63	0.87	13.0	17.58	3.19	--	--	--
Physalis longifolia	0.0	1.16	0.12	--	--	--	--	--	--
Plantago aristata	0.0	0.58	0.06	--	--	--	--	--	--
* Polygonum amphibium	--	--	--	0.0	1.56	0.15	--	--	--
* Polygonum lapathifolium	0.2	1.74	0.21	--	--	--	--	--	--
* Polygonum pennsylvanicum	43.3	81.40	14.09	0.8	5.86	0.65	--	--	--
Polygonum persicaria	0.2	0.73	0.10	--	--	--	--	--	--
* Polygonum punctatum	8.3	2.91	1.40	--	--	--	--	--	--
Populus deltoides	0.1	0.73	0.09	1.6	28.52	2.92	2.0	31.3	3.23
Potentilla norvegica	0.2	1.89	0.22	0.1	5.08	0.50	--	--	--
* Potentilla rivalis	0.0	0.58	0.06	--	--	--	--	--	--
Rorippa austrica	2.8	10.61	1.46	--	--	--	--	--	--
* Rorippa palustris	0.0	1.16	0.12	--	--	--	--	--	--
Rumex crispus	0.2	0.87	0.11	--	--	--	--	--	--
* Salix exigua	--	--	--	0.1	3.52	0.35	--	--	--
Setaria faberi	200.0	67.30	33.46	0.6	2.73	0.33	--	--	--
Solanum americanum	0.5	11.77	1.27	--	--	--	--	--	--
Solanum carolinense	0.2	5.38	0.58	--	--	--	--	--	--
* Solidago gigantea	--	--	--	0.0	1.56	0.15	--	--	--
Sonchus asper	0.1	2.62	0.28	--	--	--	--	--	--
* Stachys tenuifolia	0.0	0.58	0.06	--	--	--	--	--	--
Teucrium canadense	0.0	0.58	0.06	--	--	--	--	--	--
Thlaspi arvense	0.0	0.58	0.06	0.6	12.89	1.31	6.0	68.8	7.22
Urtrica dioica	0.5	1.60	0.23	--	--	--	--	--	--
* Vernonia fasciculata	0.0	1.89	0.20	0.0	14.06	1.35	--	--	--
* Veronica peregrina	11.5	11.34	2.69	81.0	67.97	15.92	--	--	--
Total Ramet Density(#/m^2)	376.5			430.9			698.0		
Total Frequency (%)	487.8			521.5			506.3		
Shannon Diversity	2.39			2.20			1.53		

Species Scientific Name	Early successional old-field M Ram Den(m2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m2)	Mean Freq (%)	IV-%	Cool-season grassland M Ram Den(m2)	Mean Freq (%)	IV-%
Total Richness	51			29			9		
Evenness	0.61			0.65			0.70		
Rel Impt Natives (%)	57.0			54.0			34.9		
Rel Impt Exotics (%)	43.0			46.0			65.1		
Rel Impt Wet Indicators (%)	35.9			34.1			18.8		
Rel Impt Carex (%)	16.0			2.7			3.4		
Number of 1x1 m Samples	86			32			2		
Woody Layers	ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)	
Acer saccharinum	0.12	0.02		0	0		0	0	
Morus alba	2.09	0.12		0	0		0	0	
Populus deltoides	0.35	0.02		0	0		0	0	
Vitis riparia	2.21	0.09		0	0		0	0	
Totals	4.8	0.26		0.0	0.00		0.0	0.00	
	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
	0	0	0	0	0	0	0	0	0

Table 31. South Point transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Cool-season grassland			Temporary/seasonally flooded wetland			Semi-permanently flooded wetland/aquatic			Tallgrass prairie reconstruction		
	Species Scientific Name	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%
	Acalypha virginica	1.1	7.95	1.17	2.5	5.09	0.67	--	--	--	1.0	5.26	0.55
*	Acer saccharinum	--	--	--	0.1	2.31	0.22	--	--	--	0.3	1.32	0.14
	Agropyron repens	--	--	--	--	--	--	--	--	--	0.1	2.19	0.20
	Agrostis hyemalis	0.0	6.06	0.83	0.0	5.56	0.49	--	--	--	1.1	3.29	0.40
*	Alisma sp.	--	--	--	--	--	--	0.3	1.06	0.67	--	--	--
	Ambrosia artemisiifolia	3.5	17.05	2.61	8.7	15.74	2.15	--	--	--	8.2	25.88	3.09
	Andropogon gerardii	--	--	--	8.3	15.74	2.11	--	--	--	3.6	9.65	1.21
*	Asclepias incarnata	--	--	--	0.0	3.70	0.33	--	--	--	0.0	0.88	0.07
	Asclepias syriaca	0.2	6.82	0.95	--	--	--	--	--	--	--	--	--
*	Aster novae-angliae	0.0	3.03	0.42	0.6	10.65	1.00	--	--	--	1.9	24.56	2.26
	Aster pilosus	1.8	8.33	1.28	53.9	19.91	6.43	--	--	--	10.2	5.92	1.66
	Aster sp.	--	--	--	0.0	1.85	0.16	--	--	--	--	--	--
*	Bidens cernua	--	--	--	21.3	28.24	4.35	8.0	1.59	7.80	--	--	--
	Bouteloua curtipendula	--	--	--	--	--	--	--	--	--	18.2	35.75	5.04
	Bromis inermis	562.3	99.62	56.78	1.8	7.41	0.81	0.2	1.06	0.59	8.6	15.35	2.26
	Bromus commutatus	--	--	--	--	--	--	--	--	--	0.5	3.95	0.38
	Carduus nutans	--	--	--	--	--	--	--	--	--	0.0	0.88	0.07
*	Carex scoparia	--	--	--	0.0	1.85	0.16	--	--	--	--	--	--
*	Carex tribuloides	--	--	--	0.3	2.31	0.23	--	--	--	0.8	2.41	0.30
*	Carex sp.	3.0	3.79	0.75	13.2	9.26	1.96	0.4	1.06	0.82	0.3	1.10	0.12
	Chamaecrista fasciculata	--	--	--	--	--	--	--	--	--	1.3	3.07	0.40
	Chenopodium album	0.1	1.89	0.27	0.1	2.31	0.22	--	--	--	4.9	25.22	2.66
	Cirsium arvense	--	--	--	0.3	2.31	0.23	--	--	--	--	--	--
	Cirsium discolor	0.4	11.36	1.59	0.0	1.85	0.16	--	--	--	--	--	--
	Conyza canadensis	14.8	15.53	3.26	3.4	12.96	1.45	--	--	--	32.6	55.26	8.31
	Coreopsis palmata	--	--	--	--	--	--	--	--	--	0.1	1.10	0.10
	Cornus drummondii	0.4	2.27	0.34	--	--	--	--	--	--	--	--	--
	Dactylis glomerata	0.6	1.89	0.31	--	--	--	--	--	--	--	--	--

	Species Scientific Name	Cool-season grassland M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%
	Dalea purpurea	--	--	--	--	--	--	--	--	--	0.4	8.77	0.78
	Dichanthelium oligosanthes	1.8	1.89	0.40	--	--	--	--	--	--	--	--	--
	Echinacea pallida	--	--	--	0.1	2.31	0.22	--	--	--	--	--	--
*	Echinochloa muricata	--	--	--	11.0	5.09	1.40	--	--	--	0.1	1.10	0.10
*	Eleocharis macrostachya	--	--	--	124.4	6.48	11.34	--	--	--	--	--	--
*	Eleocharis obtusa	--	--	--	115.6	22.69	12.01	--	--	--	--	--	--
	Elymus canadensis	--	--	--	0.6	6.48	0.63	--	--	--	7.0	20.18	2.48
	Elymus virginicus	1.1	4.17	0.65	2.2	11.11	1.18	--	--	--	5.6	28.73	3.03
	Erectites hieracifolia	0.1	1.89	0.27	--	--	--	--	--	--	--	--	--
	Erigeron annuus	--	--	--	0.9	4.63	0.49	--	--	--	--	--	--
	Euphorbia dentata	0.0	1.52	0.21	--	--	--	--	--	--	--	--	--
	Euphorbia maculata	--	--	--	--	--	--	--	--	--	0.5	3.07	0.31
*	Gentianna andrewsii	--	--	--	0.0	1.85	0.16	--	--	--	--	--	--
*	Glyceria grandis	--	--	--	38.8	35.19	6.48	0.4	1.06	0.82	1.1	1.10	0.21
	Gnaphalium obtusifolium	0.4	3.79	0.55	--	--	--	--	--	--	0.0	0.88	0.07
*	Helenium autumnale	--	--	--	0.1	2.31	0.22	--	--	--	0.0	0.88	0.07
	Juncus dudleyi	4.8	2.27	0.68	--	--	--	0.0	0.79	0.33	--	--	--
*	Juncus nodosus	--	--	--	0.4	2.31	0.24	--	--	--	--	--	--
	Juncus tenuis	1.2	1.89	0.35	75.6	27.78	9.00	--	--	--	4.6	5.04	0.94
	Lactuca serriola	0.0	1.52	0.21	0.0	1.85	0.16	--	--	--	0.2	3.29	0.30
*	Leersia oryzoides	0.0	1.52	0.21	4.1	9.26	1.18	--	--	--	0.7	1.10	0.17
	Lesepedza capitata	--	--	--	--	--	--	--	--	--	0.3	6.80	0.60
	Liatris aspera	--	--	--	--	--	--	--	--	--	0.4	7.46	0.67
*	Lobelia siphilitica	--	--	--	0.4	6.94	0.65	--	--	--	0.1	1.10	0.10
	Lolium perenne	--	--	--	5.2	5.56	0.94	--	--	--	143.7	42.54	19.87
*	Lythrum alatum	--	--	--	0.0	1.85	0.16	--	--	--	--	--	--
	Medicago sativa	--	--	--	0.0	1.85	0.16	--	--	--	117.8	39.25	16.65
	Melilotus sp.	0.0	1.52	0.21	--	--	--	--	--	--	0.0	2.63	0.22
	Oenothera biennis	0.0	3.03	0.42	--	--	--	--	--	--	--	--	--
	Oxalis stricta	0.5	13.64	1.91	0.1	2.31	0.22	--	--	--	--	--	--
	Panicum dichotomoflorum	3.4	4.92	0.94	11.7	11.11	2.00	0.4	1.06	0.82	2.2	4.82	0.65
	Paspalum setaceum	--	--	--	--	--	--	--	--	--	0.3	4.39	0.40
	Pastinace sativa	--	--	--	--	--	--	--	--	--	0.2	2.19	0.21

	Species Scientific Name	Cool-season grassland M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%
	Phalaris arundinacea	8.5	4.55	1.27	0.9	4.17	0.45	8.0	3.18	8.46	--	--	--
	Phleum pratense	--	--	--	0.0	1.85	0.16	--	--	--	--	--	--
	Phlox pilosa	--	--	--	--	--	--	--	--	--	0.1	1.10	0.10
	Physalis heterophylla	2.4	17.42	2.57	--	--	--	--	--	--	--	--	--
	Physalis longifolia	0.0	1.52	0.21	--	--	--	--	--	--	--	--	--
	Physostegia virginiana	--	--	--	0.0	1.85	0.16	--	--	--	0.0	1.75	0.15
	Poa pratensis	25.3	14.39	3.92	0.7	4.63	0.47	--	--	--	0.7	1.32	0.19
*	Polygonum amphibium	--	--	--	0.1	6.02	0.55	0.4	2.12	1.26	--	--	--
*	Polygonum lapathifolium	--	--	--	0.6	5.09	0.50	--	--	--	--	--	--
*	Polygonum pennsylvanicum	0.2	3.41	0.49	--	--	--	--	--	--	0.1	2.19	0.20
	Populus deltoides	--	--	--	0.6	7.41	0.71	--	--	--	0.1	3.07	0.27
	Potentilla norvegica	1.9	7.95	1.24	0.0	1.85	0.16	--	--	--	0.0	0.88	0.07
*	Pycnanthemum virginianum	--	--	--	0.3	4.63	0.44	--	--	--	--	--	--
	Ratibida pinnata	0.1	4.92	0.68	0.1	2.31	0.22	--	--	--	27.3	52.19	7.45
*	Rorippa palustris	--	--	--	1.5	13.43	1.32	--	--	--	--	--	--
	Rudbeckia hirta	0.0	3.03	0.42	1.0	14.81	1.40	--	--	--	10.7	38.60	4.43
*	Sagittaria latifolia	--	--	--	8.4	17.59	2.29	--	--	--	--	--	--
*	Salix amygdaloides	--	--	--	1.9	11.57	1.19	0.0	0.79	0.33	0.5	5.92	0.55
*	Salix exigua	--	--	--	0.1	2.31	0.22	--	--	--	--	--	--
	Schizachyrium scoparium	0.5	3.79	0.56	0.1	2.31	0.22	--	--	--	6.7	26.75	3.00
*	Scirpus atrovirens	0.2	3.41	0.49	13.2	26.39	3.48	0.9	2.12	1.64	0.0	0.88	0.07
*	Scirpus validus	--	--	--	1.5	2.31	0.33	--	--	--	1.2	1.75	0.28
	Setaria faberi	--	--	--	--	--	--	--	--	--	2.8	3.73	0.63
	Setaria glauca	--	--	--	0.0	1.85	0.16	--	--	--	0.1	1.10	0.11
	Setaria viridis	--	--	--	--	--	--	--	--	--	2.2	3.95	0.58
	Solanum carolinense	1.5	20.08	2.86	0.1	2.31	0.22	--	--	--	0.6	6.80	0.63
	Solidago canadensis	--	--	--	0.1	2.31	0.22	--	--	--	0.1	1.10	0.10
	Sonchus asper	6.7	15.53	2.64	--	--	--	0.2	1.06	0.59	1.2	1.75	0.28
	Sorghastrum nutans	--	--	--	0.1	2.31	0.22	--	--	--	--	--	--
*	Spartina pectinata	--	--	--	3.4	11.11	1.28	--	--	--	0.0	0.88	0.07
	Sporobolus asper	--	--	--	--	--	--	--	--	--	0.0	0.88	0.07
	Strophostyles helvola	0.0	3.03	0.42	--	--	--	--	--	--	0.0	0.88	0.07
	Taraxacum officinale	0.1	1.89	0.27	--	--	--	--	--	--	0.1	1.10	0.10

	Species Scientific Name	Cool-season grassland M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%
	Tradescantia ohioensis	--	--	--	--	--	--	--	--	--	0.0	0.88	0.07
	Thalictrum dasycarpum	--	--	--	--	--	--	--	--	--	0.1	1.10	0.10
	Trifolium pratense	0.0	3.03	0.42	0.9	4.63	0.49	--	--	--	1.2	9.87	0.96
	Trifolium repens	1.8	1.89	0.40	4.3	9.72	1.23	--	--	--	4.2	4.17	0.83
	Typha sp.	--	--	--	1.2	17.59	1.66	1.4	4.24	2.98	--	--	--
	Ulmus sp.	0.0	1.52	0.21	--	--	--	--	--	--	--	--	--
	Verbascum thapsus	0.5	12.12	1.70	--	--	--	--	--	--	--	--	--
*	Verbena hastata	0.0	3.03	0.42	--	--	--	--	--	--	--	--	--
	Verbena stricta	--	--	--	--	--	--	0.1	1.06	0.52	--	--	--
	Verbena urticifolia	0.0	1.52	0.21	--	--	--	--	--	--	--	--	--
*	Verbesina alternifolia	--	--	--	--	--	--	--	--	--	0.0	0.88	0.07
*	Veronica peregrina	--	--	--	27.1	37.96	5.71	--	--	--	0.0	0.88	0.07
	Viola sororia	0.1	1.89	0.27	0.0	1.85	0.16	--	--	--	--	--	--
	Vitis riparia	0.0	1.52	0.21	--	--	--	--	--	--	--	--	--
	Xanthium strumarium	0.5	4.17	0.61	--	--	--	--	--	--	1.5	15.13	1.44
		Mean Cover %			Mean Cover %			Mean Cover %			Mean Cover %		
*	Lemna minor	--	--	--	0.0	5.56	0.50	5.5	23.86	14.85	--	--	--
*	Potamogeton nodosus	--	--	--	0.1	10.65	0.96	0.1	2.65	1.17	--	--	--
*	Potamogeton pectinatus	--	--	--	3.0	6.94	0.87	29.8	71.61	56.36	--	--	--
	Total Ramet Density(#/m^2)	652.0			574.7			20.6			440.3		
	Total Frequency (%)	364.8			563.4			120.4			599.8		
	Shannon Diversity	2.19			3.40			1.57			3.00		
	Total Richness	49			69			17			68		
	Evenness	0.56			0.80			0.55			0.71		
	Rel Impt Natives (%)	31.0			94.5			90.4			52.1		
	Rel Impt Exotics (%)	69.0			5.5			9.6			47.9		
	Rel Impt Wet Indicators (%)	2.8			61.8			85.7			4.9		
	Rel Impt Carex (%)	0.8			2.4			0.8			0.4		
	Number of 1x1 m Samples	33			27			63			57		

