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VEGETATION AND ECOLOGICAL CONDITIONS

OF

THE PHEASANT BRANCH

AND BELFONTAINE CONSERVANCIES

OPPORTUNITIES FOR

RESTORATION AND MANAGEMENT

17921 Smith Road

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VEGETATION AND ECOLOGICAL CONDITIONS OF THE PHEASANT BRANCH AND BELFONTAINE CONSERVANCIES

OPPORTUNITIES FOR RESTORATION AND MANAGEMENT

INTRODUCTION

This report summarizes results from natural resource inventories conducted to understand existing ecological conditions, needs, and opportunities for ecological restoration and management in the approximately 503 acre Pheasant Branch and Belfontaine Conservancies, City of Middleton, Dane County, Wisconsin.

This report also provides 1) a description of selected natural resources useful in focusing management based on ecological values 2) recommendations for restoration of vegetation, soils, and hydrologic systems of the natural resources consistent with long-term needs of the ecological system, and 3) a description of onsite and offsite current and potential adverse impacts to both conservancy areas with proposed buffer systems to alleviate these potential or current intrusions (i.e. adverse hydrologic changes, contaminants, noise, shade suppression, naturalized species, etc.).

Wetlands within the Pheasant Branch and Belfontaine Conservancies were delineated using the U. S. Army Corps of Engineers (USACOE) 1987 Wetland Delineation Manual. This report is provided as a separate document. As part of the Wetland Delineation process, a Wetland Functional Analysis was performed to assist in determining the health of these systems. Wisconsin Department of Natural Resources Rapid Assessment Methodology for evaluating wetland functional values data sheets were used to assess wetland functions and were part of the scope of services and included in Appendix 5.

SECTION I. SUMMARY OF FIELD INVESTIGATIONS

INTRODUCTION

Public lands are often purchased for the protection of natural resources. Natural resources systems change, and the nature and direction of these changes need to be understood. This study was commissioned to update and expand previous studies that characterized selected natural resources in and around the Pheasant Branch Conservancy (Figure 1).

Since the mid 1930's numerous changes in land-use, hydrology, water quality, and establishment of local populations of exotic noxious weeds have occurred. This study had the following goals.

1. Characterize existing ecological conditions in the Pheasant Branch and Belfontaine Conservancies.

2. Identify ecological management and restoration needs to reduce ecological

system deterioration from onsite and offsite sources.

3. Provide a basis for beginning this restoration and management programming.
4. Provide a land cover type map of Pheasant Branch and Belfontaine Conservancies.

This summary report is presented in two main sections as follows:

Section I. Summary of field investigations.

> Field investigations to determine the existing ecological health of representative parcels in Pheasant Branch and Belfontaine Conservancies are summarized here and in referenced appendices.

Section II. The restoration and management planning process.

> This section provides key information to begin planning for future management and restoration programs to address ecological conditions found in the study area.

METHODS

Prior to conducting field studies, available information on the 503 acres, including historic aerial photographs, wetland inventory maps, and soil surveys, were reviewed to best understand the natural resources and land-use in the project area. During April and June 1998, the project area and surrounding properties were mapped and the wetland boundary delineated by careful reconnoitering through both Conservancy areas.

Descriptions and maps of existing vegetation and land cover types were prepared (Appendices 1, 2, 3 and Figure 3). Where permission to enter private lands was not obtained, land cover types from offsite areas were determined from public roads or were interpreted from 1992 and 1995 aerial photos.

In representative areas of each vegetation type a Timed Meander Search and quantitative vegetation sampling were conducted to understand plant species richness and composition. Timed Meander Search techniques (Goff, et al. 1982) involve the development of time-equated plant species lists. The rate of encountering new species during the process relates directly to the distribution and frequency of species in the site and the diversity of the plant community. Quantitative vegetation data was measured by plant cover frequency in one square meter sample quadrats located every 10 meters along 40 meter transects for vegetation sampling (Figure 2). Data was compiled and

summarized in absolute and relative values for frequency and cover for each plant species encountered in the study quadrats.

During the field visits, historic conditions were confirmed by review of conditions created by previous activities (drainage ditching, dead furrows, fencing, farming dredging, ditching of waterways, and other disturbances associated with previous land-use).

The primary goals of the field reconnaissance were to characterize the ecological health of the plant communities in the project area, and to evaluate and document how the Pheasant Branch and Belfontaine Conservancies have been, or are being, influenced by ecological changes and disruptions in terrestrial and aquatic systems.

RESULTS AND DISCUSSION

The natural resources of the Pheasant Branch and Belfontaine Conservancies were divided into primary land cover type classes (Table 1). Field studies concentrated on forested and wetland communities and associated buffers. The land cover classification map for the study area is depicted in Figure 3.

TABLE 1. LAND COVER TYPE CLASSIFICATION

1. Developed Land

A. Residential

B. Industrial/commercial

C. Recreational

A. Railroad/road easements
B. Mowed lawn/landscaped trees, shrubs

2. Agricultural Land

A. Residence/out buildings

B. Fields (cropped)

1. Corn 4. Nursery 7. Other (e.g.

2. Beans 5. Oats sod farm)

3. Alfalfa 6. Pasture

C. Fields (fallowed)

1. Unmowed 2. Mowed

3. Forested Communities

A. Fence rows

B. Floodplain forest

C. Recently developed forested systems in degraded condition

D. Historic oak savanna

E. Plantations/orchards/nursery

C. Mesic forest (basswood, elm, oak, ash)

4. Wetlands

A. Phragmites

B. Sedge meadow

C. Cattail

D. Reed canary grass

A. Shrub thicket (*Cornus/Salix*)
B. Bur-reed

5. Open Water/Drainages

A. Lake/pond

B. River

A. Stream/creek
B. Springs/seep
C. Detention/maintained pond
D. Farm ditch/swale
E. Channelized stream
F. Dry detention

6. Upland Prairie Remnants

A. Mesic prairie
B. Dry prairie

C. Timbered prairie
D. Prairie remnant restoration

DESCRIPTIONS AND OVERVIEW OF ECOLOGICAL CONDITIONS OF VEGETATION/LAND COVER TYPES OF THE BELFONTAINE CONSERVANCY

Based on site inventory work, most upland habitats in the Belfontaine Conservancy area are seriously deteriorated. The following is a overview of the vegetation/land cover types in the Belfontaine Conservancy.

1. Location: Belfontaine Conservancy, bedrock prominence woodlands (3DC)

Historic Vegetation: Oak Savanna

Present Vegetation: A mixed woodland community has developed over most of this steep bedrock feature. Remnant open-grown bur (*Quercus macrocarpa*), northern pin (*Quercus ellipsoidalis*), and red oaks (*Quercus rubra*) (25-30" DBH) occur at the top of the knoll with an over-stocked, younger sub-canopy of wild black cherry (*Prunus serotina*, 8-10" DBH), shagbark hickory (*Carya ovata*, 6-8" DBH), hackberry (*Celtis occidentalis*, 5-6" DBH), trembling aspen (*Populus tremuloides*, 6" DBH), boxelder (*Acer negundo*, 6-8" DBH), and eastern red cedar (*Juniperus virginiana*, 4-6" DBH). The oaks appear to be regenerating successfully, particularly along the periphery of the oak knoll; however, the majority of the understory on top of the knoll is a dense tangle of non-native honeysuckle (*Lonicera tatarica*), with multiflora rose (*Rosa multiflora*) and common buckthorn (*Rhamnus cathartica*). The ground cover is sparse to absent under the honeysuckle canopy. Some patches of native sedges and forbs persist on the north side, including Pennsylvania sedge (*Carex pensylvanica*), bellwort (*Uvularia grandiflora*), wood anemone (*Anemone quinquefolia*), sweet cicely (*Osmorhiza claytonii*), among others. Catnip (*Nepeta cataria*) and motherwort (*Leonurus cardiaca*) were abundant in newly brushed areas, along with other weedy species. Species lists prepared by others in this area include many other species, notably showy orchis (*Orchis spectabilis*). Leafy spurge (*Euphorbia esula*) is well-established on the west slope. The ecological health of this community is moderate to low due to the long term absence of fire. Current restoration efforts will bring parts of this area back to higher health levels with re-introduction of a native ground cover component.

Physical Changes: A portion of the knoll has been used as a quarry and was grazed. Bare ground created by shade suppression is very susceptible to erosion. Native seed propagule bank is probably largely depleted. Past logging has occurred with some stumps measuring 18-20" DBH. Presently the dense honeysuckle and buckthorn canopy are being aggressively brushed out. These species along with boxelder are abundant in the seed bank and will respond positively in newly brushed areas to the increased available light.