Species Scientific Name	Cool-season grassland M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%
Woody Layers	ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)	
Cornus drummondii	12.1	0		0	0		0	0		0	0	
Rosa multiflora	1.2	0		0	0		0	0		0	0	
Totals	13.3	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
	0	0	0	0	0	0	0	0	0	0	0	0

Table 32. Doolittle transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Wet mesic prairie			Temporary/seasonally flooded wetland		
	Species Scientific Name	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%
	Agropyron repens	0.1	1.74	0.06	--	--	--
	Agrostis gigantea	3.0	14.58	0.59	--	--	--
	Ambrosia trifida	0.1	1.74	0.06	--	--	--
	Andropogon gerardii	84.0	41.32	3.76	--	--	--
	Apocynum cannabinum	--	--	--	1.0	7.81	1.24
	Apocynum sibiricum	4.1	27.78	1.09	1.0	9.38	1.46
*	Asclepias incarnata	1.6	14.58	0.55	1.5	15.63	2.41
	Asclepias sullivantii	0.0	1.39	0.05	--	--	--
	Asclepias syriaca	0.0	1.39	0.05	--	--	--
	Asclepias tuberosa	0.0	1.39	0.05	--	--	--
	Aster ericoides	9.9	23.26	1.09	--	--	--
	Aster laevis	0.3	3.47	0.13	--	--	--
*	Aster lanceolatus	10.4	28.47	1.29	--	--	--
	Aster pilosus	0.6	6.94	0.26	--	--	--
*	Bidens vulgata	8.9	23.26	1.06	0.5	14.06	2.05
	Cacalia plantaginea	0.3	3.47	0.13	--	--	--
*	Calamagrostis canadensis	177.1	47.57	6.55	107.5	21.88	18.79
	Calystegia sepium	0.0	1.39	0.05	--	--	--
*	Carex annectans	2.2	1.74	0.12	--	--	--
*	Carex cristatella	0.0	1.39	0.05	--	--	--
*	Carex laeviconica	0.7	1.74	0.08	70.0	68.75	19.88
	Carex meadii	0.0	1.39	0.05	--	--	--
*	Carex lanuginosa	0.9	2.08	0.10	--	--	--
*	Carex scoparia	0.3	5.90	0.22	--	--	--
*	Carex vesicaria	0.0	0.00	0.00	27.5	17.19	6.43
*	Carex sp.	277.0	97.92	11.07	45.5	31.25	11.04
*	Cicuta maculata	1.3	12.50	0.48	--	--	--
	Cirsium altissimum	0.2	7.64	0.27	--	--	--
	Cirsium arvense	1.0	5.90	0.23	--	--	--
	Comandra umbellata	5.0	14.24	0.64	--	--	--
	Dalea purpurea	5.1	21.18	0.88	--	--	--
	Dichanthelium acuminatum	4.3	17.71	0.74	--	--	--
*	Eleocharis erythropoda	407.6	78.82	14.65	--	--	--
	Elymus canadensis	0.6	3.82	0.15	--	--	--
*	Equisetum laevigatum	0.6	3.47	0.15	--	--	--
	Erigeron strigosus	0.0	1.39	0.05	--	--	--
	Eryngium yuccifolium	1.7	14.58	0.56	--	--	--
	Fragaria virginiana	3.6	33.68	1.28	--	--	--
*	Galium obtusum	65.4	72.22	4.34	--	--	--
	Helianthus grosseserratus	22.9	58.68	2.69	--	--	--

	Species Scientific Name	Wet mesic prairie M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%
	Helianthus rigidus	0.1	1.74	0.06	--	--	--
*	Iris shreveii	--	--	--	0.0	6.25	0.88
	Juncus dudleyii	0.1	3.13	0.11	--	--	--
	Liatris pycnostachya	1.1	10.07	0.38	--	--	--
	Lithospermum canescens	2.0	14.24	0.55	--	--	--
*	Lycopus americanus	5.2	23.26	0.96	--	--	--
	Lysimachia quadriflora	1.0	14.58	0.54	--	--	--
*	Lythrum alatum	0.4	2.08	0.09	--	--	--
	Monarda fistulosa	0.0	1.39	0.05	--	--	--
*	Oxypolis rigidior	0.9	10.07	0.38	--	--	--
	Panicum virgatum	9.6	16.67	0.85	--	--	--
	Parthenocissus quinquefolia	--	--	--	0.5	7.81	1.17
	Phalaris arundinacea	0.2	1.74	0.07	--	--	--
	Phlox pilosa	0.7	7.29	0.27	--	--	--
	Poa pratensis	351.7	71.53	12.20	--	--	--
*	Polygonum amphibium	2.6	10.07	0.42	80.5	93.75	24.93
*	Pycnanthemum virginianum	12.0	44.44	1.89	--	--	--
*	Ranunculus sceleratus	--	--	--	1.0	7.81	1.24
	Ratibida pinnata	5.2	26.74	1.08	--	--	--
	Rosa arkansana	1.9	13.19	0.52	--	--	--
	Rudbeckia hirta	0.1	3.13	0.11	--	--	--
*	Sagittaria brevirostra	--	--	--	2.0	23.44	3.58
*	Salix petiolaris	0.7	2.43	0.10	--	--	--
	Schizachyrium scoparium	43.6	15.63	1.75	--	--	--
	Senecio pauperculus	0.6	4.86	0.19	--	--	--
	Silphium laciniatum	1.4	18.40	0.69	--	--	--
	Sisyrinchium campestre	5.4	11.11	0.54	--	--	--
*	Sium suave	0.1	3.13	0.11	--	--	--
	Solidago canadensis	17.3	45.49	2.07	--	--	--
*	Solidago gigantea	0.4	3.82	0.15	--	--	--
	Solidago rigida	11.4	32.64	1.46	--	--	--
	Sonchus aspera	1.2	8.68	0.34	--	--	--
	Sorghastrum nutans	84.2	34.72	3.54	--	--	--
*	Spartina pectinata	13.6	26.39	1.30	--	--	--
	Sphenopholis obtusata	17.3	6.94	0.72	--	--	--
	Sporobolus asper	0.3	1.74	0.07	--	--	--
	Sporobolus heterolepis	6.1	3.47	0.29	--	--	--
*	Stachys palustris	4.8	19.10	0.80	--	--	--
	Taraxacum officinale	0.0	1.39	0.05	--	--	--
	Thalictrum dasycarpum	0.1	3.13	0.11	--	--	--
	Trifolium pratense	0.4	3.47	0.13	--	--	--
*	Vernonia fasciculata	0.6	1.74	0.08	--	--	--
	Vicia americana	0.1	4.51	0.16	--	--	--
	Viola sororia	39.9	67.01	3.45	--	--	--
	Zizia aurea	3.8	18.06	0.74	--	--	--
	Total Ramet Density(#/m^2)	1749.0			338.5		

Species Scientific Name	Wet mesic prairie M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%
Total Frequency (%)	1314.9			325.0		
Shannon Diversity	3.15			1.95		
Total Richness	79			13		
Evenness	0.72			0.76		
Rel Impt Natives (%)	86.3			100.0		
Rel Impt Exotics (%)	13.7			0.0		
Rel Impt Wet Indicators (%)	47.0			91.2		
Rel Impt Carex (%)	11.7			37.4		
Number of 1x1 m Samples	36			8		
Woody Layers	ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)	
Salix petiolaris	76.7	0		0	0	
	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
	0	0	0	0	0	0

Table 33. Engledinger transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Wet-mesic cool-season grass & forb			Sedge meadow			Wet mesic prairie		
	Species Scientific Name	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%
	Agropyron repens	0.3	2.6	0.2	--	--	--	--	--	--
	Agrostis gigantea	264.5	90.6	15.1	4.7	7.3	1.1	38.0	62.0	4.7
	Andropogon gerardii	--	--	--	--	--	--	0.0	2.1	0.1
	Apocynum sibiricum	1.0	23.4	2.2	--	--	--	1.3	31.3	1.5
*	Asclepias incarnata	--	--	--	--	--	--	0.0	2.1	0.1
	Asclepias syriaca	0.2	2.6	0.2	--	--	--	--	--	--
	Aster ericodes	--	--	--	--	--	--	4.7	33.3	1.7
*	Aster lanceolatus	3.8	20.8	2.0	0.2	2.1	0.2	0.5	5.2	0.3
*	Aster nova-angliae	1.0	4.7	0.5	0.4	2.1	0.2	1.8	12.0	0.6
*	Aster puniceus	--	--	--	--	--	--	0.7	9.9	0.5
*	Bidens (frondosa)	--	--	--	0.4	5.5	0.6	--	--	--
	Botrychium virginianum	--	--	--	--	--	--	0.0	2.1	0.1
	Bromus inermis	1.3	5.2	0.5	--	--	--	--	--	--
	Cacalia plantaginea	--	--	--	--	--	--	5.5	29.7	1.6
*	Calamagrostis canadensis	--	--	--	110.8	64.9	15.0	--	--	--
	Calystegia sepium	0.0	4.2	0.4	0.0	0.8	0.1	--	--	--
*	Carex hystericina	0.7	3.1	0.3	--	--	--	--	--	--
*	Carex (lacustris)	--	--	--	--	--	--	--	--	--
*	Carex lanuginosa	0.0	2.1	0.2	0.0	0.8	0.1	--	--	--
*	Carex suberecta	4.2	4.7	0.5	--	--	--	--	--	--
*	Carex vulpinoidea	1.0	2.6	0.3	--	--	--	--	--	--
*	Carex sp.	32.2	38.5	4.3	417.7	98.5	42.0	268.5	99.0	18.0
*	Cicuta maculata	0.0	2.1	0.2	0.1	1.5	0.2	--	--	--
	Cirsium altissimum	--	--	--	--	--	--	0.3	7.3	0.3
	Cirsium arvense	6.0	35.4	3.4	0.8	5.2	0.6	--	--	--
	Cornus sp.	0.0	2.1	0.2	--	--	--	--	--	--
*	Eleocharis	29.2	24.0	2.9	25.3	18.3	3.8	92.2	63.0	7.5
*	Epilobium coloratum	--	--	--	0.1	0.8	0.1	0.0	0.0	0.0
	Equisetum arvense	19.7	33.9	3.6	0.2	3.0	0.3	11.5	15.6	1.3
	Erechtites hieracifolia	--	--	--	0.0	1.2	0.1	--	--	--
*	Eupatorium perfoliatum	--	--	--	0.5	5.8	0.6	0.8	10.4	0.5
	Fragaria virginiana	--	--	--	--	--	--	0.2	2.6	0.1
*	Galium obtusum	--	--	--	3.3	13.3	1.6	9.3	34.9	2.0
*	Glyceria grandis	--	--	--	--	--	--	0.0	0.0	0.0
*	Glyceria striata	--	--	--	1.1	0.9	0.2	1.3	8.3	0.4
*	Helenium autumnale	--	--	--	--	--	--	2.0	16.7	0.9
	Helianthus grosesseratus	3.2	23.4	2.2	6.0	19.4	2.4	5.0	30.2	1.6
*	Iris shrevei	--	--	--	--	--	--	0.2	2.6	0.1
	Juncus dudleyii	0.0	2.1	0.2	--	--	--	44.3	32.3	3.7
*	Juncus torreyi	1.5	5.7	0.6	--	--	--	1.3	9.4	0.5
*	Leersia oryzoides	--	--	--	1.1	9.8	1.1	2.8	8.9	0.5
*	Lemna minor	--	--	--	0.0	1.2	0.1	--	--	--
*	Ludwigia alternifolia	--	--	--	--	--	--	--	--	--
*	Lycopus americanus	3.7	21.9	2.1	1.7	16.9	1.8	3.5	38.0	1.9
*	Lycopus asper	--	--	--	10.2	53.7	6.2	11.7	52.1	2.9
*	Lysimachia ciliata	--	--	--	--	--	--	32.0	49.0	3.8

Species Scientific Name	Wet-mesic cool-season grass & forb M Ram Den(m^2)	Mean Freq (%)	IV-%	Sedge meadow M Ram Den(m^2)	Mean Freq (%)	IV-%	Wet mesic prairie M Ram Den(m^2)	Mean Freq (%)	IV-%
* Lysimachia thyrsiflora	--	--	--	0.2	2.3	0.2	0.3	5.2	0.3
* Lythrum alatum	--	--	--	0.2	0.8	0.1	2.0	13.5	0.7
Muhlenbergia sp.	--	--	--	0.5	2.3	0.3	0.3	4.7	0.2
Parthenocissus quinquefolia	0.2	4.7	0.4	--	--	--	--	--	--
Pastinaca sativa	0.2	2.6	0.2	--	--	--	--	--	--
Phlaris arundinacea	2.0	11.5	1.1	--	--	--	2.0	10.4	0.6
* Poa (palustris)	--	--	--	5.1	0.9	0.5	--	--	--
Poa pratensis	1505	96.9	47.8	30.9	18.6	4.2	340.8	92.2	21.3
* Polygonum amphibium	0.8	2.6	0.3	3.2	34.0	3.6	0.5	5.2	0.3
* Pycnanthemum virginianum	4.3	9.4	1.0	8.0	30.2	3.6	32.7	81.3	5.3
Ratibida pinnata	--	--	--	--	--	--	0.0	2.1	0.1
Rosa arkansana	--	--	--	--	--	--	1.5	12.5	0.6
* Sagittaria latifolia	--	--	--	--	--	--	--	--	--
* Scirpus atrovirens	0.8	7.3	0.7	0.2	2.1	0.2	0.8	9.9	0.5
* Scutellaria galericulata	--	--	--	0.0	1.4	0.1	--	--	--
* Scutellaria lateriflora	--	--	--	--	--	--	0.5	9.9	0.5
* Senecio aureus	--	--	--	--	--	--	21.2	41.7	2.9
Solidago canadensis	41.5	58.3	6.4	8.8	35.2	4.2	47.3	84.9	6.2
* Solidago gigantea	--	--	--	0.4	1.2	0.2	1.3	11.5	0.6
* Sparganium eurycarpum	--	--	--	--	--	--	--	--	--
* Spartina pectinata	--	--	--	0.0	0.6	0.1	2.2	17.7	0.9
* Stachys palustris	0.2	2.6	0.2	0.6	7.0	0.8	0.2	4.7	0.2
Toxicodendron radicans	--	--	--	3.1	3.8	0.6	0.7	2.6	0.2
* Verbena hastata	--	--	--	0.1	2.1	0.2	0.0	2.1	0.1
Viola (sororia)	--	--	--	0.0	1.4	0.1	1.2	17.7	0.9
	Mean Cover %			Mean Cover %			Mean Cover %		
Bryophyta	--	--	--	3.5	20.1	2.3	0.3	5.2	0.3
* Ranunculus flabellaris	--	--	--	0.0	2.3	0.2	--	--	--
Total Ramet Density(#/m^2)	1,928			646			995		
Total Frequency (%)	552			499			1105		
Shannon Diversity	2.05			2.26			2.87		
Total Richness	31			40			47		
Evenness	0.60			0.61			0.75		
Rel Impt Natives (%)	31.7			94.1			73.4		
Rel Impt Exotics (%)	68.3			5.9			26.6		
Rel Impt Wet Indicators (%)	15.9			83.6			52.9		
Rel Impt Carex (%)	5.6			42.1			18.0		
Number of 1x1 m Samples	24			82			24		

Woody Layers	ShrubD (st/are)	SapD (st/are)	ShrubD (st/are)	SapD (st/are)	ShrubD (st/are)	SapD (st/are)
Elaeagnus angustifolia	0	0	0	0	0	0.17
Toxicodendron radicans	0	0	3.98	0	0	0
Ulmus rubra	0	0	0.24	0.1	0.42	0
Totals	0	0	4.2	0.1	0.4	0.2

	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
Ulmus americana	0	0	0	2.4	0.02	100	0	0	0

able 33. Engledinger transect
5x25 cm and 1x1 m plots), an
etland indicator species, ( ) ir
V) are given for species in th

Species Scientific Name	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%
Agropyron repens	--	--	--	--	--	--
Agrostis gigantea	8.6	26.8	2.7	--	--	--
Andropogon gerardii	--	--	--	--	--	--
Apocynum sibiricum	0.6	16.1	1.2	--	--	--
Asclepias incarnata	0.6	8.9	0.7	0.0	12.5	2.6
Asclepias syriaca	--	--	--	--	--	--
Aster ericodes	--	--	--	--	--	--
Aster lanceolatus	0.6	8.9	0.7	--	--	--
Aster nova-angliae	--	--	--	--	--	--
Aster puniceus	1.7	17.9	1.4	--	--	--
Bidens (frondosa)	0.6	16.1	1.2	--	--	--
Botrychium virginianum	--	--	--	--	--	--
Bromus inermis	--	--	--	--	--	--
Cacalia plantaginea	--	--	--	--	--	--
Calamagrostis canadensis	40.6	42.9	6.9	0.0	6.3	1.3
Calystegia sepium	--	--	--	--	--	--
Carex hystericina	--	--	--	--	--	--
Carex (lacustris)	26.9	28.6	4.5	17.0	26.6	12.1
Carex lanuginosa	--	--	--	--	--	--
Carex suberecta	--	--	--	--	--	--
Carex vulpinoidea	--	--	--	--	--	--
Carex sp.	341.7	82.1	37.9	22.5	20.3	12.9
Cicuta maculata	--	--	--	--	--	--
Cirsium altissimum	--	--	--	--	--	--
Cirsium arvense	--	--	--	--	--	--
Cornus sp.	--	--	--	--	--	--
Eleocharis	5.7	17.9	1.8	0.0	6.3	1.3
Epilobium coloratum	0.0	7.1	0.5	--	--	--
Equisetum arvense	4.6	32.1	2.7	--	--	--
Erechtites hieracifolia	0.0	7.1	0.5	--	--	--
Eupatorium perfoliatum	0.0	7.1	0.5	--	--	--
Fragaria virginiana	--	--	--	--	--	--
Galium obtusum	2.9	23.2	1.9	0.5	7.8	1.8
Glyceria grandis	0.0	0.0	0.0	27.5	18.8	14.5
Glyceria striata	1.7	8.9	0.8	--	--	--
Helenium autumnale	--	--	--	--	--	--
Helianthus grosesseratus	1.1	23.2	1.8	--	--	--
Iris shrevei	--	--	--	--	--	--
Juncus dudleyii	0.0	7.1	0.5	--	--	--
Juncus torreyi	0.0	7.1	0.5	--	--	--
Leersia oryzoides	8.0	30.4	2.9	0.0	6.3	1.3
Lemna minor	--	--	--	--	--	--
Ludwigia alternifolia	--	--	--	0.0	6.3	1.3
Lycopus americanus	1.7	26.8	2.1	--	--	--
Lycopus asper	14.9	58.9	5.6	0.5	7.8	1.8
Lysimachia ciliata	--	--	--	--	--	--

Species Scientific Name	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%
Lysimachia thyrsiflora	1.1	17.9	1.4	--	--	--
Lythrum alatum	--	--	--	--	--	--
Muhlenbergia sp.	--	--	--	--	--	--
Parthenocissus quinquefolia	--	--	--	--	--	--
Pastinaca sativa	--	--	--	--	--	--
Phlaris arundinacea	--	--	--	5.0	7.8	3.5
Poa (palustris)	--	--	--	--	--	--
Poa pratensis	40.0	33.9	6.2	--	--	--
Polygonum amphibium	2.9	19.6	1.7	--	--	--
Pycnanthemum virginianum	6.3	12.5	1.5	--	--	--
Ratibida pinnata	--	--	--	--	--	--
Rosa arkansana	--	--	--	--	--	--
Sagittaria latifolia	2.3	19.6	1.6	25.5	50.0	20.2
Scirpus atrovirens	--	--	--	--	--	--
Scutellaria galericulata	--	--	--	--	--	--
Scutellaria lateriflora	0.0	14.3	1.0	0.5	7.8	1.8
Senecio aureus	--	--	--	--	--	--
Solidago canadensis	12.0	37.5	3.8	--	--	--
Solidago gigantea	1.1	8.9	0.7	--	--	--
Sparganium eurycarpum	--	--	--	7.5	20.3	7.1
Spartina pectinata	2.9	8.9	0.9	--	--	--
Stachys palustris	--	--	--	--	--	--
Toxicodendron radicans	--	--	--	--	--	--
Verbena hastata	--	--	--	--	--	--
Viola (sororia)	0.6	8.9	0.7	--	--	--
	Mean Cover %			Mean Cover %		
Bryophyta	0.4	8.9	0.7	--	--	--
Ranunculus flabellaris	0.1	8.9	0.6	22.7	37.5	16.5
Total Ramet Density(#/m^2)	531			107		
Total Frequency (%)	705			242		
Shannon Diversity	2.63			2.26		
Total Richness	34			15		
Evenness	0.75			0.84		
Rel Impt Natives (%)	91.1			96.6		
Rel Impt Exotics (%)	8.9			3.4		
Rel Impt Wet Indicators (%)	79.3			96.5		
Rel Impt Carex (%)	42.5			25.0		
Number of 1x1 m Samples	7			8		

Woody Layers	ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)	
Elaeagnus angustifolia	0	0		0	0	
Toxicodendron radicans	0	0		0	0	
Ulmus rubra	0	0		0	0	
Totals	0	0		0	0	
	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
Ulmus americana	0	0	0	0	0	0

Table 34. Hay-Buhr transect data for communties in the survey zone. Mean ramet density, mean frequency (in 25x25 cm and 1x1 m plots), and importance values are given for species in the herb layer. An (*) indicates a wetland indicator species, ( ) indicates probable identification. Density (D), basal area (BA) and importance values (IV) are given for species in the woody layers. See text for more details.

		Tallgrass prairie reconstruction			Sedge meadow			Temporary/seasonally flooded wetland			Semi-permanently flooded wetland/aquatic		
	Species Scientific Name	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%	M Ram Den(m^2)	Mean Freq (%)	IV-%
	Acalypha virginica	1.1	5.68	0.35	0.3	2.16	0.14	--	--	--	--	--	--
*	Acer saccharhinum	--	--	--	0.1	2.16	0.13	--	--	--	--	--	--
	Achillea millefolium	2.2	6.82	0.48	0.3	2.16	0.14	--	--	--	--	--	--
	Agrimony striata	--	--	--	5.5	8.62	0.89	--	--	--	--	--	--
	Agropyron repens	--	--	--	0.1	2.16	0.13	--	--	--	--	--	--
	Agrostis gigantea	60.7	53.41	6.93	18.6	27.59	2.93	0	10.00	0.73	--	--	--
	Ambrosia artemisiifolia	0.4	10.23	0.52	--	--	--	--	--	--	--	--	--
	Ambrosia trifida	--	--	--	0.1	2.16	0.13	--	--	--	--	--	--
	Andropogon gerardii	92.4	34.09	8.28	--	--	--	--	--	--	--	--	--
*	Anemone canadensis	--	--	--	5.5	19.40	1.48	0.8	12.50	1.03	--	--	--
	Asclepias syriaca	--	--	--	0.0	3.45	0.19	--	--	--	--	--	--
*	Aster lanceolatus	3.3	21.59	1.27	6.6	25.00	1.87	2.4	25.00	2.18	--	--	--
	Aster ontarionsis	--	--	--	--	--	--	4.8	25.00	2.55	--	--	--
*	Aster puniceus	0.7	15.91	0.82	9.5	33.19	2.54	--	--	--	--	--	--
*	Boehmeria cylindrica	--	--	--	1.2	12.07	0.75	16.8	42.50	5.64	--	--	--
*	Calamagrostis canadensis	--	--	--	64.1	52.16	7.74	25.6	27.50	5.88	16.0	4.17	4.02
*	Campanula aparanoides	--	--	--	6.2	7.76	0.90	--	--	--	0.8	4.17	0.66
*	Carex (lacustris)	--	--	--	7.2	20.26	1.65	24.8	65.00	8.48	--	--	--
*	Carex projecta	14.5	5.68	1.32	--	--	--	--	--	--	--	--	--
*	Carex tribuloides	25.8	28.41	3.22	223.4	90.09	21.96	116.8	67.50	22.60	5.6	9.17	2.30
*	Carex crawei	--	--	--	2.1	2.59	0.30	--	--	--	--	--	--
*	Carex vulpinoidea	134.5	71.59	13.11	25.7	18.10	2.94	--	--	--	--	--	--
	Chamaecrista fasciculata	0.0	4.55	0.22	--	--	--	--	--	--	--	--	--
*	Cicuta bulbifera	--	--	--	--	--	--	0	20.00	1.45	--	--	--
*	Cicuta maculata	--	--	--	0.4	4.74	0.29	--	--	--	--	--	--
	Cirsium altissimum	1.5	36.36	1.85	0.4	6.47	0.38	--	--	--	--	--	--
	Cirsium arvense	--	--	--	1.1	14.66	0.88	--	--	--	--	--	--
	Cirsium discolor	0.4	10.23	0.52	0.3	4.31	0.26	--	--	--	--	--	--

Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Sedge meadow M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%
* Eleocharis sp.	--	--	--	0.6	2.16	0.16	--	--	--	14.7	10.00	4.41
Elymus canadensis	0.7	5.68	0.32	2.6	6.03	0.53	--	--	--	--	--	--
Equisetum arvense	1.1	17.05	0.90	1.4	23.28	1.38	--	--	--	--	--	--
Erigeron annuus	1.5	21.59	1.14	--	--	--	--	--	--	--	--	--
Euthamia graminifolia	10.2	50.00	3.13	1.7	9.91	0.67	--	--	--	--	--	--
Fragaria virginiana	33.8	69.32	5.76	1.0	5.60	0.38	--	--	--	--	--	--
* Galium obtusum	--	--	--	3.6	11.21	0.89	1.6	25.00	2.06	0.0	6.67	0.78
* Gentiana andrewsii	1.1	5.68	0.35	--	--	--	--	--	--	--	--	--
Geum canadense	--	--	--	0.3	4.31	0.26	--	--	--	--	--	--
* Geum laciniatum	0.4	10.23	0.52	2.1	21.98	1.36	--	--	--	--	--	--
Helianthus grosseserratus	19.6	59.09	4.25	12.1	32.76	2.71	--	--	--	--	--	--
Hypericum punctatum	0.4	5.68	0.30	0.0	1.72	0.09	--	--	--	--	--	--
* Impatiens	--	--	--	0.7	9.91	0.59	--	--	--	--	--	--
* Iris shreveii	--	--	--	0.4	6.03	0.36	11.2	25.00	3.51	3.7	8.33	1.80
Juncus tenuis	17.8	23.86	2.43	--	--	--	--	--	--	--	--	--
Lactuca canadensis	0.4	5.68	0.30	0.3	6.03	0.35	--	--	--	--	--	--
Lactuca serriola	1.5	12.50	0.70	--	--	--	--	--	--	--	--	--
* Leersia oryzoides	--	--	--	--	--	--	15.2	40.00	5.21	40.5	39.17	13.52
* Lycopus uniflorus	--	--	--	1.8	16.38	1.03	--	--	--	--	--	--
* Lysimachia ciliata	--	--	--	0.8	2.59	0.20	--	--	--	--	--	--
* Lysimachia terrestris	--	--	--	1.1	8.62	0.55	5.6	50.00	4.48	1.6	5.00	0.94
* Lythrum alatum	--	--	--	1.4	2.59	0.25	--	--	--	--	--	--
Muhlenbergia sp.	--	--	--	1.4	8.62	0.58	--	--	--	--	--	--
* Onoclea sensibilis	2.9	18.18	1.08	60.7	51.72	7.45	2.4	27.50	2.36	--	--	--
Panicum virgatum	5.8	23.86	1.56	0.8	2.16	0.18	--	--	--	--	--	--
Phalaris arundinacea	--	--	--	21.8	15.52	2.51	49.6	47.50	10.97	8.0	10.00	2.93
* Physostegia virginiana	--	--	--	0.0	1.72	0.09	--	--	--	--	--	--
Plantago rugelli	0.0	4.55	0.22	--	--	--	--	--	--	--	--	--
Poa pratensis	163.3	43.18	13.81	80.7	50.86	8.93	--	--	--	--	--	--
* Polygonum amphibium	--	--	--	0.0	1.72	0.09	21.6	65.00	8.00	20.0	25.00	7.33
* Polygonum punctatum	--	--	--	--	--	--	0.8	12.50	1.03	0.8	4.17	0.66
* Polygonum sagitatum	0.4	5.68	0.30	0.6	8.19	0.49	2.4	15.00	1.45	0.3	4.17	0.54
* Pontedaria cordata	--	--	--	--	--	--	--	--	--	0.3	7.50	0.93

	Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Sedge meadow M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%
	Potentilla norvegica	0.0	4.55	0.22	--	--	--	--	--	--	--	--	--
	Potentilla simplex	17.5	40.91	3.22	12.6	26.72	2.42	--	--	--	--	--	--
*	Pycnanthemum virginianum	--	--	--	3.7	9.48	0.80	--	--	--	--	--	--
*	Ranunculus abortivus	0.4	5.68	0.30	0.6	4.31	0.28	--	--	--	--	--	--
	Rosa arkansana	--	--	--	0.1	2.16	0.13	--	--	--	--	--	--
	Rudbeckia hirta	1.1	6.82	0.41	--	--	--	--	--	--	--	--	--
	Rumex crispus	--	--	--	0.3	2.16	0.14	--	--	--	--	--	--
*	Rumex verticillata	--	--	--	--	--	--	--	--	--	0.8	4.17	0.66
*	Sagittaria latifolia	--	--	--	--	--	--	7.2	42.50	4.18	5.6	32.50	5.02
*	Sagittaria rigida	--	--	--	--	--	--	--	--	--	28.3	50.83	12.17
*	Scirpus cyperinus	--	--	--	--	--	--	--	--	--	2.7	4.17	1.07
*	Scirpus validus	--	--	--	--	--	--	--	--	--	0.3	4.17	0.54
*	Scutellaria lateriflora	--	--	--	0.1	2.16	0.13	--	--	--	--	--	--
*	Senecio aureus	0.0	4.55	0.22	--	--	--	--	--	--	--	--	--
	Solidago canadensis	30.5	86.36	6.34	22.6	37.07	3.75	20	17.50	4.30	--	--	--
*	Solidago gigantea	6.2	48.86	2.79	9.7	43.10	3.09	--	--	--	--	--	--
*	Sparganium eurycarpum	--	--	--	--	--	--	--	--	--	13.6	44.17	8.14
*	Spartina pectinata	--	--	--	0.1	2.16	0.13	--	--	--	--	--	--
*	Spirea alba	0.7	11.36	0.60	--	--	--	--	--	--	--	--	--
*	Stachys palustris	0.0	4.55	0.22	3.7	20.26	1.39	--	--	--	--	--	--
*	Stellaria longifolia	16.4	44.32	3.30	23.4	62.50	5.20	--	--	--	--	--	--
	Taraxacum officinale	1.5	26.14	1.36	1.0	14.66	0.87	--	--	--	--	--	--
	Teucrium canadense	--	--	--	0.1	2.16	0.13	--	--	--	--	--	--
	Thalictrum dasycarpum	--	--	--	0.0	1.72	0.09	--	--	--	--	--	--
*	Triadenum fraseri	--	--	--	0.6	2.59	0.18	--	--	--	--	--	--
	Trifolium repens	22.9	65.91	4.81	--	--	--	--	--	--	--	--	--
*	Vernonia fasciculata	--	--	--	0.0	1.72	0.09	--	--	--	--	--	--
	Viola sororia	--	--	--	0.4	6.03	0.36	--	--	--	--	--	--
*	Zizania aquatica	--	--	--	--	--	--	--	--	--	26.7	35.83	10.07
		Mean Cover %			Mean Cover %			Mean Cover %			Mean Cover %		
	Bryophyta	0.23	5.68	0.29	0.04	2.16	0.12	0.50	25.00	1.89	--	--	--

Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Sedge meadow M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%
* Ceratophyllum demersum	--	--	--	--	--	--	--	--	--	11.1	30.00	5.94
* Elodea nuttallii	--	--	--	--	--	--	--	--	--	0.1	4.17	0.50
* Lemna minor	--	--	--	--	--	--	--	--	--	24.7	82.50	15.05
Total Ramet Density(#/m^2)	695			656			330			190		
Total Frequency (%)	1042			916			688			430		
Shannon Diversity	3.08			3.18			2.67			2.64		
Total Richness	43			65			21			23		
Evenness	0.82			0.76			0.88			0.84		
Rel Impt Natives (%)	72.4			83.6			88.3			97.1		
Rel Impt Exotics (%)	27.6			16.4			11.7			2.9		
Rel Impt Wet Indicators (%)	29.4			67.4			79.6			97.1		
Rel Impt Carex (%)	17.6			26.9			31.1			2.3		
Number of 1x1 m Samples	11			29			5			15		
Woody Layers	ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)		ShrubD (st/are)	SapD (st/are)	
Betula nigra	0	0		2.1	0		0.0	0		0	0	
Cornus racemosa	0	0		11.4	0.07		40.0	11.2		3.3	0	
Fraxinus pennsylvanica	0	0		4.3	0		11.0	0.8		0	0	
Prunus	0	0		2.1	0		0.0	0		0	0	
Rubus	1.8	0		1.7	0		0.0	0		0	0	
Spirea alba	0.9	0		2.9	0		15.0	0		0	0	
Ulmus sp.	0	0		0.0	0		1.0	0		0.3	0	
Viburnum lentago	0	0		1.0	0		0.0	0		0	0	
Vitis riparia	0	0		0.3	0		0.0	0		0	0	
Totals	2.7	0.0		25.9	0.07		67.0	12.0		3.7	0.0	
	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)	TreeD (st/ha)	TreeBA (m^2/ha)	TreeIV (%)
Acer saccharinum	0	0	0	0	0	0	40	0.45	7.8	0	0	0
Fraxinus pennsylvanica	0	0	0	6.9	0.02	7.1	760	3.86	92.2	0	0	0

Species Scientific Name	Tallgrass prairie reconstruction M Ram Den(m^2)	Mean Freq (%)	IV-%	Sedge meadow M Ram Den(m^2)	Mean Freq (%)	IV-%	Temporary/seasonally flooded wetland M Ram Den(m^2)	Mean Freq (%)	IV-%	Semi-permanently flooded wetland/aquatic M Ram Den(m^2)	Mean Freq (%)	IV-%
Salix nigra	0	0	0	48.3	1.15	92.9	0	0	0.0	0	0	0
Totals	0	0	0	55.2	1.17	100	800	4.31	100	0	0	0

Table 36. Descriptive community variables in all wetlands sampled along transects. Community codes are given below the table.

Site	Wetland Comm	Total Ramet Density(#/m^2)	Total Frequency (%)	Shannon Diversity	Total Richness	Shannon Evenness	Relative Importance Natives (%)	Relative Importance Exotics (%)	Relative Importance Wet Indicators (%)	Relative Importance Carex (%)
Boevers	TF	736	1353	3.23	72	0.76	76.8	23.2	50.9	10.3
Mink Creek	TF	1381	444	2.22	49	0.57	94.7	5.3	92.9	1.4
Mink Creek	WC3F	1893	1038	3.03	64	0.73	58.7	41.3	46.5	11.2
Palisades	TF	432	347	2.97	49	0.76	72.3	27.7	27.7	5.7
Palisades	SF	2	102	0.44	3	0.40	100.0	0.0	94.8	0.0
Pleasantville	TF	783	586	2.75	43	0.73	85.2	14.8	78.9	8.5
Pleasantville	SF	14	148	1.11	9	0.51	97.5	2.5	97.5	0.0
Brush Creek	RCG	572	263	1.69	13	0.66	6.8	93.2	1.7	0.0
Brush Creek	SF	0	133	0.57	3	0.52	100.0	0.0	91.7	0.0
Brush Creek	TF	499	434	2.53	30	0.74	73.1	26.9	63.9	1.7
Brush Creek	WC3	662	610	2.69	43	0.71	80.3	19.7	25.8	17.4
Grooms	TF	413	547	2.50	41	0.67	35.6	64.4	12.5	4.3
New Hampton	TF	2119	467	2.55	37	0.71	69.5	30.5	60.2	4.1
New Hampton	SF	8	145	1.36	6	0.76	66.5	33.5	66.5	0.0
Wickiup Hill	RCG	533	323	2.04	45	0.54	32.6	67.4	16.2	2.4
Wickiup Hill	WSW	286	445	3.04	81	0.69	53.9	46.1	42.1	2.4
Wickiup Hill	TF	538	666	2.71	40	0.73	66.1	33.9	58.9	0.0
Badger Creek	TF	981	688	2.71	61	0.66	80.6	19.4	72.1	3.3
Badger Creek	WC3	685	754	2.73	22	0.88	58.8	41.2	43.1	7.6
Dike	TF	362	341	2.31	49	0.59	48.4	51.6	43.3	5.7
Jarvis	TF	431	521	2.20	29	0.65	54.0	46.0	34.1	2.7

Site	Wetland Comm	Total Ramet Density(#/m^2)	Total Frequency (%)	Shannon Diversity	Total Richness	Shannon Evenness	Relative Importance Natives (%)	Relative Importance Exotics (%)	Relative Importance Wet Indicators (%)	Relative Importance Carex (%)
South Point	TF	575	563	3.40	69	0.80	94.5	5.5	61.8	2.4
South Point	SF	21	120	1.57	17	0.55	90.4	9.6	85.7	0.8
Doolittle	TF	339	325	1.95	13	0.76	100.0	0.0	91.2	37.4
Engledinger	SM	646	499	2.26	40.0	0.61	94.1	5.9	83.6	42.1
Engledinger	TF	531	705	2.63	34.0	0.75	91.1	8.9	79.3	42.5
Engledinger	SF	107	242	2.26	15.0	0.84	96.6	3.4	96.5	25.0
Hay-Buhr	SM	656	916	3.18	65.0	0.76	83.6	16.4	67.4	26.9
Hay-Buhr	TF	330	688	2.67	21.0	0.88	88.3	11.7	79.6	31.1
Hay-Buhr	SF	190	430	2.64	23.0	0.84	97.1	2.9	97.1	2.3

SF	Semi-permanently flooded wetland/aquatic
TF	Temporary/seasonally flooded wetland
SM	Sedge meadow
RCG	Temporary flooded reed canary grass
WC3F	Wet cool-season grass & forb
WC3	Wet cool-season grassland
WS/W	Wet shrubland-willow

Table 35. Comparison of descriptive community variables in temporary/seasonally flooded wetlands sampled along transects. Site data is given followed by the means for comparison tests. Use of (*) indicates a median.

Site	Size	Age	Total Ramet Density(#/m^2)	Total Frequency (%)	Shannon Diversity	Total Richness	Shannon Evenness	Relative Importance Natives (%)	Relative Importance Exotics (%)	Relative Importance Wet Indicators (%)	Relative Importance Carex (%)
Boevers	S	1	735.7	1353.1	3.23	72	0.76	76.8	23.2	50.9	10.3
Mink Creek	S	8	1380.7	444.2	2.22	49	0.57	94.7	5.3	92.9	1.4
Palisades	S	5	431.6	347.0	2.97	49	0.76	72.3	27.7	27.7	5.7
Pleasantville	S	3	783.1	585.6	2.75	43	0.73	85.2	14.8	78.9	8.5
Brush Creek	M	8	498.6	434.2	2.53	30	0.74	73.1	26.9	63.9	1.7
Grooms	M	1	413.2	547.3	2.50	41	0.67	35.6	64.4	12.5	4.3
New Hampton	M	3	2118.9	467.0	2.55	37	0.71	69.5	30.5	60.2	4.1
Wickiup Hill	M	6	538	666	2.71	40	0.73	66.1	33.9	58.9	0.0
Badger Creek	L	6	981.3	688.1	2.71	61	0.66	80.6	19.4	72.1	3.3
Dike	L	7	362.5	341.0	2.31	49	0.59	48.4	51.6	43.3	5.7
Jarvis	L	2	430.9	521.5	2.20	29	0.65	54.0	46.0	34.1	2.7
South Point	L	1	574.7	563.4	3.40	69	0.80	94.5	5.5	61.8	2.4
Doolittle	S	--	338.5	325.0	1.95	13	0.76	100.0	0.0	91.2	37.4
Engledinger	M	--	531.4	705.4	2.63	34	0.75	91.1	8.9	79.3	42.5
Hay-Buhr	L	--	329.6	687.5	2.67	21	0.88	88.3	11.7	79.6	31.1
Paired t-test means											
Recon	n=3		770.7	579.8	2.67	47.4	0.70	70.9	29.1	54.8	4.2
Natural	n=3		399.8	572.6	2.42	22.6	0.80	93.1	6.9	83.4	37.0
p-value			0.032	0.97	0.47	0.16	0.21	0.030		0.001	0.013
p-value with 2 sample t-test						0.014	0.055				
One-way ANOVA means or medians											
Small	n=4		* 759.3	682.4	2.79	53.2	0.71	82.24	17.76	62.60	6.48
Medium	n=4		* 518.3	528.5	2.57	37	0.71	61.08	38.92	48.87	2.51
Large	n=4		* 502.7	528.5	2.65	52	0.68	69.37	30.63	52.79	3.53
p-value			0.592	0.686	0.74	0.19	0.77	0.26		0.71	0.14
Regression on Age											
r^2	n=12		0.0028	0.21	0.22	0.072	0.20	0.025		0.20	0.19
p-value			0.86	0.14	0.118	0.39	0.14	0.619		0.15	0.15

two sample t test

Recon	n=12	* 556.4	* 534.3	2.67	47.4	0.69	70.8	35.9	54.7	* 3.7
Natural	n=3	* 338.5	* 687.5	2.42	22.6	0.79	93.1	11.7	83.3	* 37.3
p-value		0.071	0.72	0.32	0.014	0.055	0.059		0.054	0.012

Table 37. Key to codes used in the DCA ordination in Chart 3. The first letter identifies the site, the second letter identifies the community.

Sites	Communities
B – Boevers	B – Wet shrubland/willow
C – Badger Creek	C – Sedge meadow
D – Doolittle	E – Early successional old field
E – Engledinger Marsh	P – Wet mesic prairie
G – Grooms	Q – Tall grass reconstruction
H – Hay-Buhr	S – Semi-permanently flooded/aquatic
J – Jarvis	T – Temporary/seasonally flooded wetland
K – Dike	V – Wet cool-season grassland
L – Palisades	W – Wet cool-season grassland and forb
M – Mink Creek	X – Cool-season grassland
N – New Hampton	Y – Wet-mesic cool-season grassland and forb
R – Brush Creek	Z – Temporary flooded reed canary grassland
S – South Point	
T – Pleasantville	
W – Wickiup Hill	

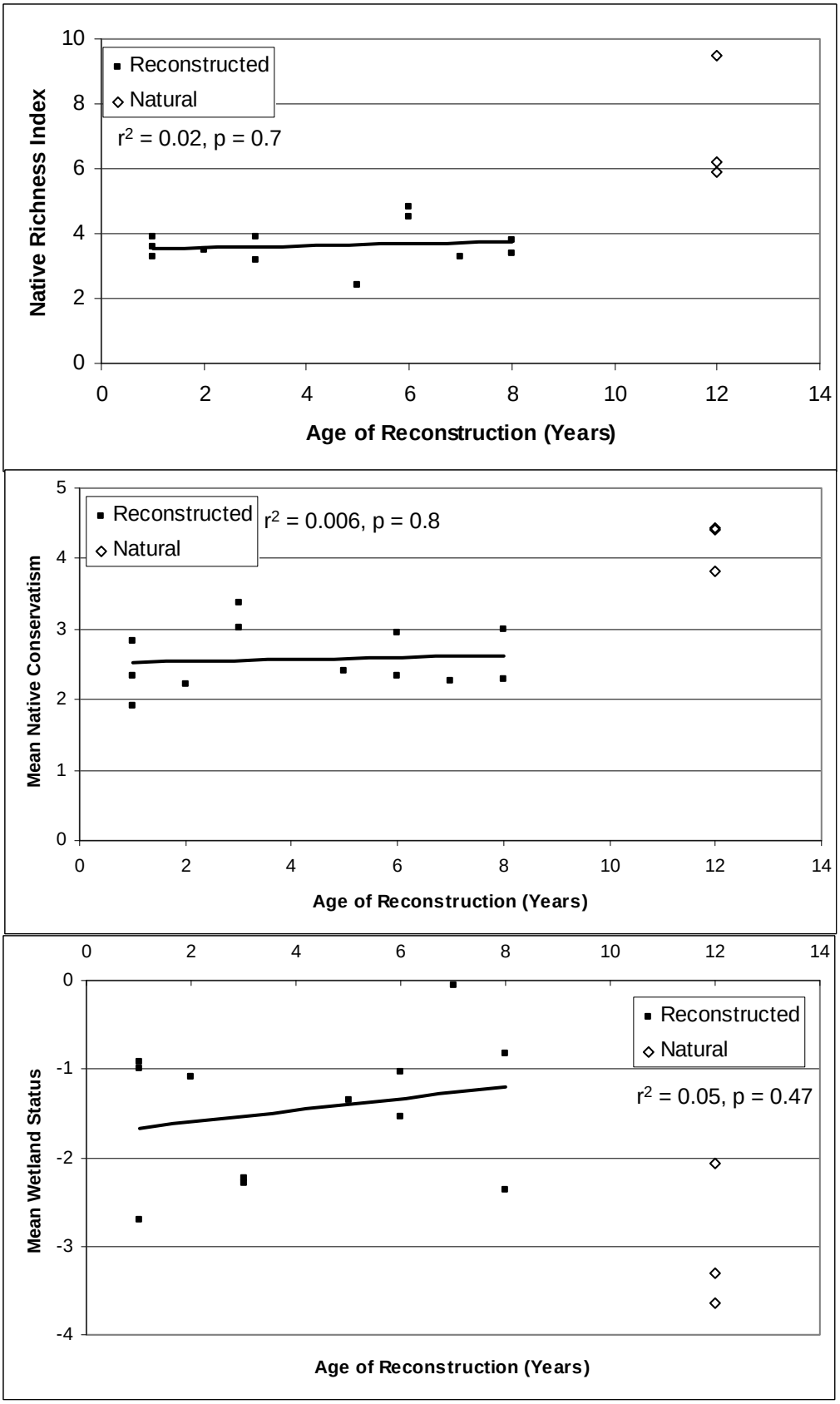

Chart 1. Linear regression of floristic quality measures on age of reconstruction (n=12). Natural sites are shown for comparison. No significant linear relationships were observed, but for all three variables a significant difference in means occurred between reconstructed and natural sites.