Biological Changes: Invasion by non-native honeysuckle has resulted from the cessation of fire and grazing on the top. Slopes (especially lower) have been invaded by numerous woody species, as well as, leafy spurge.

Wildlife Observed: Fox and nesting wild turkeys have been reported in the area; blue jay, robin, American crow, red wing black bird, song sparrow, brown thrasher, black capped chickadee were observed in the recent survey.

Management Recommendation:

1. Continue honeysuckle and woody species removal by girdling and herbicide application to cut stumps.
2. Continue prescribed burning of entire knoll. After remedial stage (i.e. after 3-4 years) place knoll on burn rotation.
3. Leafy spurge control.
4. Reintroduction of native species.

2. Location: Belfontaine Conservancy (Figure 2, Transect 4), brushed prairie remnant (6B)

Historic Vegetation: Dry Prairie/Savanna

Present Vegetation: At the base of the knoll between agricultural fields and dry prairie/savanna there is a degraded prairie remnant. This area has been overgrown by woody species, such as honeysuckle, hawthorns (*Crataegus spp.*), multiflora rose, and smooth sumac (*Rhus glabra*). Native prairie species persist, especially in areas that have been recently brushed. These include bergamot (*Monarda fistulosa*), spiderwort (*Tradescantia ohiensis*), and prairie bush clover (*Lespedeza capitata*). A number of non-native herbaceous species, including leafy spurge, Queen Anne's lace (*Daucus carota*), and Canada blue grass (*Poa compressa*) are found on the slope (Appendix 1, Table 4, and Appendix 2, Table 4). These species comprise over 56% of the plant cover in the study transect. Fifty-nine (59) plant species were found in the vicinity of the transect located in the brushed prairie. Of these, 61% were native plant species. A large percentage of these natives can be described as native weedy or early successional species. Based on this, the brushed area is of low to moderate ecological health, but with continued brushing and burning, should return to higher health levels.

Physical Changes: Woody plant invasion.

Biological Changes: Shade suppression from native and non-native shrubs, invasion by aggressive non-native, agricultural weeds.

Wildlife Observed: Two garter snakes, cardinal, field sparrow, and eastern meadow lark were observed during the survey.

Management Recommendation:

1. Continue brushing and herbicide application to honeysuckle, multiflora rose.

2. Continue prescribed burning.

3. Reintroduction of native species.

4. Leafy spurge control through herbicide application or through biological control.

3. Location: Belfontaine Conservancy, dry prairie (6BD) (Figure 2, Transect 5)

Historic Vegetation: Dry Prairie

Present Vegetation: Portions of the knoll, especially the west facing slope support native grasses such as little bluestem (*Andropogon scoparius*), big bluestem (*Andropogon gerardii*), dropseed (*Sporobolus heterolepis*), and needle grass (*Stipa spartea*). These species comprise 30% of the plant species cover (Appendix 1, Table 5). Native wildflowers comprise 9% of the plant species cover. Two non-native cool season grasses comprise 48% of the plant cover. These are Canada blue grass and Kentucky blue grass (*Poa pratensis*). Numerous native wildflowers are also present such as, silky aster (*Aster sericeus*), purple prairie clover (*Petalostemum purpureum*), violet wood sorrel (*Oxalis violacea*), and dyers weed (*Solidago nemoralis*) (Appendix 2, Table 5). Forty-seven (47) plant species were observed in the dry prairie, of which 74% were native species. Soils are thin, with rock out croppings common. This area has been managed with fire recently and is presently being returned to a high level of ecological health.

Physical Changes: A walking path has been created through the prairie, which has impacted the adjacent prairie area. This community has likely decreased in size from its original distribution on the knoll due to lack of fire and invasion by woody growth, but will expand again with the recent return of fire.

Biological Changes: Woody species invasion.

Wildlife Observed: (see notes on brushed prairie remnant); two state threatened mammals have been reported from dry and dry mesic prairie in the area of Pheasant Branch marsh (record over 25 years old). These include the prairie vole (*Microbus ochrogaster*) and western harvest mouse (*Reithrodontomys megalotis*).

Management Recommendation:

1. Perform late spring prescribed burning to control woody species and non-native cool season grasses. May be necessary to initiate a burn rotation on the high quality remnant.
2. Brush and herbicide (Garlon 4) non-native trees and shrubs such as honeysuckle which is found along the periphery of the existing prairie.
3. Restore path to native vegetation. May be necessary to install barrier to prevent use of trail by foot traffic.

4. Location: Belfontaine Conservancy, tree rows (3A) along the northern fenceline boundary

Historic Vegetation: Mesic Prairie

Present Vegetation: Tree rows consist of young-growth trees and shrubs whose seeds are largely wind and bird disseminated, including boxelder, wild black cherry, and hackberry. The understory includes common agricultural grasses and forbs, such as smooth brome (*Bromus inermis*) and burdock (*Arctium minus*). These are low health communities.

Physical Changes: The establishment of woody vegetation along a straight fenceline has created an unnatural feature. Original soils have been altered by surface water and wind deposition of sediments, and row cropping activity.

Biological Changes: The original native seed bank is probably no longer present. Tree rows and fencelines, while low-quality vegetation cover, have limited wildlife habitat value, providing nesting, feeding, and cover, as well as migration corridors for birds and mammals.

Wildlife Observed: No wildlife recorded.

Management Recommendation:

1. Remove non-native shrubs, which provide a vector for dispersal of these species to adjacent areas.

5. Location: Belfontaine Conservancy, northwest agricultural field (2B1, 5F)

Historic Vegetation: Mesic Prairie/Savanna

Present Vegetation: Prior to conversion to corn in 1998, this area was under a well-established cover of old-field vegetation dominated by non-native, cool-season grasses and native and non-native weedy forbs. Common species present before cultivation and likely to be abundant in the seed bank include fescue (*Festuca elatior*), smooth brome, crab grass (*Digitaria sanguinalis*), dandelion (*Taraxacum officinale*), white clover (*Trifolium repens*), and foxtail grass (*Setaria viridis*). The drainage swale that dissects the field is dominated by giant ragweed (*Ambrosia trifida*). This is a low health community.

Physical Changes: Decades of agricultural use and exposure to erosive environmental elements has resulted in the significant loss of topsoil along with the native seed bank. An eroded drainage swale has developed functioning as a conveyance for nutrient-rich effluent generated by a feed lot to the north. This effluent is directed into the northwest end of the marsh and sedge meadow area.

Biological Changes: The present seed bank consists of largely non-native, early-successional weedy grasses and forbs. The potential for supporting a diverse faunal community is no longer present

Wildlife Observed: No wildlife recorded.

Management Recommendation:

1. Restore to mesic to dry prairie vegetation on the rolling uplands and mesic to wet prairie vegetation in wetter soils in the drainage swale and lower ground marginal to the sedge meadow community. Manage with prescribed fire and grazing, if possible.
2. Construct a biofilter wetland feature to mitigate impacts from feed lot effluent.

6. Location: Belfontaine Conservancy, dry detention basin (5H) adjacent to Pheasant Branch Road, north of the visitor parking lot.

Historic Vegetation: Mesic Prairie

Present Vegetation: This highly disturbed area supports reed canary grass (*Phalaris arundinacea*), burdock (*Arctium minus*), stinging nettles (*Urtica dioica*), and elderberry (*Sambucus canadensis*). This is a low health area.

Physical Changes: This area receives runoff from uplands to the west from a culvert under Pheasant Branch Road. It is a highly disturbed area.

Biological Changes: Original soils and native seed bank are no longer present. Wildlife habitat value is low. The dominant vegetation is reed canary grass, an invasive, non-native species.

Wildlife Observed: No wildlife recorded.

Management Recommendation:

1. Excavate depression to create pond/biofilter wetland to treat and infiltrate stormwater runoff from offsite areas west of Pheasant Branch Road. Portions of the agricultural field/pasture surrounding this area should be planted to native prairie to further buffer this water.
2. Plant native emergent and wetland plants, such as sedges, rushes, etc., to serve as biofilters.

DESCRIPTIONS AND OVERVIEW OF ECOLOGICAL CONDITIONS OF VEGETATION/LAND COVER TYPES OF THE PHEASANT BRANCH CONSERVANCY

Based on site inventory work, most upland and lowland forest habitats in the Pheasant Branch Conservancy are deteriorated resulting from invasion by non-native species and/or through hydrological alterations. Herbaceous wetlands have high diversity and high quality vegetation. Invasions by native shrubs and non-native reed canary grass has occurred in several locations.

7. Location: Pheasant Branch Conservancy, lowland forest (3B, 3B/4D) (Figure 2, Transects 6 and 7)

Historic Vegetation: Lowland Forest

Present Vegetation: The lowland forest system comprises the south portion of the Conservancy. Silver maple (*Ace saccharinum*), American elm (*Ulmus americana*), cottonwood (*Populus deltoides*), and boxelder are the dominant tree species in this forest complex. Portions of this complex contain large tree specimens with a low density shrub subcanopy and a moderate ground layer (Appendix 1, Table 6, Transect 6). Portions of this complex have a moderate to dense subcanopy of European buckthorn (Appendix 2, Table 7 and 8, Transect 7) but still contains a moderate ground layer. The species found in quadrats are typical of highly disturbed lowland systems. A few are found in association with upland forest systems, such as honeysuckle, dame's rocket (*Hesperis matronalis*), sweet cicely, and enchanter's nightshade (Circaea quadrisulcata). Increased shade and hydrological modification have apparently allowed for the invasion of shade tolerant upland plant species into the lowland forest complex. Another portion of the lowland forest (on the most southern end near by Century

Avenue) consists of an almost monotypic stand of reed canary grass beneath the native trees. This community is of low to moderate ecological health.

Physical Changes: Rerouting of the Pheasant Branch, and disposition of dredge spoil piles; severe erosion of rerouted channel has and is occurring; dewatering of portions of the forest.

Biological Changes: Invasion of European buckthorn, reed canary grass, and dame's rocket into portions of the subcanopy and ground layer.

Wildlife Observed: King fisher, cat bird; a 10-12" bass observed in Pheasant Branch diversion channel.

Management Recommendation:

1. Removal of European buckthorn by cutting and herbicide treatment will be necessary to decrease shade from the subcanopy.
2. Removal/girdling of selected boxelder to increase light.
3. Herbicide of reed canary grass using Roundup or Rodeo as plants begin to bolt.
4. Reintroduce limited fire to stimulate native seed/propagules and control dame's rocket and buckthorn seedlings.

8. Location: Pheasant Branch Conservancy, shrub/scrub areas

Historic Vegetation: Sedge Meadow

Present Vegetation: Shrub thicket (4E). Portions of the sedge meadow complex have been invaded by native shrubs, with red osier dogwood (*Comus stolonifera*) the dominant shrub (Appendix 2, Table 8). In areas of dense shrubs, native sedge meadow species are sparse. Increased shrub growth, as well as farm ditches have resulted in dewatering of portions of the sedge meadow complex allowing for the invasion of drier plant species such as brome grass and Kentucky blue grass in some areas, (Appendix 1, Table 1, Appendix 2, Table 1). Fifty-seven (57) plant species were observed in the shrub/scrub area, of which 91% were native species. These shrub/scrub areas are moderate to high ecological health systems.

Physical Changes: Creation of farm ditches has dewatered portions of sedge meadow. Spoil piles along ditches and scraped areas are vectors for the invasion of non-native shrubs and herbaceous species.

Biological Changes: Invasion of some plant species usually found in drier habitats, especially on spoil piles. Shade suppression by shrubs of native sedges and herbaceous species.

Wildlife Observed: No wildlife recorded.

Management Recommendation:

1. Prescribed burning.
2. Cutting and herbiciding of dense patches of red osier dogwood where a fire will not carry in winter when access is easier and work tasks can be performed more efficiently.
3. On spoil piles, herbicide non-native shrubs by cutting and herbicide application and herbicide reed canary grass where it occurs on spoil piles.

9. Location: Pheasant Branch Conservancy, reed canary grass areas (4D).

Historic Vegetation: Sedge Meadow

Present Vegetation: Reed canary grass (4D) has invaded and formed almost monotypic stands in several locations in the Pheasant Branch area. These areas are usually associated with areas receiving water from offsite. Drainage areas where water is discharged (3B/4D), areas or in wetland peripheral areas (3B/4D) or where boxelder trees have invaded (3C). Increased sedimentation also appears to favor the establishment of this species. These are low ecological health systems.

Physical Changes: Increased sedimentation and poor water quality.

Biological Changes: Invasion by non-native aggressive weeds capable of surviving sediment deposition.

Wildlife Observed: None observed.

Management Recommendation:

1. Herbicide reed canary grass using Rodeo, or perhaps "Poast" in non-aquatic environments as the plants begin to bolt.
2. Small areas may need to have sediment removed to original soil level and replanted with native seeds and plants.
3. Create biofilter sedimentation trap wetlands up stream of high quality wetland areas.
4. Reduce sediment and nutrient loading from offsite. Design of buffer systems using native vegetation in Belfontaine Conservancy could substantially reduce sediment and nutrient loading from the north.

10. Location: Pheasant Branch Conservancy, cattail areas (4C).

Historic Vegetation: Sedge Meadow

Present Vegetation: Cattail marsh (4C) with interspersed sedge species (4B). Areas adjacent to the main spring channel have been invaded by broad leaf cattail (*Typha latifolia*). As the cattail expands outward from the channel, native sedge meadow species are displaced (Appendix 1, Table 3, and Appendix 2, Table 3). Eventually almost monotypic stands of cattail will be found, especially in areas where water levels fluctuate the least. Portions of these areas are of moderate ecological health, while areas containing cattail and giant reed grass almost exclusively are low health systems. On the west side of the spring channel a large area of bur-reed (*Sparganium eurycarpum*) interspersed with cattails and sedges are found (4BCF) adjacent to this area and within the channel a bed of wild rice (*Zizania aquatica*) is found. This is a high health system.

Physical Changes: Rerouting of Pheasant Branch has increased water levels in the lower reaches of the marsh and backed up the spring outflow creating a less dynamic surface water regimen in portions of the marsh.

Biological Changes: Cattail has expanded into historic sedge meadow and bur-reed areas. Giant reed grass (*Phragmites australis*), an aggressive species, has invaded portions of the current zone.

Wildlife Observed: Sand hill cranes (two families reported to have nested in the wetland), great blue herons, otter reported in Graber's Pond to the west.

Management Recommendation:

1. Reintroduce fire on a rotational basis. Every 3 to 5 years is adequate for this system.
2. Herbicide cattails at the sedge meadow interface to decrease spread into sedge meadows.
3. Herbicide *Phragmites* clones or manually cut stems several times during the growing season.

11. Location: Pheasant Branch Conservancy, sedge meadows

Historic Vegetation: Sedge Meadow

Present Vegetation: A large portion of the Pheasant Branch marsh is comprised of sedge meadows in different degrees of ecological health. Significant areas of sedge meadow remain in high ecological health (4B). These are dominant by gramnoids such as tussock sedge (*Carex stricta*) and Canada bluejoint grass (*Calamagrostis*

canadensis) (Appendix 1, Table 2, Transect 2, and Appendix 2, Table 2). Joe pye weed (*Eupatorium maculatum*), and in wetter areas arrowleaf (*Sagittaria latifolia*), are the most important herbaceous species. Species diversity was low in quadrats and moderately diverse in total species. High quality meadow areas also contain areas which are designated as fens, one of the rarest plant communities in the state.

Physical Changes: Creation of detention ponds on the east side of the sedge meadow may cause significant surface water and sediment problems. Rerouting of Pheasant Branch has altered hydrological conditions of spring channel, and dredging of portion of the spring has left on dredge spoil pile to the east of the spring.

Biological Changes: Cattail encroachment in zone areas as well as shrub invasion.

Wildlife Observed: Great blue heron, sand hill crane, sora rail and red wing blackbird. The blandings turtle (*Emydoidea blandingii*) currently under review by the U. S. Fish and Wildlife Service for federal listing, is reported to occur in the Pheasant Branch system. The sedge meadow, open water marshes, and shallow stream communities represent suitable habitat for this species.

Management Recommendation:

1. Reintroduce on a rotational basis prescribed fire to sedge meadow system. Burning every 3 to 5 years is adequate for this system.
2. Evaluate surface water quantity and sedimentation coming from detention basin.
3. Revegetate all bare ground around detention basins with native prairie vegetation.