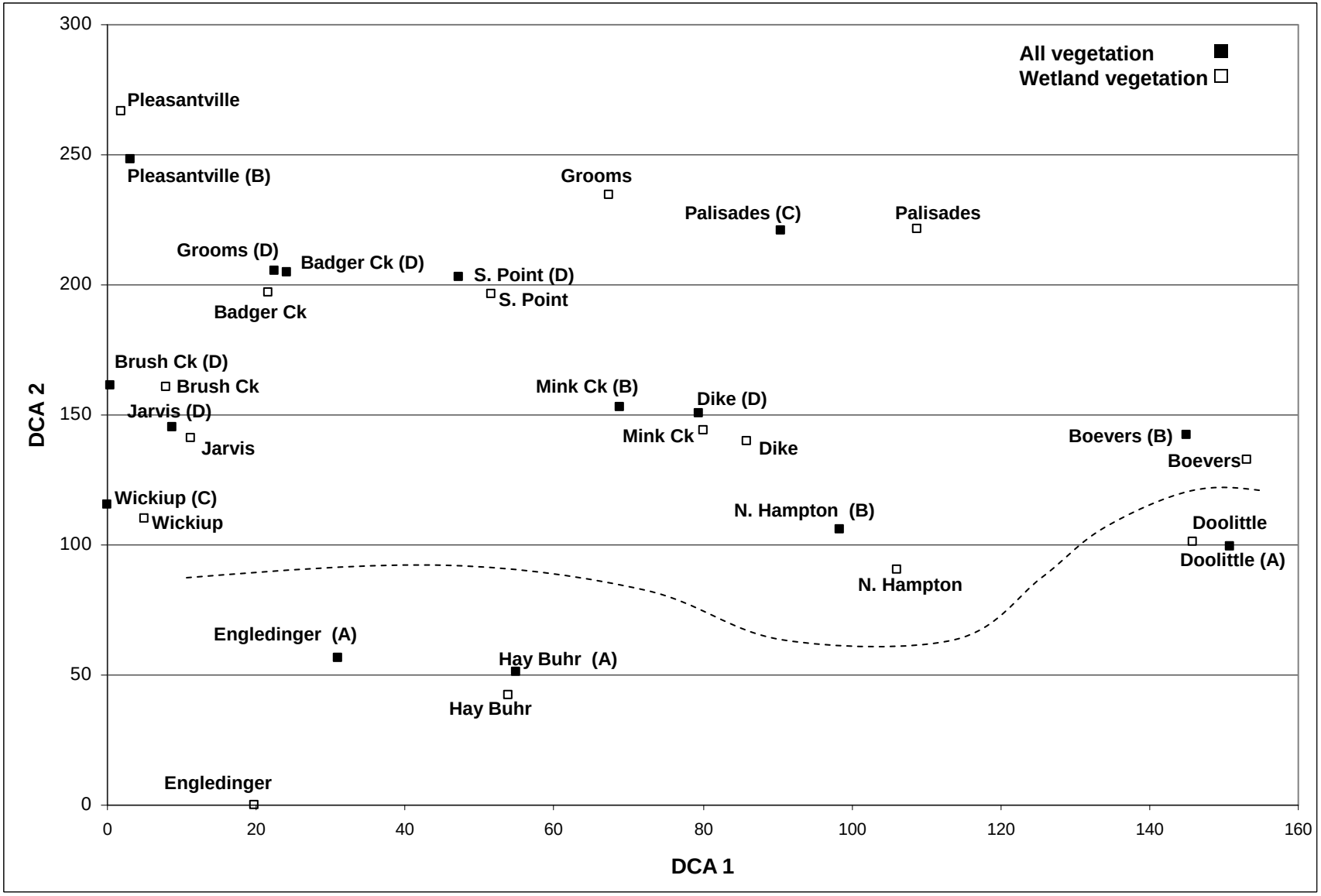

Chart 2. Detrended Correspondence Analysis (ordination) of sites with floristic data. Two samples are present for each site – one representing all vegetation and one representing only the wetland vegetation. Qualitative "grades" for the total vegetation are shown (see text).

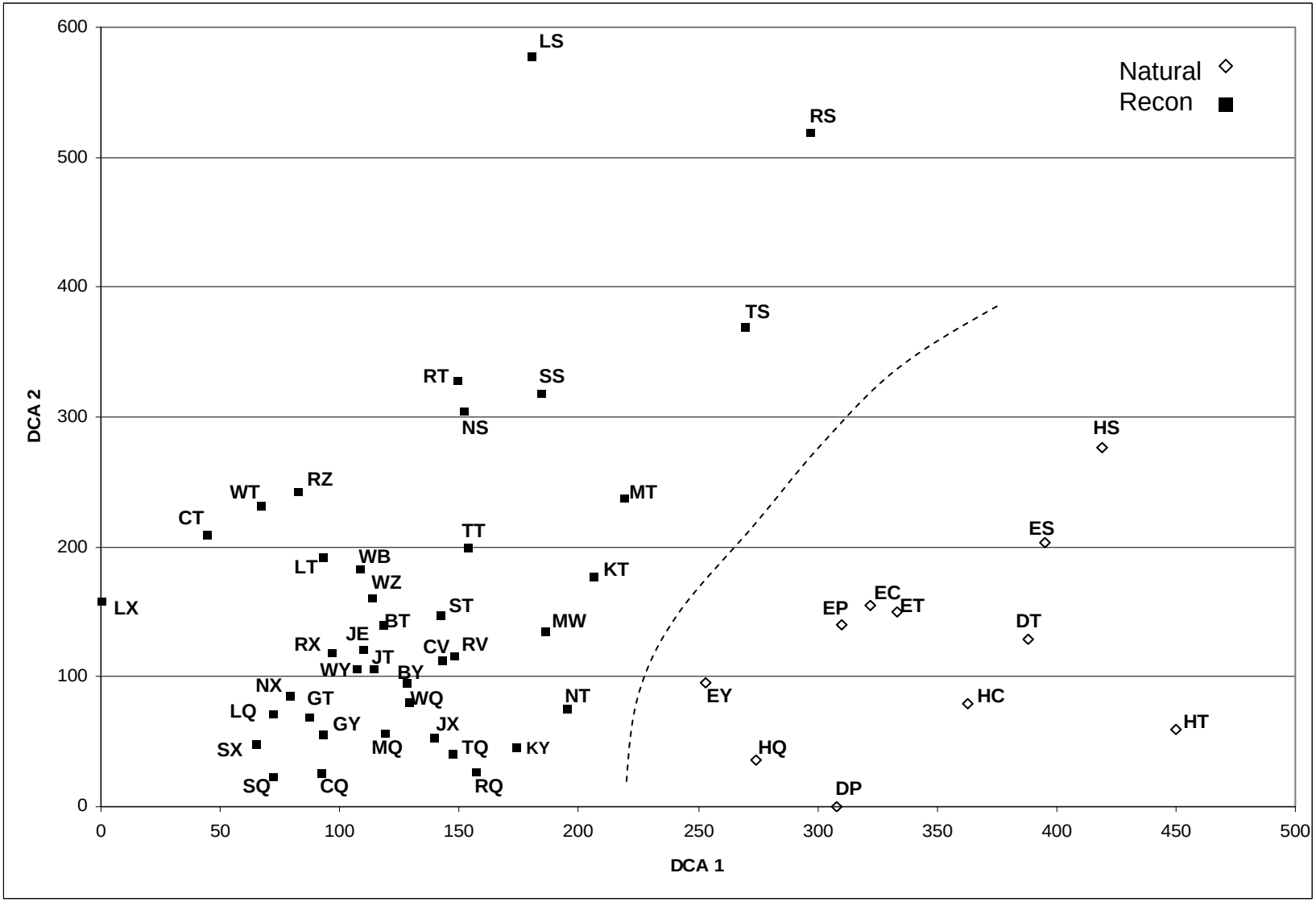

Chart 3. Detrended Correspondence Analysis (ordination) of 51 community samples from wetland transects. Each sample is coded to reflect its site and community. See Table 37 for a key to these codes and the methods for details on species abundance.

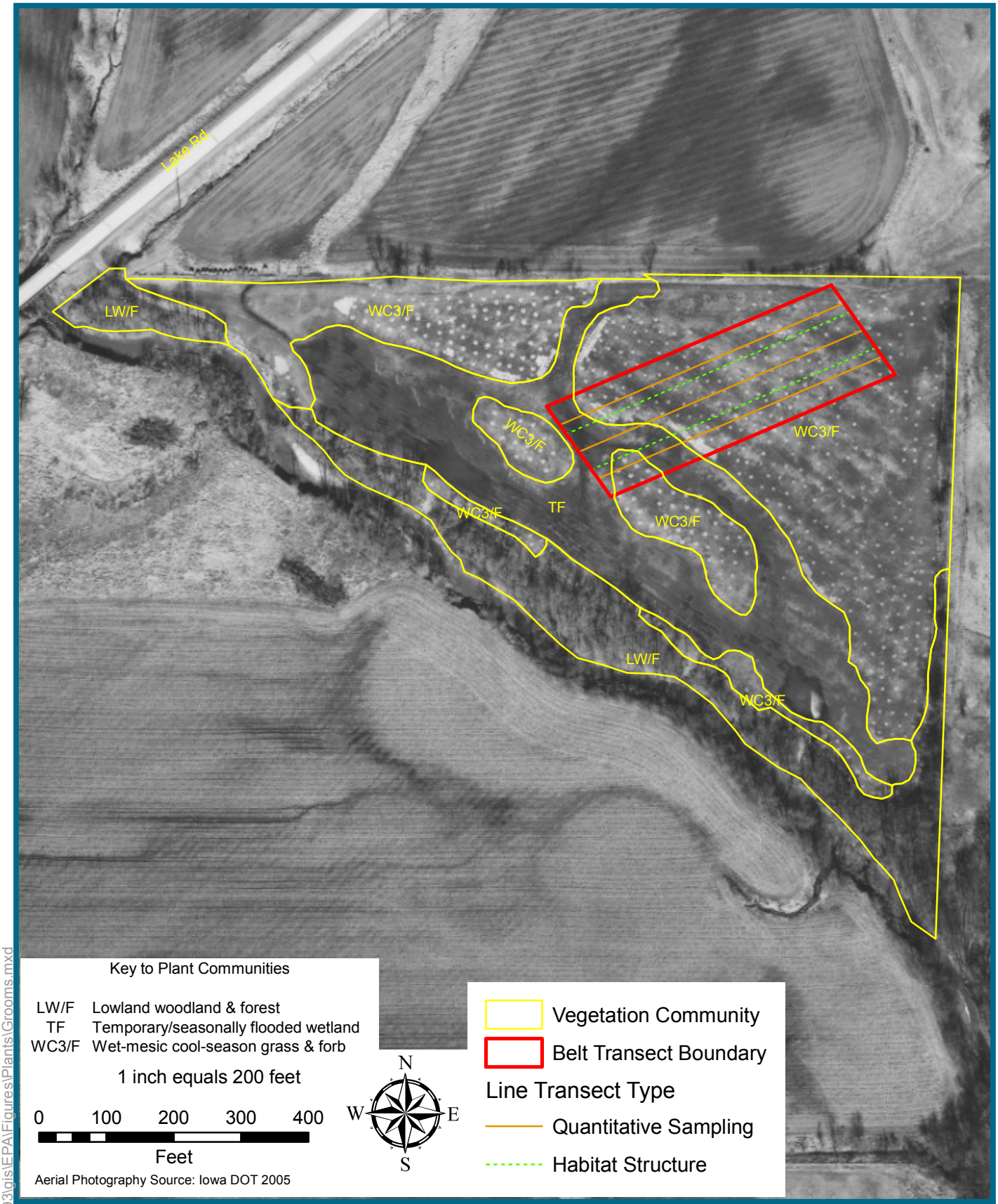

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Figure 1
Site No. 1 - Grooms

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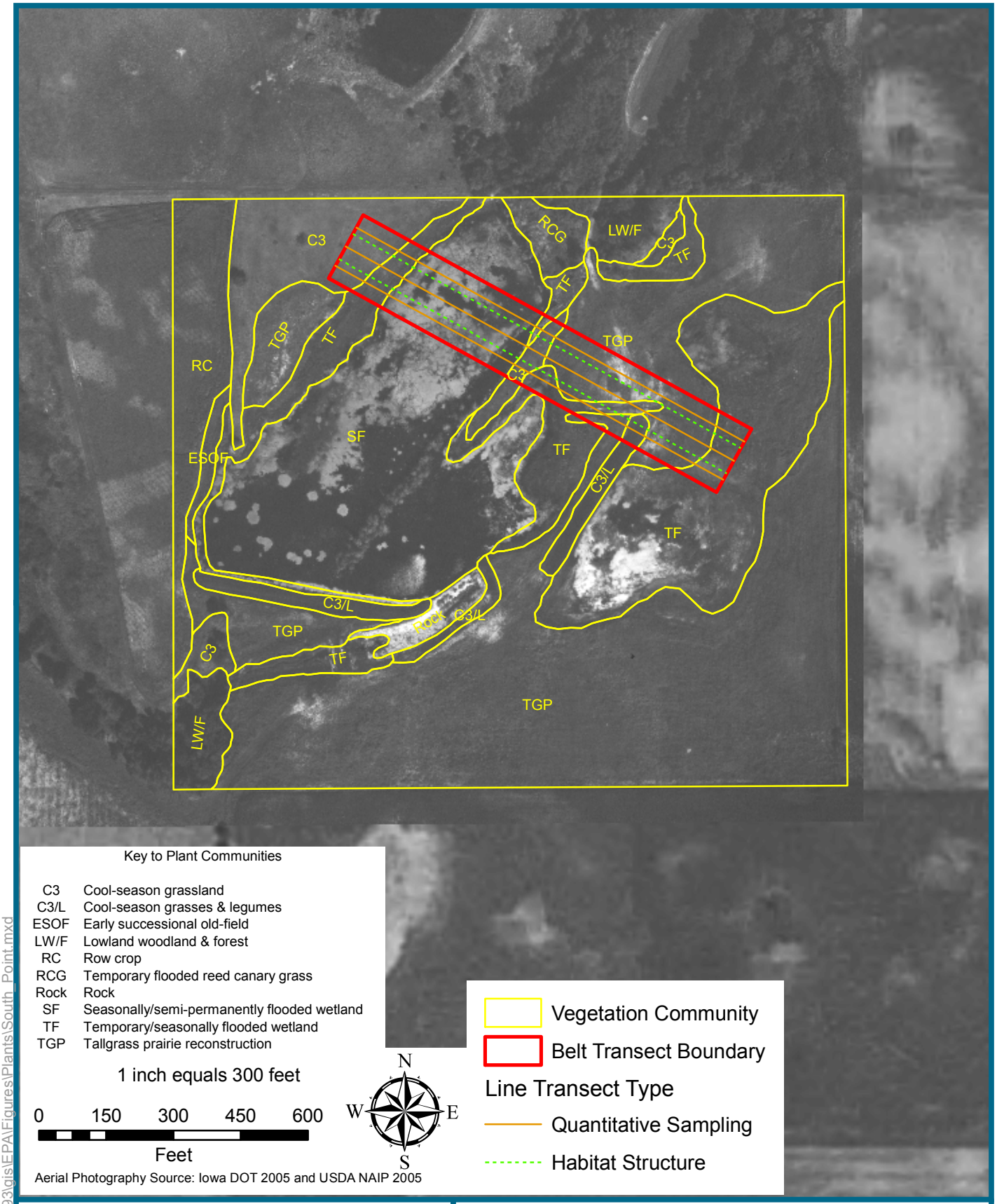

Aerial Photography Source: Iowa DOT 2005 and USDA NAIP 2005

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Figure 2
Site No. 2 - South Point

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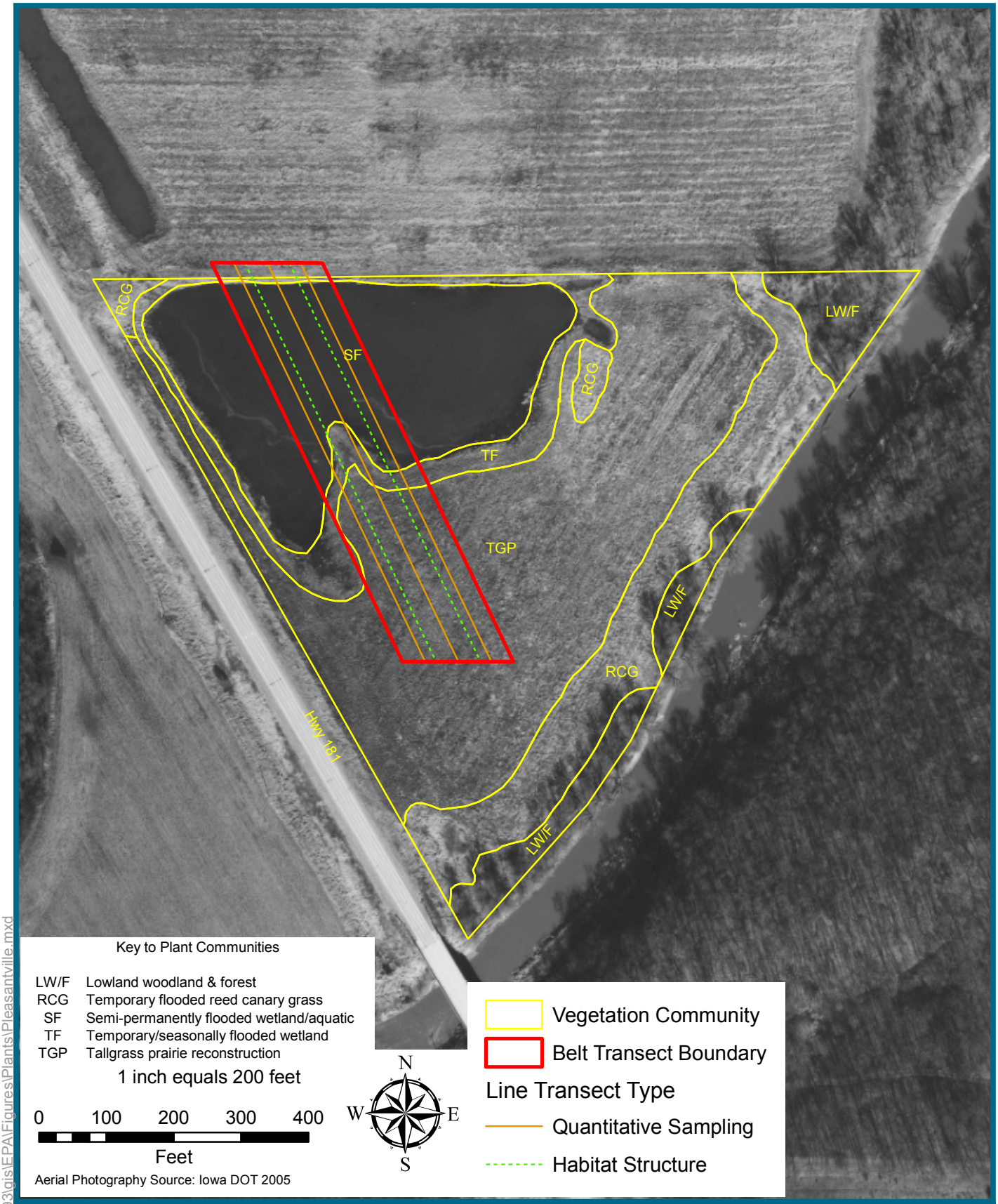

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Figure 3
Site No. 3 - Pleasantville

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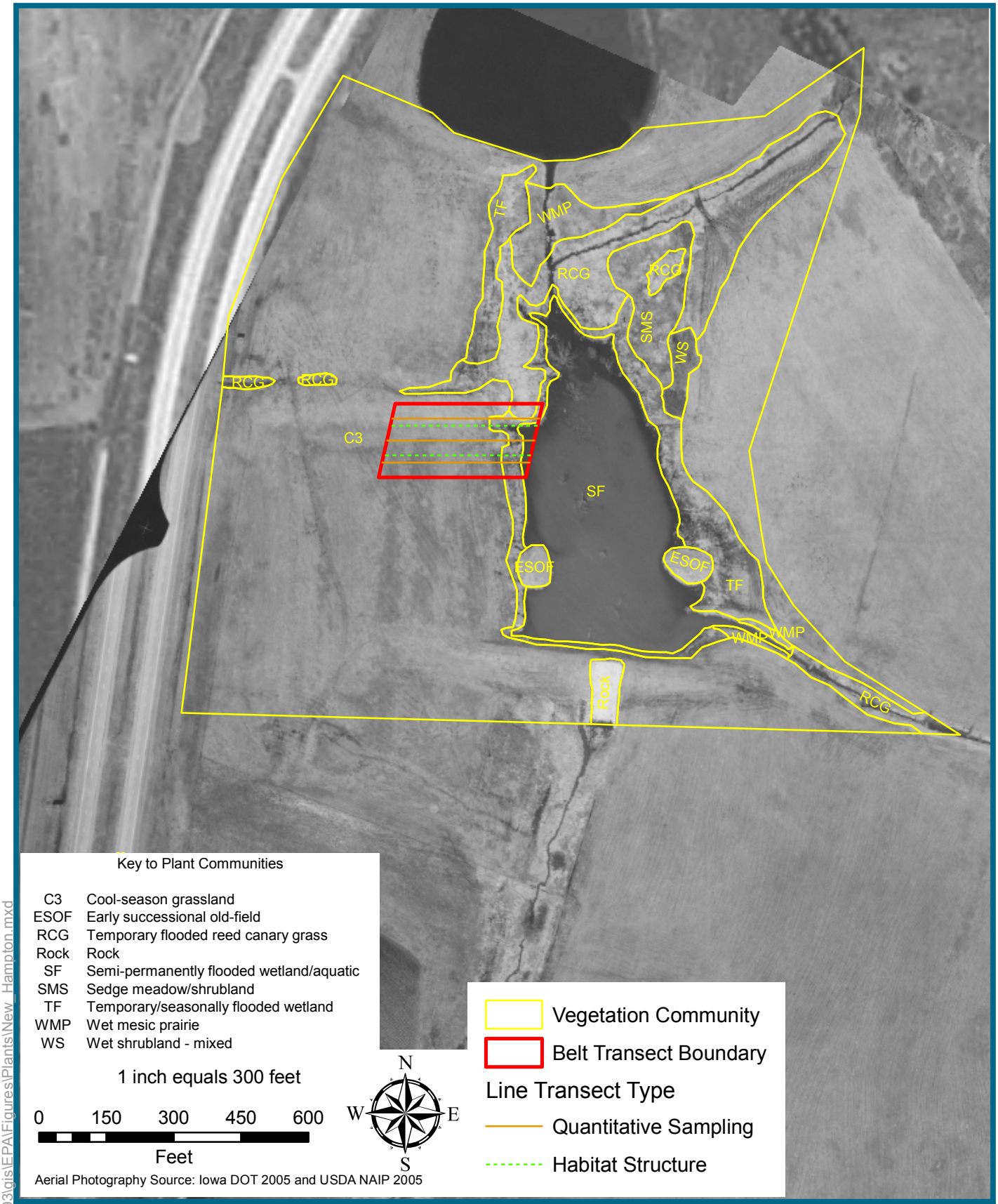

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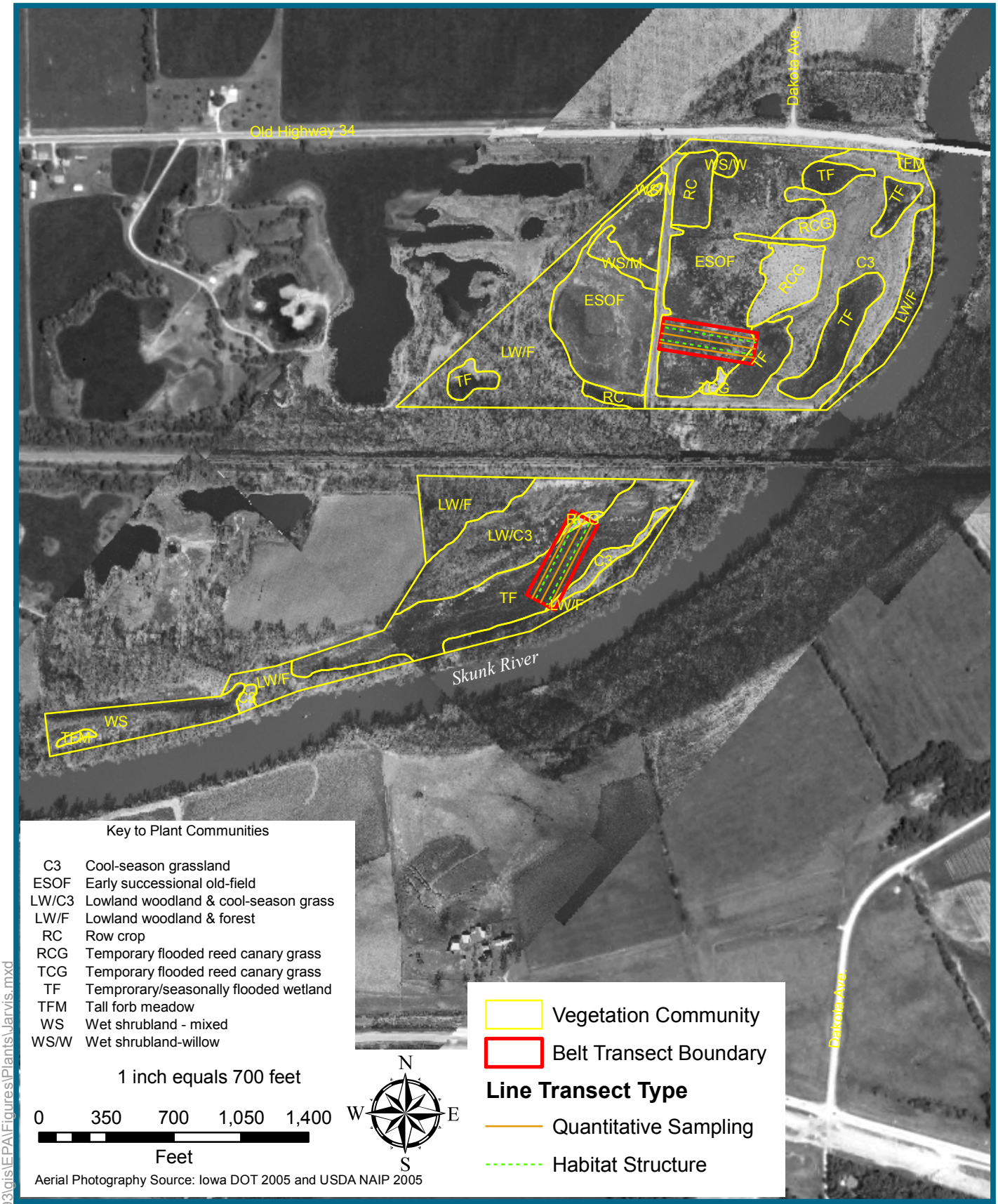
Figure 4
Site No. 4 - New Hampton

Jan 2008

45593



Key to Plant Communities

C3	Cool-season grassland
ESOF	Early successional old-field
LW/C3	Lowland woodland & cool-season grass
LW/F	Lowland woodland & forest
RC	Row crop
RCG	Temporary flooded reed canary grass
TCG	Temporary flooded reed canary grass
TF	Temprorary/seasonally flooded wetland
TFM	Tall forb meadow
WS	Wet shrubland - mixed
WS/W	Wet shrubland-willow

1 inch equals 700 feet

0 350 700 1,400

Feet

N W E S

Vegetation Community

Belt Transect Boundary

Line Transect Type

Quantitative Sampling

Habitat Structure

Aerial Photography Source: Iowa DOT 2005 and USDA NAIP 2005

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Figure 5
Site No. 5 - Jarvis

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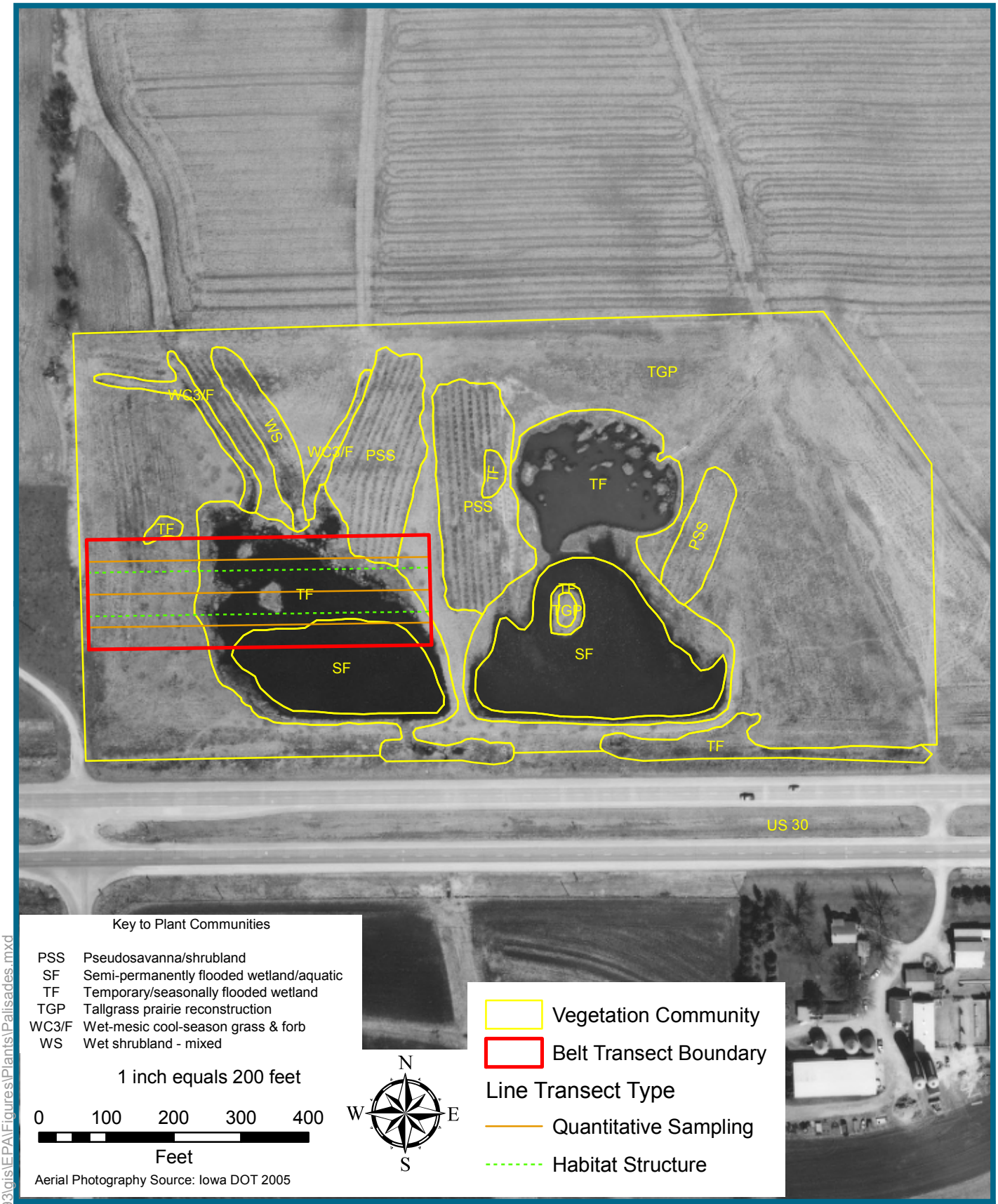

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Figure 6
Site No. 6 - Palisades

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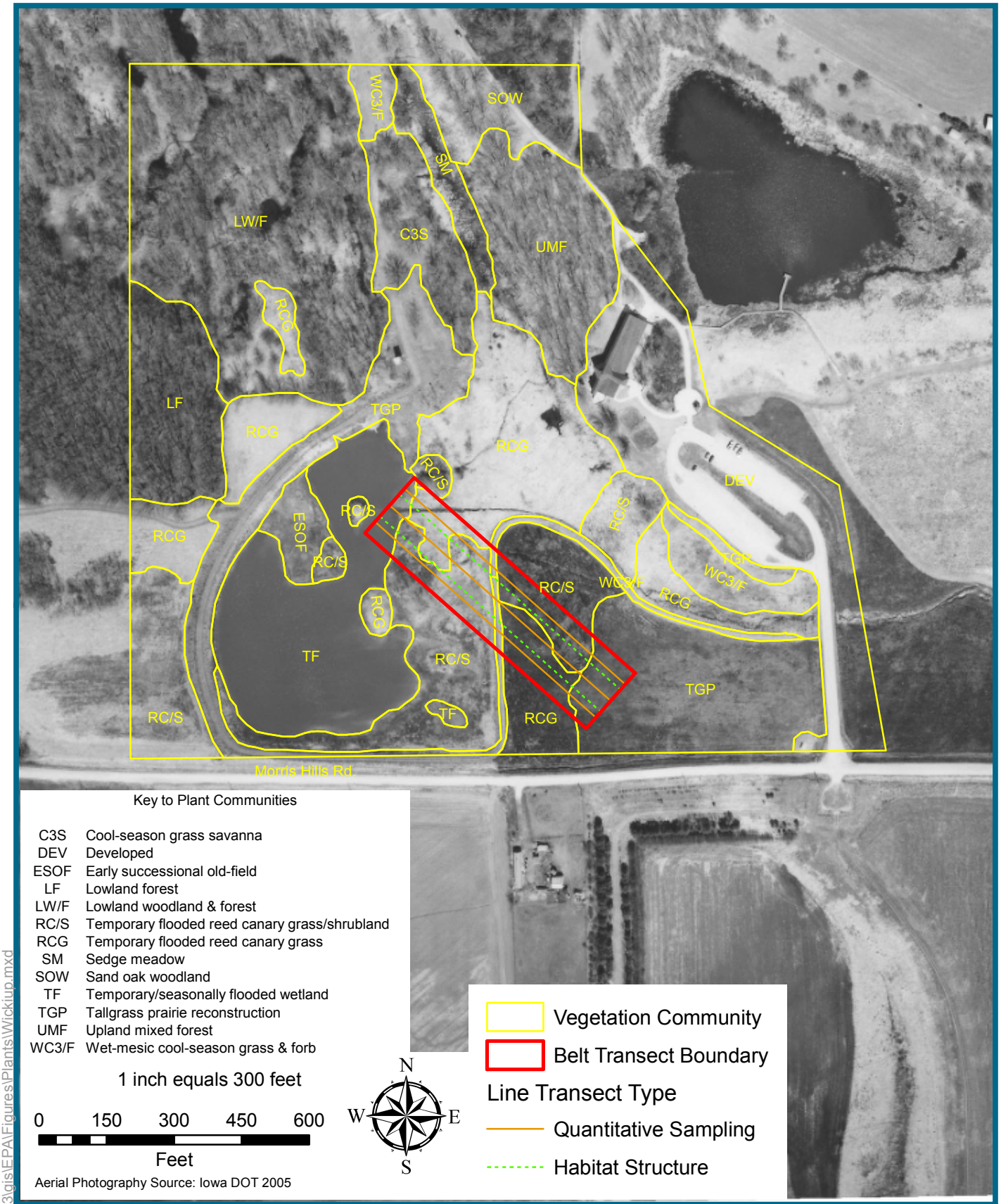