12. Location: Pheasant Branch Conservancy, oak woods (3DC) along west slope and Pheasant Branch Road.

Historic Vegetation: Oak Savanna

Present Vegetation: Scattered open-grown oaks with dense subcanopy of boxelder, wild black cherry, and other more shade-tolerant species. The understory has become over grown with non-native honeysuckle and common buckthorn. The ground cover vegetation has become shade-suppressed and depauperate with mostly weedy species dominating. These are moderate ecological health systems, because of the large oaks, but significant restoration will be required. Wild petunia (*Ruellia humilis*), a plant listed as endangered in Wisconsin has been reported from the area by Zimmerman in 1995 and the Natural Heritage Inventory (record, 1992). Another plant of State Special Concern bluets (*Hedyotis caerales*), which can occur in open woods and damp meadows, has been reported from this vicinity in 1989.

Physical Changes: While oaks are still present, the formerly open canopy has become over-stocked with boxelder, wild black cherry, and other species, creating a dense, shade-producing sub-canopy. The ground cover has become sparse to absent under

these conditions resulting in the loss of topsoil along with the native seed bank from steep slopes.

Biological Changes: The native open oak savanna with a diverse ground cover component is absent, replaced by a much less diverse plant community and associated faunal community.

Wildlife Observed: None observed. Conspicuous deer trails are indicative of heavy use by white tail deer.

Management Recommendation:

1. Thinning of over-stocked canopy and removal of invasive honeysuckle and common buckthorn by cutting and herbiciding stumps with Garlon 4.
2. Reintroduce fire.
3. Reintroduce native savanna species with seeds and plugs. Collection of native savanna species seed by volunteers or purchase from a native seed nursery are two methods of acquiring seed.

13. Location: Pheasant Branch Conservancy, young growth woodlands (3C) along the west slope and spoils berm along the stream diversion.

Historic Vegetation: Oak Savanna

Present Vegetation: These communities have developed on lands disturbed by agriculture and newly created well-drained soils, such as those resulting from the construction of the Pheasant Branch diversion. In former cropped fields and pasture old-field assemblages develop consisting of native and non-native agricultural weeds and cool-season grasses, such as blue grasses and smooth brome. Weedy species such as fleabanes (*Erigeron spp.*), dandelion and goldenrod (*Solidago spp.*) were also common. Over time, wind and bird disseminated tree and shrub species invade, such as boxelder, wild black cherry, green ash (*Fraxinus pensylvanica*), and American elm. These communities also develop in formerly open oak savannas where fire or light grazing have been absent for many years. These systems are low ecological health systems.

Physical Changes: Original top soils and native seed bank propagules have probably been lost due to past disturbance and subsequent sheet and rill erosion of unstable soils on steep banks. The berm along the creek diversion ditch receives sand and silt loads during flood events. This feature also serves as a walking trail with some areas becoming devoid of stabilizing vegetation and becoming eroded.

Biological Changes: Native prairie and savanna vegetation and associated fauna have largely been replaced by less diverse plant and animal communities.

Wildlife Observed: No wildlife reported, but evidence of use by white tail deer.

Management Recommendation:

1. Thin over-stocked canopy in savanna areas and remove invasive shrubs and saplings by cutting and herbiciding stumps with Garlon 4.
2. Reintroduce fire and conduct herbicide treatments where needed.
3. Reintroduce native prairie and savanna species by seeding.

14. Location: Pheasant Branch Conservancy old fields (2C1) along west slopes below the visitor parking lot.

Historic Vegetation: Oak Savanna.

Present Vegetation: Old field vegetation on this area consists of largely non-native, cool season grasses and weedy forbs, including blue grass, plantain (*Plantago major*), horseweed (*Erigeron canadensis*), bull thistle (*Cirsium vulgare*), and common burdock. Woody invasion is occurring from surrounding wooded edges with honeysuckle, wild black cherry, boxelder, eastern red cedar, and staghorn sumac (*Rhus typhina*). Pale Indian plantain (*Cacalia atriplicifolia*) a species of limited range (prairie province) in Wisconsin is found in large numbers in this area. This is a low ecological health system.

Physical Changes: Past agricultural disturbance has contributed to the loss of original topsoil and native seed bank. A parking lot has been constructed adjacent to the field.

Biological Changes: Native prairie and savanna species have been replaced by non-native, agricultural weedy species along with a component of early successional, native and non-native trees, shrubs, and herbaceous plant species.

Wildlife Observed: No wildlife observed.

Management Recommendation:

1. Reintroduce fire to set back non-natives and shrubs.
2. Brush out over-stocked wooded edges to create a transitional area to oak savanna to the south to maintain pale Indian plantain population.
3. Restore the area to native mesic to dry prairie vegetation. No-till drill prairie species into existing ground cover to maintain pale Indian plantain population and provide a small prairie restoration demonstration site.

15. Location: Pheasant Branch Conservancy degraded sedge meadow (5D/4EB/3C)

Historic Vegetation: Sedge Meadow, Shallow Marsh

Present Vegetation: This area has a low topographic position transitional between upland slopes and floodplain forest above the Pheasant Branch diversion channel. It receives surface drainage from the surrounding uplands and flooding from Pheasant Branch Creek and thus has 1-2" of standing water at least periodically (5D). It supports a combination of sedge meadow and fen species (4B) including lake sedge (*Carex lacustris*), marsh aster (*Aster simplex*), cord grass (*Spartina pectinata*), and joe pye weed. Lowland forest (3B) with silver maple, boxelder, cottonwood, sand bar willow (*Salix interior*), and red osier dogwood (6E) are found adjacent to the seepage area. Cattails and reed canary grass are important in the community. This is a moderately degraded ecological system, but with limited management will return to high ecological health.

Physical Changes: Ditching and down-cutting of Pheasant Branch Creek has effectively dewatered the surrounding muck, and other hydric soils. Sediment loading from surrounding developed uplands has buried original soils and created conditions favorable to invasion by reed canary grass.

Biological Changes: Degraded conditions have favored establishment of invasive reed canary grass and cattails. Dewatering has improved conditions for woody species.

Wildlife Observed: No wildlife reported.

Management Recommendation:

1. Removal of light-reducing tree and shrub canopy by cutting, girdling and herbicide application to cut stumps using Garlon 4.
2. Herbicide (Rodeo) reed canary grass in mid-June just prior to bolting.
3. Reintroduce native sedge meadow species in areas where reed canary grass has been eradicated/controlled.
4. Expand the community, if possible, to provide biofilter for upland surface waters entering the Pheasant Branch marsh system.

TABLE 2. QUALITY ASSESSMENT OF ALL NATURAL AREAS SURVEYED.

B=Belfontaine Conservancy, P=Pheasant Branch Conservancy.

Location		High Quality	Moderate Quality	Low Quality
1.	Oak savanna (B)		**X**	**X**
2.	Brushed prairie (B)		**X**	**X**
3.	Dry prairie (B)	**X**		
4.	Tree row (B)			**X**

5.	Agricultural field (B)			**X**
6.	Dry detention (B)			**X**
7.	Lowland forest (P)		**X**	**X**
8.	Shrub carr (P)	**X**	**X**	
9.	Reed canary (P)			**X**
10.	Cattail (P)		**X**	**X**
11.	Sedge meadow (P)	**X**	**X**	
12.	Oaks savanna (P)		**X**	
13.	Young-growth woodlands (P)			**X**
14.	Old-fields (P)			**X**
15.	Degraded sedge meadow (P)		**X**	

FIGURE 1. PROJECT BOUNDARY.

FIGURE 2. LOCATION OF VEGETATION STUDY TRANSECTS 1-7 (shown in the context of the ecological management units Figure 4) IN THE PHEASANT BRANCH AND BELFONTAINE CONSERVANCIES, CITY OF MIDDLETON, DANE COUNTY, WISCONSIN.

FIGURE 3. LAND COVER TYPE MAP FOR THE PHEASANT BRANCH AND BELFONTAINE CONSERVANCIES, CITY OF MIDDLETON, WISCONSIN.

FIGURE 4. ECOLOGICAL MANAGEMENT ZONES FOR THE PHEASANT BRANCH AND BELFONTAIN CONSERVANCIES.

SECTION II. RESTORATION AND MANAGEMENT PLANNING PROCESS

INTRODUCTION

Section 1 of this study has documented the ecological health of ecological communities in the Belfontaine and Pheasant Branch Conservancies. The goal of the reporting process is to assess their ecological value and to identify restoration and management needs. This section develops a restoration management and monitoring framework for each of the selected general plant community types identified in the project area.

The Belfontaine and Pheasant Branch Conservancies were divided into ecological management units based on plant community structure and by physical barriers (Figure 4).

RESTORATION MANAGEMENT PHILOSOPHY

This document provides the basic ingredients to satisfy the general goals and objectives, as provided in the preceding section.

The philosophical basis of this plan is heavily reliant on careful, consistent, and efficient implementation of the programs detailed herein. The philosophy has focused on creating ecologically valuable biological communities within the context of a urban and disturbed landscape. Landscape disturbances and the existing condition of the landscape have been detailed in this report. This document has provided fundamental information that serves as a baseline for assessing the effectiveness of future restoration management programs. Vascular vegetation in this project is being used as a surrogate for environmental quality. The assumption is that, if the vascular vegetation communities are restored, wildlife opportunities and human enjoyment benefits will be realized.

The restoration philosophy for this project will focus on creating and restoring ecological systems with minimum effort. It is not our intent to re-create landscapes that were present 150 years ago. Some changes in the landscape preclude the opportunities for doing this, and it is not a goal of this project to burden the City of Middleton or Dane County Parks with restoration and management that would not be practical or have achievable objectives and goals.

ADAPTIVE MANAGEMENT

Management plans need to be flexible because of the variability exhibited by the temporal and spatial resources addressed by a plan. Plans need, at times, to be changed in response to new data and derived insights. For these reasons, this plan should be viewed as being neither conclusive, nor absolute. This plan is a starting point in an ongoing process. The process relies on monitoring to provide feedback on

program effectiveness, and for evaluation and justification for changes. This process of evaluation, adjustment, refinement, and change is adaptive management. This process is fundamental to management, maintenance, and restoration. We propose that any changes to the management plan be articulated between parties (citizens, City and County staff) and that the ultimate decision rests with the technical expert (or experts), and policy makers who can review the pros and cons and assist in decision making based on ecological merit and the intent of the proposed changes. The structure for negotiating any proposed changes and the agreement process needs to be thoroughly articulated between parties at this point in time to facilitate the most convenient and congenial atmosphere for future negotiations on this subject.

1) Structure of a Management and Restoration Program and Implementation:

This program needs to incorporate all findings from the two levels outlined below of the restoration program to finalize a program schedule. This phase also is useful for finalizing boundaries of the restoration and management efforts.

The restoration and management program plan will be comprised of the two parts described:

a) Remedial Phase: The remedial phase is the period during which major efforts to restore vegetation, habitat structure, and biological diversity is undertaken to begin the process of restoring ecological functions. Tasks undertaken during this phase may include reducing introduced non-native and other undesirable trees and brush, removal of previous debris and substrate fill areas, addressing erosion and contamination problems, and other general tasks.

b) Maintenance Phase: After major investments of human energy and money are expended to achieve initial goals, restoration shifts to a low-intervention program. This is less costly, and provides an excellent opportunity for long-term community and volunteer involvement.

Once established, the maintenance phase is guided by both regular management techniques and by strategies that are implemented on a rotation through identified subunits (i.e. units that are convenient to manage such as prescribed burning units demarcated by existing and convenient hiking trails that serve as safe fire breaks).

2) Scheduling Monitoring and Management For Ecological Restoration Projects:

a) In most land management programs, tasks to be undertaken are relatively simple, and most are repetitive. Often the most difficult part of the restoration program is organization of the tasks in a clear and easily understood format. It is also important that the program and schedule be designed to be flexible. Flexibility is a requisite anytime activities are planned that require complimentary and facilitating meteorologic conditions, and to allow for feedback from the monitoring program to identify changes in strategy, techniques, and timing that may be necessary or desirable to satisfy the restoration goals.

b) Applied Ecological Services, Inc. (AES) has created a simple time line oriented format for displaying and scheduling tasks required in the Pheasant Branch and Belfontaine Conservancies (Table 3). This approach provides all tasks in the left hand column and quarterly scheduling of each task over, at least, a 5-year period. During each quarter, specific target dates for implementation are identified with ample time to provide appropriate notice for scheduling personnel, volunteers, and equipment needs. Annually, budget projections should be created for each task and level of effort expected. Maps for each task, identifying limits of the work effort, and corresponding in-field markings should also provided to personnel organizing the restoration field work.

c) The Restoration and Management schedule: Finalization of this schedule for restoration and management is contingent on several pieces of information and timing:

1. An assessment of financial commitment

2. Personnel and labor availability and requirements

3. Duration and guidance provided by the public participation process, and

4. Results of the monitoring programs.

TABLE 3.

EXAMPLE FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

FOR THE CONSERVANCY SYSTEM

		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
		QTR	QTR	QTR	QTR	QTR
1.	**Prescribed Burn Site Inspection:**	1 2 [3]* 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4
	Assess site conditions to determine feasibility, fuel load conditions					
2.	**Burn Management:**	1 [2] [3] 4	1 [2] 3 4	1 [2] 3 4	1 [2] 3 4	1 [2] 3 4
	Apply for permits, schedule burn, contact local authorities, finalize burn plan					
3.	**Conduct Burn:**	1 [2] [3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4
4.	**Weed Management and Site Inspection:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4
	Assess site condition, identify threats, i.e. purple loosestrife, reed canary grass. Recommend mowing where necessary and/or design herbicide application plan					
5.	**Mowing:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4
6.	**Herbicide Management:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4
	Wick application to non-native invasions.					
7.	**Summary Report:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]
	Annual report to client to provide specifics on activity and recommendations					
8.	**Vegetation Monitoring:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]

9.	**Hydrologic Monitoring:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]
Installation of water level recorder						
10	**Hydrologic Monitoring:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]

3) Specialized Training for Restoration and Management: For many of the restoration tasks (i.e. prescribed burning, herbicide use, monitoring and research) specialized training, often licensing or certification, and oversight and guidance are required well in advance of the dates for commencement of the restoration program. Personnel and volunteers involved in prescribed burning, brush control, monitoring, seed collection, etc., should receive training commensurate with the activity in which they would be involved. Training is especially important for those activities that may have risk and safety implications (i.e. prescribed burning), but also for monitoring, where an accurate assessment of the ecological performance of the ecological system to the restoration treatments is required.

4) Ecological Monitoring: The process of ecological monitoring provides important and regular data on the effectiveness of the restoration program. Effectiveness is to be judged against the original (and new) goals and measurable objectives designed by the project. Goals are generally refined during project design phases and over time as project performance is measured.

Monitoring should use standard methods of measurement and provide a systematic record of important and key variables that directly or indirectly measure the ecological system and restoration performance.

Monitoring for most variables can utilize study transects which can be permanently field marked. Repeating the sampling methods for vegetation would provide measures of the response of the vegetation community to restoration treatments.

Photographic monitoring, including 35-millimeter color slide and color video coverage of the restoration treatment process and results, is useful. We would propose that permanently installed photographic stations be identified and regularly visited during the course of the restoration process. This documentation, when coordinated with vegetation monitoring (also birds, insects, etc.), will be immensely useful in development of interpretative and educational materials.

The monitoring program should focus on measurement of the following variables:

* Effectiveness of management/restoration strategies on vascular vegetation

* Erosion control effectiveness and sedimentation rates

* Attainment of the management/restoration goals and objectives

* Public perception of the restoration program results

* Visual conditions and changes that occur once restoration and management programs are implemented

5) Reporting: Every year during the remedial phase, one report should be prepared for this restoration program. This report should detail all tasks, labor, costs, and locations and dates of all management and restoration efforts undertaken. The report should also detail monitoring data collected, to identify trends in the status and condition of the ecological variables. Public perception information, such as that generated in association with this demonstration projects, may best be reported in memorandum format (if this surveying is intermittent) or perhaps as a separate report if a standard (survey form) program for assessment of perception is implemented. Generally, we recommend that every 5 years a detailed technical analysis and summary of all the previous data be completed. This report may best be termed "*Ecological Status Report*". It would be designed to assimilate all previous data, and prepare easily understood graphics and summary materials. This is a very useful report for identifying achievement of important milestones.

THE MANAGEMENT/RESTORATION PLAN

The management/restoration plan is comprised of two phases: The remedial and maintenance phases. The remedial phase involves the major restoration and

management tasks, and, consequently, is usually the more laborious and costly. The second phase is the maintenance phase. It is less costly, and represents the long-term management/ restoration program tasks. It should be viewed as a routine maintenance program conducted annually at strategic times to achieve and maintain specific ecological and biological objectives.

The period of time required to conduct the remedial restoration phase depends on the level of effort required, condition of the ecological system, opportunities and constraints (i.e. access, weather, biological response), and financial base of the program. Typically a remedial phase of two to three years is required, followed by the maintenance phase.

RESTORATION TASKS

This study indicated non-native plants are present and often times have an overwhelming influence on the native vegetation. Restoration tasks associated with this project include:

1) Reduction of non-native shrubs and trees.