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Figure 7
Site No. 7 - Wickiup Hill

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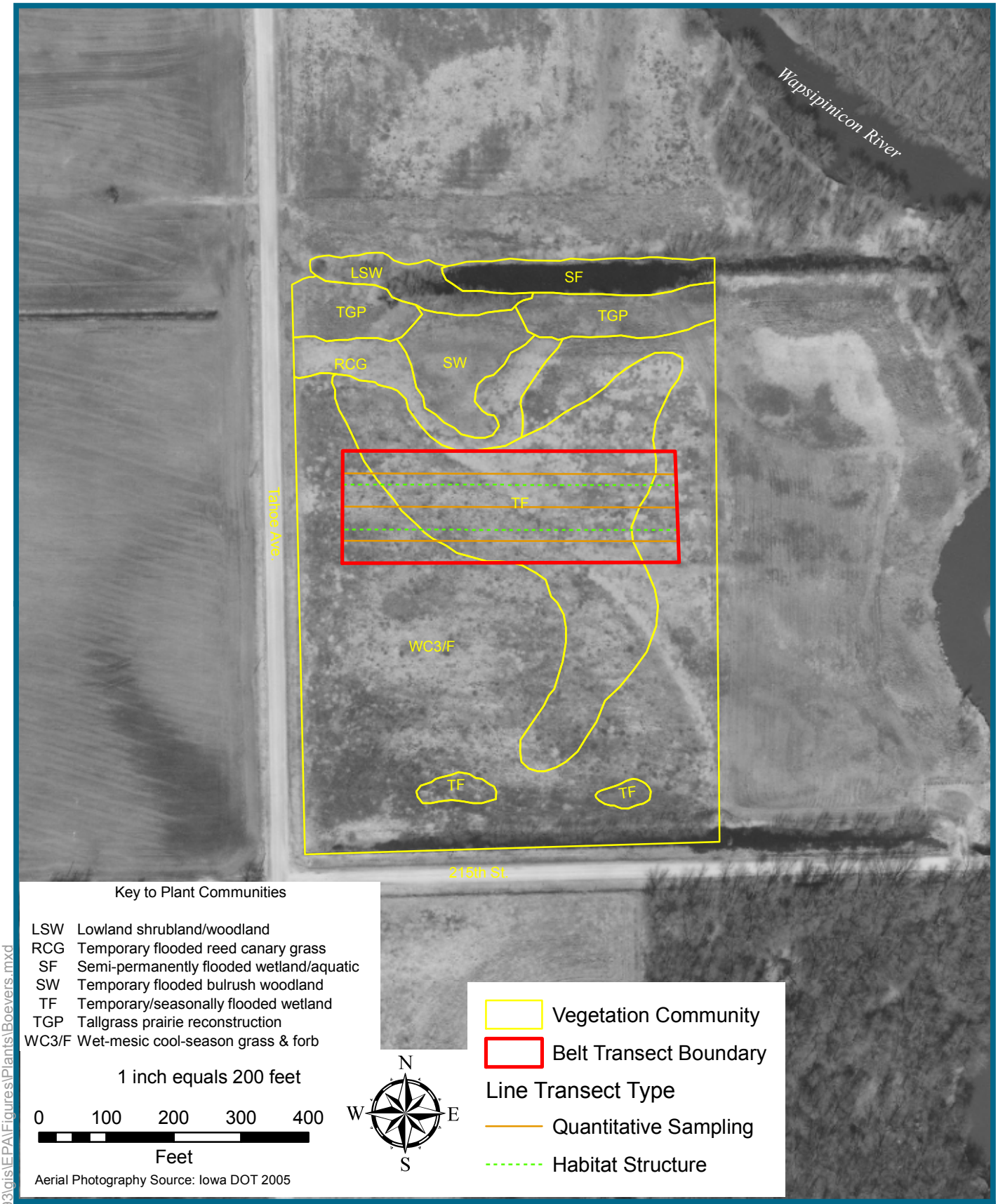

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Figure 8
Site No. 8 - Boevers

Jan 2008

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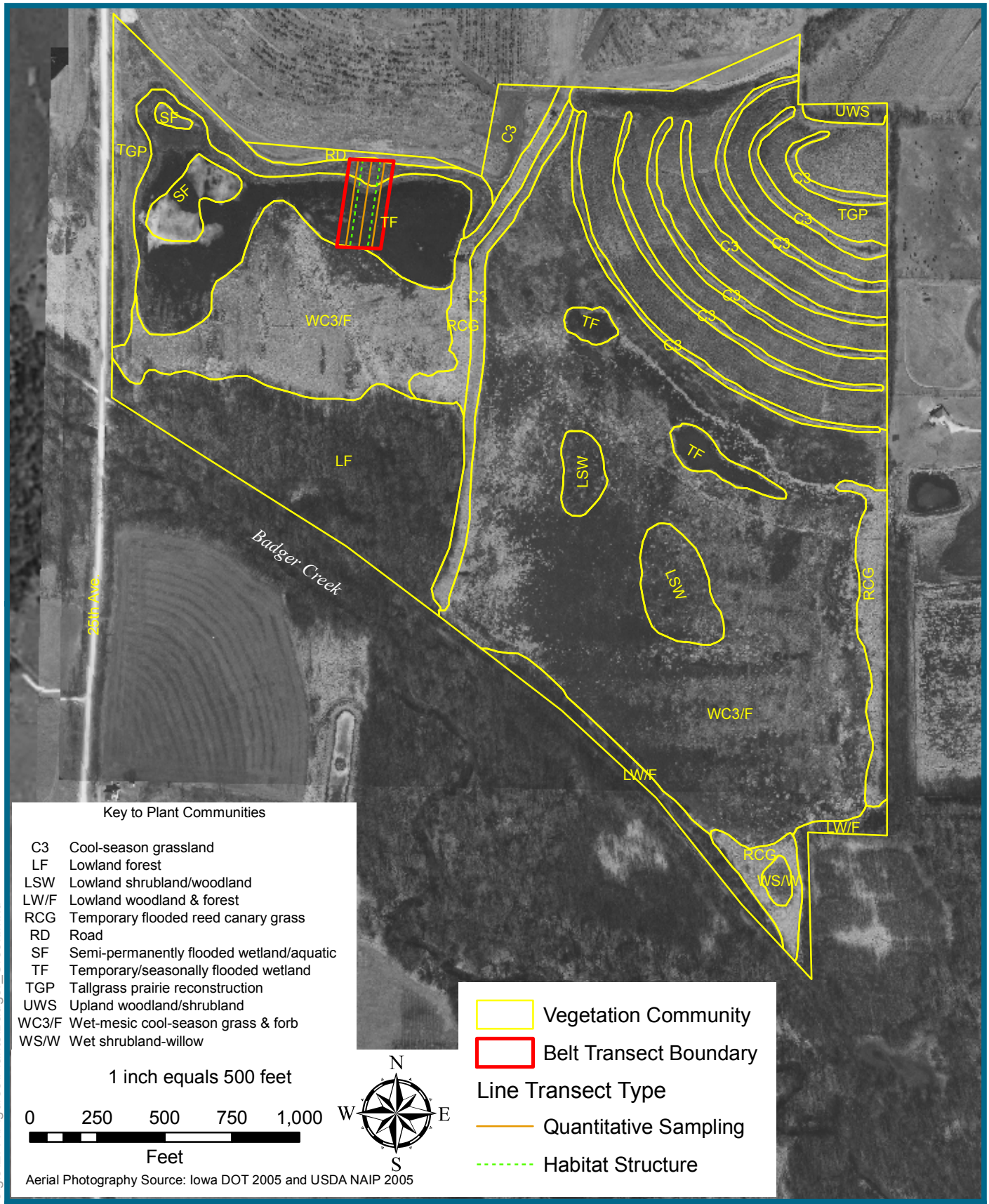

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Figure 9
Site No. 9 - Badger Creek

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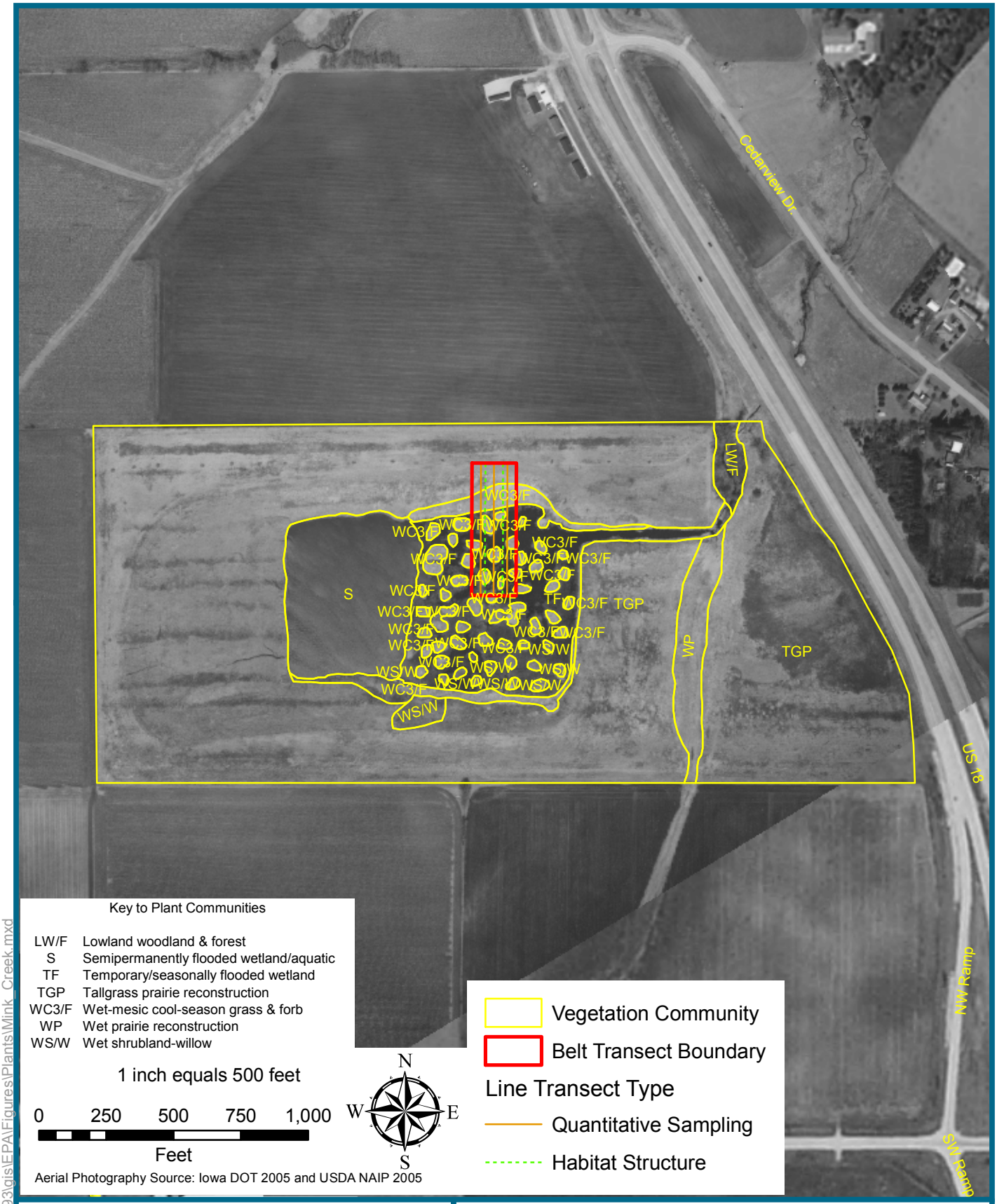

Aerial Photography Source: Iowa DOT 2005 and USDA NAIP 2005

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Figure 10
Site No. 10 - Mink Creek

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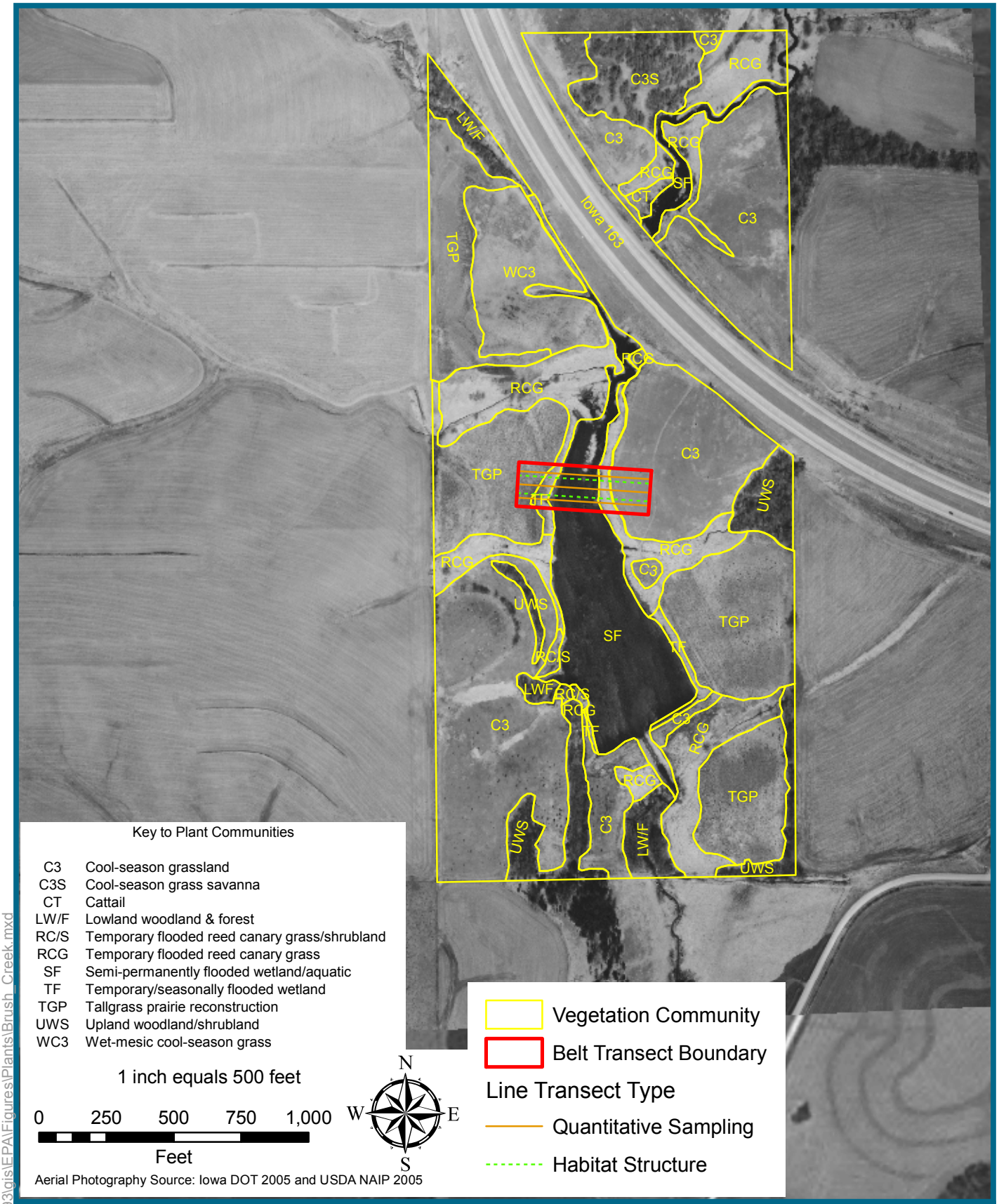