2) Reduction of non-native ground cover vegetation both in the forested areas, wetlands and in open fields.

3) Reduction of overstocked canopy of native, early-successional trees. In some locations early successional trees (such as boxelder) provide an overall prevailing influence on the rate of succession, aesthetics, and diversity of the biological communities. In locations where these plants dominate, we propose that thinning of the canopy structure will allow more light to the ground, which will promote the establishment and growth of native ground cover vegetation.

4) Enhancement of opportunities for growth of native ground cover vegetation. Because of the dense shade in some woodlands and wetlands created by non-native trees and shrubs, ground cover vegetation is largely suppressed and consequently not growing. Bare ground is also found in the shade suppressed areas. A restoration strategy will require the reduction of the growth of these non-native plants, addition of seed collected from the local area, and management strategies (such as prescribed burning) to enhance the growth of the native ground cover vegetation.

5) Education. One of the principle needs associated with any restoration project is the understanding of the restoration goals, status, and process by the adjacent homeowners, City and County staff, volunteers and others involved with the land.

RESTORATION OBJECTIVES AND PERFORMANCE CRITERIA

To address restoration tasks, specific performance criteria and objectives have been designed. These are briefly outlined below. Later sections of this report lay out the methods for implementing restoration tasks and achieving the objectives and performance criteria, and provide scheduling for these efforts.

MANAGEMENT OBJECTIVES AND PERFORMANCE CRITERIA

1. Brushing. Under this criteria, using the techniques defined in later sections, 90% mortality of all treated stems shall be achieved within a three year period. This will include a 90% reduction in the non-native woody plants and native shrub material.

Problematic plant species: Within the Pheasant Branch and Belfontaine Conservancies a number of non-native (and a few native) woody invasive species have become established. While prescribed burning may reduce some of these species, it is often necessary to use selective or non-selective herbicides on some species.

Woody species: Woody non-native and native species invasion can result in significant reductions in the native woody and herbaceous component within a plant community. The most problematic species are non-native European buckthorn (*Rhamnus cathartica)*, non-native honeysuckle (*Lonicera spp.),* native boxelder (*Acer negundo),* and native red osier dogwood (*Cornus stolonifera*).

European buckthorn (*Rhamnus cathartica):* In high quality areas, small plants in small localized areas may be hand pulled, dug, or pulled using a weed wrench (Hoffman and Kearns eds. 1997). Keep soil disturbance to a minimum. In large infestations, chemical control should be used. Chemical control methods are best done during the fall when most native plants are dormant and buckthorn is still actively growing. This reduces the risk of affecting non-target plants. The buckthorns' green leaves will provide easy recognition and allow for a thorough treatment at this time. Control treatments are also effective in the growing season, but there is more risk of affecting non-target plants, and the effectiveness of the treatment is generally lower. Winter application of chemicals has proven to be successful as well, and further reduces the risk of damaging non-target species.

During the growing season, cutting stems off near ground level and treating them with glyphosate (Roundup) successfully curbs resprouting. Immediately after cutting, a 20-25% active ingredient (a.i.) glyphosate) solution should be applied to the stumps (Glass, 1994). Re-sprouts should be cut and treated again, or sprayed with a hand sprayer of 1.05% a.i. glyphosate solution to the foliage. Foliar application of glyphosate herbicide using a backpack sprayer is effective, but less selective.

For severely disturbed sites, a 25-50% a.i. triclopyr (Garlon) solution diluted in water can be sprayed with a low pressure hand sprayer, a spray bottle, or sponge applicator to freshly cut stumps (Heidorn, 1991). A 12.5% a.i. triclopyr (formulated for oil dilution) solution is also effective as a cut stump treatment. Basal bark application of 6% a.i. triclopyr (formulated for oil dilution) solution or 2-4-D (12.5% a.i.) in diesel fuel also effectively controls buckthorns.

Treatment for European buckthorn in the spring and fall with a mixture of 25% a.i. triclopyr (formulated for oil dilution), a spreading agent (10%), and diesel fuel (65%) has been successful. The triclopyr concentration can be increased to 30% in the dormant season. For stems larger than 2 inches, spray all the way around the stem. For smaller stems, spraying one side is sufficient. This treatment may not be effective on larger trees.

Fosamine (Krenite), a non-selective bud inhibitor for woody species, can be applied as a basal bark treatment in the fall at 3% a.i. concentration in water.

Honeysuckle (*Lonicera tatarica)*, small and medium sized young plants can often be dug or pulled (Nyboer, 1992). In sensitive areas, physical removal may disturb the soil sufficiently to result in more invasions. In fire adapted communities, spring burning will kill seedlings and top kill larger plants, but resprouting may occur (Nyboer, 1992).

Bush honeysuckles can be chemically controlled by cutting the stems at the base with a brush-cutter, chain saw, or other tools. Stumps should be treated immediately with a 20% active ingredient (a.i.) glyphosate solution using a low-pressure, hand-held sprayer, sponge applicator, or contact solution bottle (Nyboer, 1992). Stumps can be treated later after cutting with the same herbicidal solution, although this may not be as effective. Two cuts per year—the first in early spring followed by one in early autumn have been effective. If not followed by herbicide treatment, cuts made in winter will encourage vigorous resprouting when plants come out of dormancy. Triclopyr formulated for water dilution (Garlon 3A) is not effective on this species; triclopyr (Garlon 4) formulated for dilution in diesel fuel can be used for applications on cut stumps throughout the year, although winter application has in some cases proven to be 100%

effective, whereas spring treatment has shown 70-80% effectiveness (Hoffman and Kearns 1997). If stump treatment is not done at the time of cutting, foliage on the resprouts may be sprayed, taking care to avoid non-target plants.

Where burning is not possible, a 1.5% a.i. glyphosate (Roundup) solution can be sprayed to cover the foliage of honeysuckle (Nyboer, 1992). Spraying after the plant blooms may kill mature and seedling plants. Spraying prior to the emergence of native shrubs and ground flora is the safest time to spray without impacting native species. In wetlands, glyphosate (Rodeo) formulated for use over water must be used.

Both mechanical and chemical control methods must be repeated for a least three to five years in order to stop new plants emerging from the seed bank. Re-invasion by bush honeysuckles may be aided by "underplanting" disturbed areas with tolerant native species.

Boxelder (*Acer negundo)*, is resistant to girdling. Trees and resprouts must be cut and herbicide applied to the stump (Hoffman and Kearns 1997). Glyphosate (Rodeo) licensed for use in wetland systems is recommended.

Red Osier Dogwood (*Cornus stolonifera*), can be successfully controlled by cutting stems in summer and fall and carefully applying an herbicide (Roundup) to cut stems using a wick or spot applicator. Basal bark application may also be effective. Glyphosate applied to foliage at 7 pints/acre in August has been found to kill dogwood (Hoffman and Kearns 1997). Prescribed burning will top kill red osier dogwood if fuel load is sufficient. However plants will resprout from roots.

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2. Native Ground Cover Vegetation. Within a period of five years, we propose that native ground cover vegetation should achieve a cover value in meter square quadrat samples of 50-70% grasses and sedges, and 30-50% cover of native forbs. Prior to this, reduction or elimination of problematic species may be necessary.

Herbaceous problematic species: Non-native species invasion can result in almost monotypic stands of that species. This reduces plant diversity and reduces wildlife habitat value. The most problematic herbaceous species at the Pheasant Branch and Belfontaine Conservancies are 1) common reed grass (*Phragmites australis)*, 2) reed canary grass (*Phalaris arundinacea)*, 3) leafy spurge (*Euphorbia esula)*, and 4) dame's rocket (*Hesperis matronalis*). Specific recommendations taken from Hoffman and Kearns eds. (1997) follow:

Reed canary grass (*Phalaris arundinacea)*, is difficult to eradicate; no single control method is universally applicable. In natural communities, mechanical control practices are recommended. In buffer areas and in severely disturbed sites, chemical and mechanical controls may be used. If herbicide is used, care should be taken to prevent contact with non-target species. Any control technique to reduce or eliminate reed canary grass should be followed by planting native species adapted to the site.

Small, discrete patches of reed canary grass may be covered by black plastic for at least one growing season; the bare spot can then be reseeded with native species (Henderson, 1990). This method is not always effective and must be monitored because rhizomes can spread beyond the edge of the plastic. Hand-pulling or digging may work on small stands in the early stages of invasion (Hutchison 1992).

Prescribed burn in late spring or late fall may help reduce the reed canary grass population if repeated annually for 5 to 6 years. However, these fires are difficult to conduct due to water levels and/or the greenness of the grass at the time of burning. The application of 1.5% active ingredient solution of glyphosate (Rodeo) will "brown off" reed canary grass enough to conduct prescribed burns. A late-spring burn followed by mowing or wick-applying Glyphosate to the emerging flowering shoots will eliminate reed canary grass seed production for that year.

Mowing twice yearly (early to mid-June and again in early October) may help control reed canary grass by removing seed heads before the seed matures and exposing the ground to light, which promotes the growth of native wetland species (Gillespie and Murn 1992). Disking the soil in combination with a mowing or burning regime may help by opening the soil to other species.

Small, scattered clones (2 feet in diameter) can be controlled by tying the stems together just before flowering, cutting them, and applying glyphosate (Rodeo) in a 33% active ingredient (a.i.) solution to cut stems. Apfelbaum and Sams (1987) found several herbicides effectively killed reed canary grass.

A formulation of glyphosate designed for use in wetlands will kill reed canary grass (especially young plants) when applied to foliage. Apply in early spring when most native plant species are dormant. Any herbicide application should be done only after removing dead leaves from the previous year in order to maximize growing shoot exposure and to minimize herbicide use.

A 5% a.i. solution of glyphosate (Rodeo) formulated for use over water applied as a foliar spray will kill reed canary grass. Two herbicidal

applications may be necessary to ensure complete coverage. Herbicide applied with a wick applicator attached to a tractor affects taller stands of reed canary grass without impacting the shorter vegetation. A late mowing in mid-September, followed by the application of 5% a.i. glyphosate in October can help to control reed canary grass.

While herbicide kills reed canary grass, the seed bank may germinate and recolonize the site. Several herbicidal application may be necessary to inhibit seed bank recolonization. After the first application of herbicide has killed living plants, disturbance of the soil can encourage seed bank germination. When this occurs, the site can again be treated with herbicide to deplete the seed bank.

An alternative method involves wick application of glyphosate in the first to third weeks of June, followed by a late June to mid-July burn. This technique reduces reed canary grass cover, depletes the seed bank, and stimulates native seed banks.

Leafy spurge (*Euphorbia esula)*, no mechanical control methods have been found to work effectively. Destruction of the root system is essential for control and mechanical methods such as fire, cultivation, mowing and pulling have not been successful (Cole 1990, 1991).

Several biological control agents are being investigated (flies, beetles, fungus, etc.). Seven insects have been released to control leafy spurge (Messersmith and Lym 1990; Lym 1994). Together, these insects feed on the leaves, shoot tips, stems, root crowns, and secondary roots of leafy spurge. Experimental releases in a few sites in Wisconsin since 1995 have shown good insect reproduction, and some impact on spurge is becoming evident.

Grazing by goats in areas infested with leafy spurge has been used on range lands (Sedivec et al. 1995). The goats, which show a strong preference for spurge, are less costly than chemical control measures.

It has also been observed that the allelopathic effects of black walnut inhibits plant growth.

Until a proven biological control is approved, herbicides appear to be a temporary solution. Land managers who find small infestations of this plant are advised to take immediate action to control it through the application of chemicals.

Picloram (Tordon) is the most effective chemical control for this species but should not be used on high quality natural areas (Lym and Messersmith 1990). This chemical may seriously affect woody species,

and extreme care should be taken in its application. Picloram moves through the soil and is absorbed by the roots of adjacent plants up to 30 feet away. The recommended application rate for scattered patches is 2 lbs./acre in late spring followed by 2 lbs./acre in early fall; the result is 85-90% shoot control for 3-4 years. For large infestations that are accessible and easily treatable, annual applications in late spring using Picloram at 0.5 lbs./acre achieves up to 70% control. This must be followed by 0.5 lbs./acre once a year.

Quinclorac at 5.7 lb./acre plus Picloram at 2.8 lb./acre was found to provide 85 percent control of leafy spurge nine months after treatment (Hoffman and Kearns 1997). Quinclorac has been shown to successfully control leafy spurge in the green house environment when applied either to the foliage or the soil. If plant shoot tops are cut at time of treatment, 0.12 lb./acre of Quinclorac should be used. Otherwise, 2-4 lb./acre of soil-applied Quinclorac should be used.

A 3% active ingredient solution of fosamine applied to blooming plants in June and July has been effective (Glass 1992). Fosamine is a bud inhibitor which targets woody species and does not appear to affect herbaceous plants. Control was achieved after one year of chemical application, but follow-up was necessary for three to four years to inhibit germinants form the soil seed bank.

Glyphosate may be used to treat small patches, but requires repeated application (Lym 1994). Dicamba (Banvel) has also been cited for selective broadleaf weed control.

Common Reed (*Phragmites australis).* Areas that have been invaded by common reed have excellent potential for recovery, but it is imperative to monitor the site. Common reed very readily re-invades suitable habitats even after it has been eradicated (Marks and Randall 1994).

Cutting can control and possibly eliminate common reed, depending on the time of year when it is done. It is generally agreed that the most effective time to cut common reed is midway during the growing season (about mid-June) when the rhizome reserves are at there lowest. This generally results in a low shoot population in the following spring (Hocking et al. 1983). Shoots cut early in the growing season generally re-sprout, resulting in no major effect on the population. Late in the season rhizomes have replenished their reserves and cutting again has little effect. Hocking et al. (1983) reported that cutting three times during the growing season reduces stem biomass by 60%, and repeated annual cutting eventually eliminates stands.

Drainage of an area can effectively control common reed, especially if followed by heavy grazing (Hocking et al. 1983). Once the area is drained and the reed eliminated, it is unable to re-invade (Haslam 1965).

Plowing or disking, if done properly, can help control common reed, but if done incompletely will only serve to fragment the rhizomes and spread the population. If the fragments are brought to the surface they will desiccate, or if buried deeper they are likely to exhaust their reserves before the shoots reach the surface (Haslam 1971). Hocking et al. (1983) reported that rotary hoeing followed by springtime cultivation is effective in bringing the rhizomes to the surface.

Marks et al. (1994) found that covering reed grass with black plastic may be effective, but is much more labor intensive than cutting and burning.

Flooding can be used to control common reed when three foot of water covers the rhizomes for an extended period during the growing season, usually four months (Marks et al. 1994). It must be noted that many areas cannot be flooded to the necessary depth and duration without damaging or destroying the desirable plant species or communities.

Amitrole, Amitrole-T, 2.2-DPA, and glyphosate have been successfully used to control common reed (Dunham 1970) Hocking et al. 1983). Glyphosate applied using a rope wick application and foam spray at 12 liters per ha gave 98% control (Hocking et al. 1983). Application of glyphosate is most effective when the plants are mature and actively translocating resources to the rhizomes. Spraying shoots that are senescing during late autumn is recommended (Hosking et al. 1983). Herbicides containing amitrole (25 g amitrole per liter plus 220 g ammonium tiocyanate per liter) applied at 2.2 to 2.3 liters to 100 liters water, and 2,2-DPA (740 g of 2,2-DPA as the Na salt) applied a 1 to 2 kg per 100 liters of water are effective if sprayed during flowering (Hocking et al. 1983).

Rodeo (active ingredient: 53.8% glyphosate) is registered for use in areas of open water and is often used to control common reed (Marks et al. 1994). Rodeo should be applied after the tasseling stage when plants are actively translocating nutrients to the rhizomes. In dense stands, some plants may not receive adequate exposure to the herbicide, and retreatment may be necessary. Marks et al. (1994) reported 90% success after Rodeo was applied aerialy in late August. A prescribed burn was conducted in the area during the following February to remove litter and allow reestablishment of marsh vegetation.

In more sensitive areas where protection of surrounding vegetation is a concern, Rodeo can be applied to specific plants or small populations

using a backpack sprayer. Marks et al. (1994) reported success using Rodeo in tidal areas and using Accord, another glyphosate product, in non-tidal areas. The herbicides were applied from mid-August to mid-October, when the seeds were ripening. Only tasseling plants were treated.

Dame's Rocket (*Hesperis matronalis*) is not yet widely recognized as an invasive plant in the Midwest. Consequently, this plant may not be recognized as a troublesome species until it is well-established as a formidable problem. Locating and removing plants immediately before seed set is the best way to prevent the spread of dame's rocket. Be sure to check the contents of "wildflower" seed mixes for this species, and do not plant those that carry it.