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Figure 11
Site No. 11 - Brush Creek

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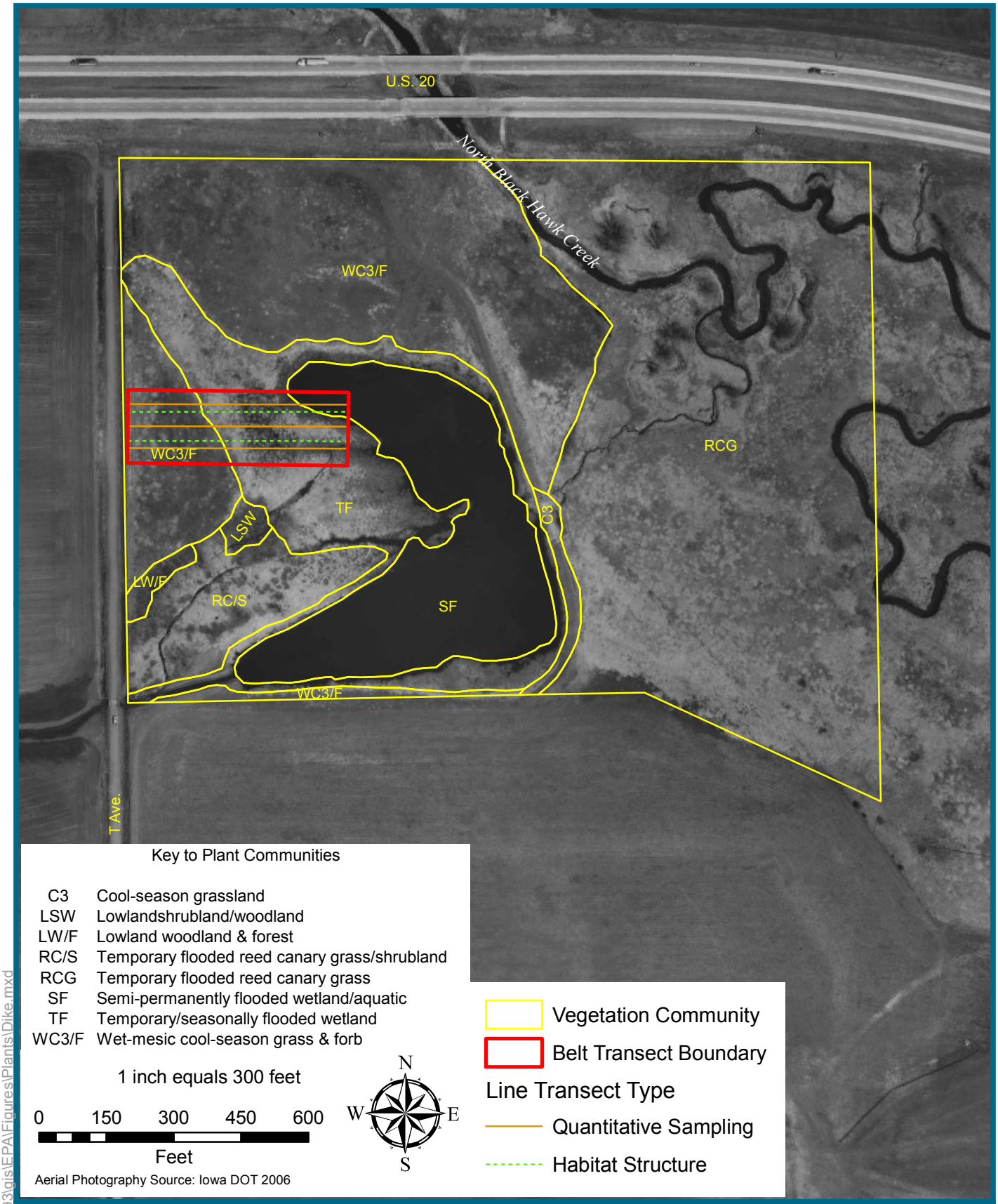

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Figure 12
Site No. 12 - Dike

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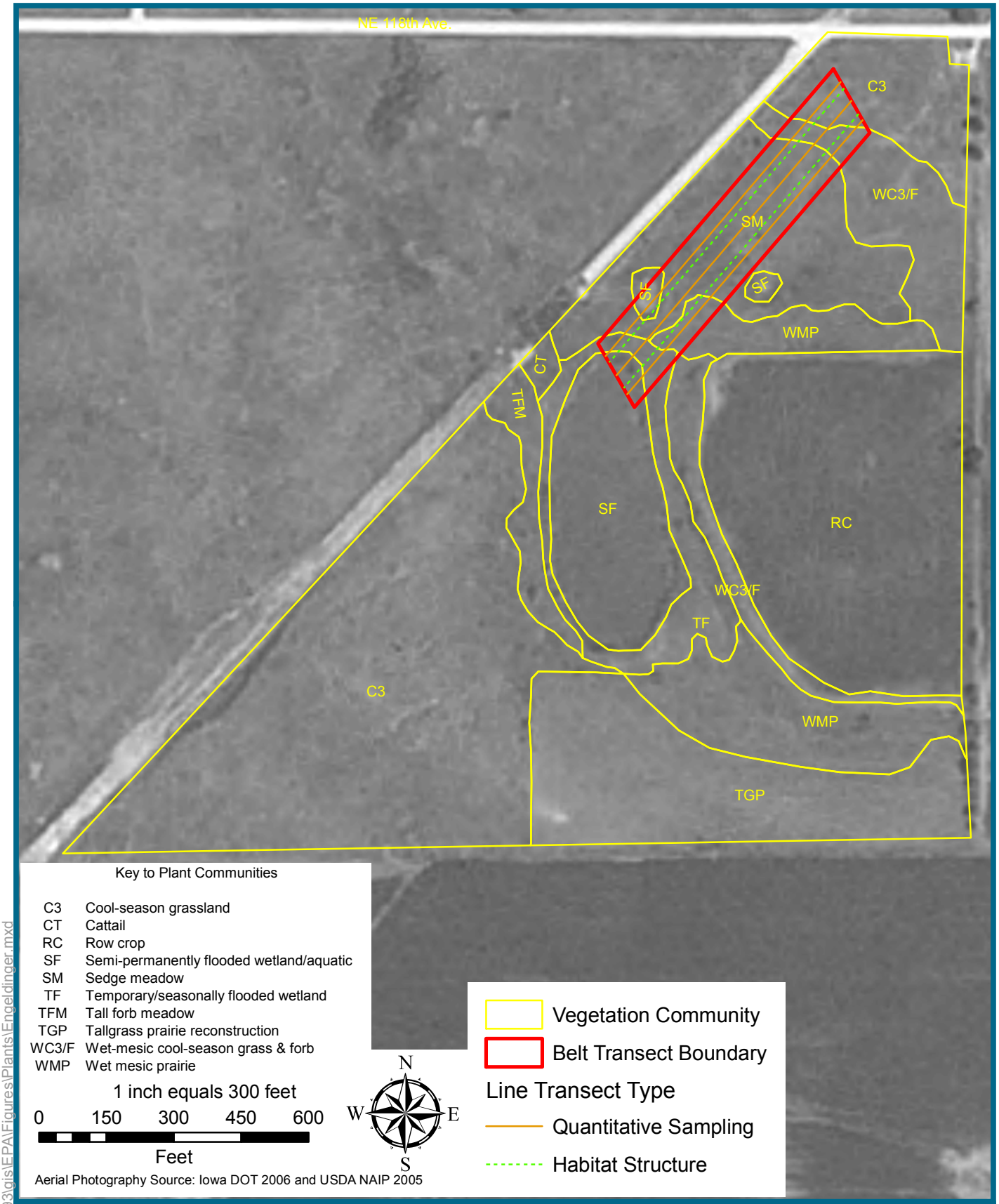

Aerial Photography Source: Iowa DOT 2006 and USDA NAIP 2005

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Figure 13
Site No. 13 - Engeldinger Marsh

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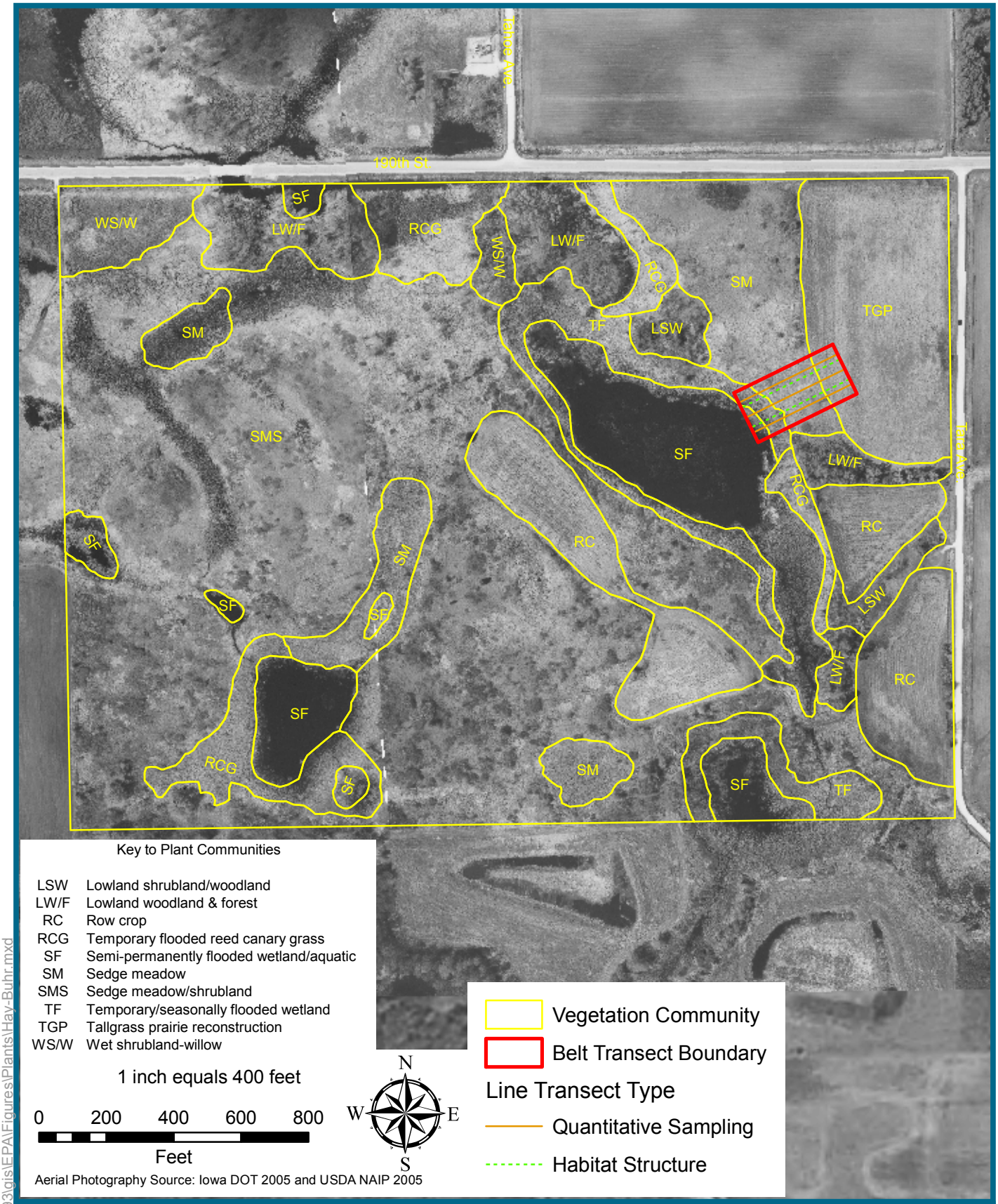

Aerial Photography Source: Iowa DOT 2005 and USDA NAIP 2005

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Figure 14
Site No. 14 - Hay-Buhr

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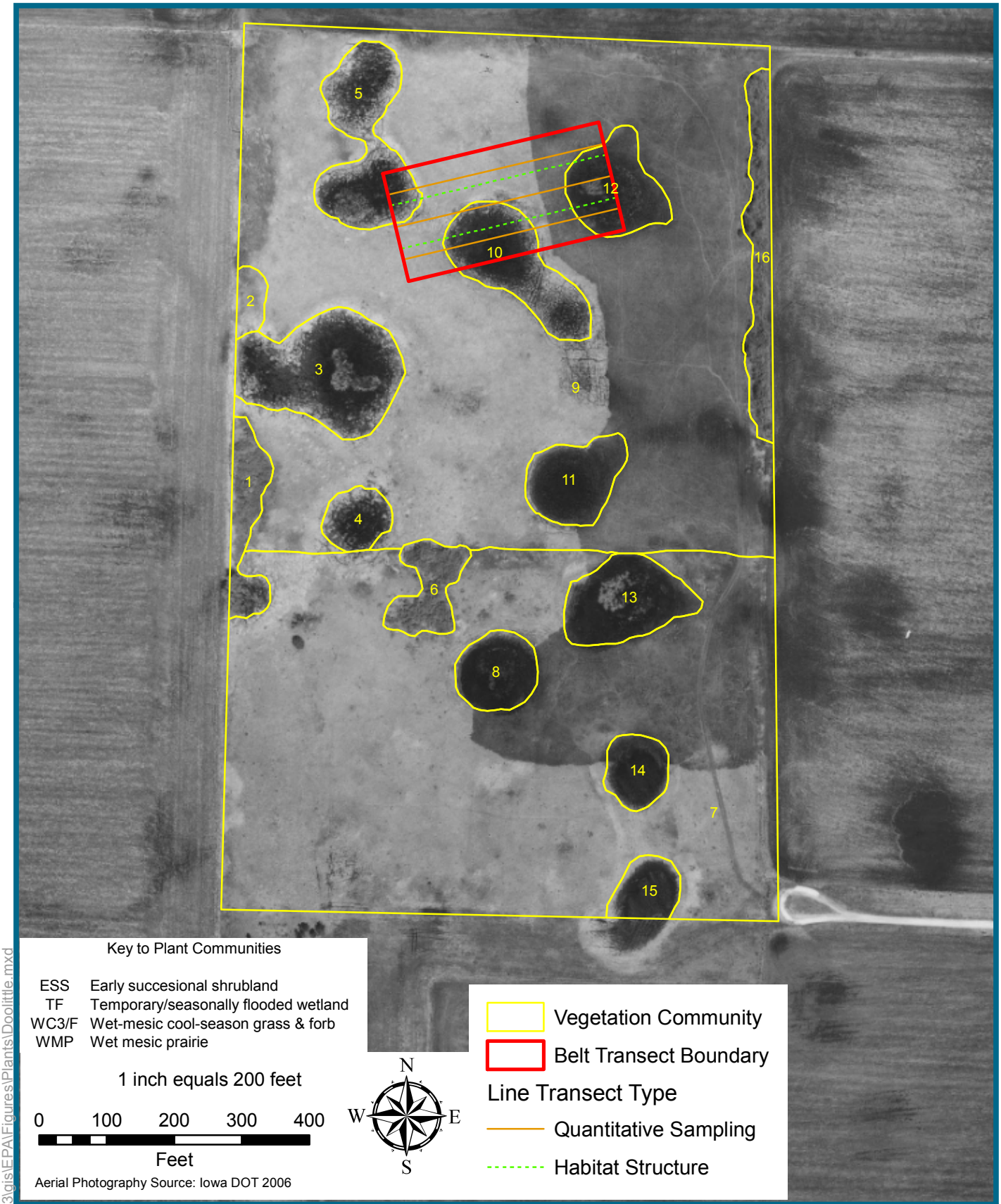

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Figure 15
Site No. 15 - Doolittle Prairie

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