Pulling may need to be done for several years to remove new plants established from the seed bank. Pulling or use of a dandelion digger is most effective when the soil is moist. If plants are pulled when in bloom, they should not be placed in compost piles, as the seeds may still ripen and spread. Flower-heads should be bagged for landfills, or dried and burned where permissible. Where there is sufficient leaf litter or other fuel, burning has been found to be an effective control method.

Selectively applying a broadleaf herbicide like glyphosate to seedlings according to label recommendations may also be an effective means of control. To avoid damaging adjacent native vegetation, apply herbicides in late fall when the rosettes are still green.

3. Planted Areas. We propose that planted areas achieve performance within five years comparable to the native ground cover vegetation objectives. That is, within a period of five years native planted ground cover. Vegetation should achieve a cover value in meter square quadrats of 50-70% cover of grasses and sedges, and 30-50% cover of native wildflowers.

PROGRAM IMPLEMENTATION

INTRODUCTION

This section provides recommendations and additional detail to consider in implementation of the management and maintenance program within specific ecological communities.

RECOMMENDATIONS

Recommendations that follow are proposed to manage, maintain and monitor the effectiveness of restoration activities in upland forests, floodplain forests, wetlands, prairies, and Pheasant Branch Creek banks. In the process, prescribed burning is the single most useful and important management method required for restoration. The other restoration strategies prepare a site for use of prescribed burning, or are primarily involved in reintroduction of proper conditions and species into sites. Once fire can be easily and safely reintroduced, the remedial phase is over. A shift to the maintenance phase will require less labor, money, and overall effort.

1. **Prepare sites for use of prescribed burning management**: Preparation of the site so that prescribed burning can be introduced is often a major remedial phase management strategy.

   In locations where dense brush and little combustible fuel occurs, manual reduction of existing dense shrub growth will be required to open the areas. Once open, and especially if ground cover vegetation responds directly or after reintroduction, prescribed burning can be used.

   If use of fire is hampered in areas with non-native, cool-season grasses (i.e. reed canary grass), alternatives to consider to facilitate eventual use of fire are described as follows. Where the evergreen growth of cool season grasses does not carry fire, very careful and discriminate use of herbicides can assist in reduction of the cool season grasses. In these situations, direct plant contact with a wick applicator and the herbicide *Rodeo* or *Roundup* (Glyphosate) or the grass herbicide "Fusion" have provided quick and safe initial control of the grasses. Often, low mowing of the grasses (.5 to 1 inch height) can reduce green foliage and, after drying, this litter can be used as fuel to carry a fire. In these situations, fire is prescribed to follow (5-15 days) the herbicide treatment. This method will be especially useful in old fields proposed to be restored to prairie or wetlands.

   Herbicide is generally applied to cool season grasses after they have reached a height of 5-8 inches and display a new flush of green, actively growing foliage. Herbicide is applied at the label rates by trained applicators with good botanical training. Areas not receiving treatment should be cordoned off, and careful attention paid to inappropriate application and the problems that could result.

In larger pieces of property, large wick applicators with adjustable boom heights are very useful for wicking taller, dominant plants. This strategy often can utilize an all- terrain vehicle (or riding lawn mower) for carrying the boom.

Regardless of the method used, very careful oversight of the process is desirable. Although the herbicide *Roundup* is incorporated within several hours after application, and wick application in contrast to spraying involves a very small quantity of herbicide, the areas that are treated should be field-labeled and guarded to manage human-use for the first couple hours after application. *Roundup* has very low toxicity to wildlife, and will not present a threat to pets.

2. **Reintroduction of plant species**:

a. Because the Belfontaine Conservancy area is not a "natural area", a policy for determining which species of plants are appropriate for reintroduction or introduction may not be as important as in a Natural Area. However, we would propose that plant introductions be limited to species for which the likelihood of historic occurrence exists. This does not rule out opportunities for use of short-lived, non-native species (i.e. annual rye grass *Lolium multiflorum*, which may assist in stabilizing badly eroding areas) or the use of hybrid popular for short-term site buffering.

b. Plant propagation and introduction of seeds (and perhaps plants) from local species should continue concurrently with other management and restoration strategies. Our observations suggest soil seed banks are present in many areas. To restore these areas, additional seeds from native species (propagated and cultivated for seed production, or wild harvested seeds) should be gathered or produced in ample quantity (and quality) to enable prompt introduction during the early years of restoration. For species that are no longer present in the area, appropriate and closest locations should be identified for seed harvesting, propagation, cultivation, and eventual introduction purposes. We generally recommend that seed come from as close to the site of introduction as possible. We generally limit the bounds for collection for any introduction program to the physiographic province (i.e. natural area division) of the recipient location. We encourage that priority be given to native grasses and sedges initially (to provide seed that can be used to quickly stabilize slopes in degraded wetland areas) followed by the annual, biennial, and perennial flowers.

There may be opportunities during this program to involve volunteers in seed collection and growing.

3. **Restoration of existing ecological or proposed ecological communities**:

Lowland hardwood forests: Removal of non-native shrubs and ground cover species is required. Currently, portions of this community have been invaded by the non-natives, European buckthorn, dame's rocket, and reed canary grass. Ecosystem health will continue to decline if action is not taken to control non-native shrubs and herbs in this community.

Management recommendations:

1. Removal of European buckthorn by cutting and herbicide treatment with Garlon 4A. In most instances stems can be cut and left in place.
2. Removal/girdling of selected boxelder to increase light. Girdling should occur only in areas away from trails as not to result in a hazard from falling trees.
3. Herbicide of reed canary grass using Rodeo where standing water is present and "Poast" where a broadleaf native component remains and standing water is not present. The optimal time for herbiciding is when the plants begin to bolt, usually in mid-June.
4. Reintroduce limited fire to stimulate native seed/propagules and control dame's rocket and buckthorn.

The lowland forest area has been divided into three ecological management units (Figure 4). A five-year schedule for maintenance activities provides tasks necessary to begin the restoration of the management units in the lowland hardwood forest (Tables 4A, 4B and 4C).

Upland oak savannas: Several oak woodlands are found within the property boundaries. These are severely degraded resulting from an invasion of non-native shrubs. Control of these non-natives will be necessary to increase the quality and ecological health of this community. The upland oak savanna system has been divided into three ecological management units (Figure 4).

Management recommendations:

1. Continue honeysuckle and woody species removal by cutting/girdling and herbicide application to cut stumps in Area 3DIII.
2. Continue prescribed burning of savanna woodland and knoll (3DIII). After remedial stage (i.e. after 3-4 years) initiate burn rotation.

3. Begin buckthorn and honeysuckle eradication through brushing and herbicide application to cut stumps in Areas 3DI and 3DII.
4. Begin prescribed burning of savanna woodland Areas 3DI, 3DII, 3DIII.
5. Leafy spurge control around 3DI.
6. Reintroduction of native species into 3DI, 3DII and 3DIII.

A five-year schedule for maintenance activities provides tasks necessary to continue and begin the restoration of savannas (Tables 5A, 5B and 5C).

Recently developed woods: Several areas of recently developed woods consisting of boxelder and cottonwood are found on the western side of the Pheasant Branch Conservancy. These areas typically are dominated in the understory by non-native cool season grasses. The low health systems will require substantial labor to restore. The recently developed woodlands have been divided into two management zones (Figure 4).

Management recommendations

1. Remove all early successional trees such as buckthorn in 3CI and herbicide stumps Garlon 4.
2. Herbicide understory grass and forbs with non-selective herbicide such as Roundup in 3CI.
3. Replant to savanna. Plant oaks such as bur oaks and white oaks. Install native savanna ground cover seed mix in 3CI.
4. Remove non-native buckthorns and young boxelders in 3CII.
5. Herbicide non-native herbaceous species such as reed canary grass with Roundup/Rodeo.
6. Reintroduce fire in 3CII, and eventually in 3CI.

A five-year schedule for maintenance activities provides tasks necessary to continue restoration or creation of savannas from recently developed wooded areas (Tables 6A and 6B).

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Wetlands: Several wetland types are found within the project site. These include sedge meadow, scrub/shrub, cattail and reed canary grass areas. The wetland system has been divided into three management zones (Figure 4).

Management recommendations:

1. Herbicide reed canary grass in 4I, 4II, and 4III as plants begin to bolt (mid-June).

2. Control giant reed grass by herbiciding or cutting in 4II.
3. Small areas may need to have sediment removed to original soil level and replanted with native seeds and plants.
4. Create biofilter and sedimentation trap wetlands up stream of high quality wetland areas.
5. Reduce sediment and nutrient loading from offsite. Retrofitting existing adjacent detention ponds to wetland biofilters or wetland sedimentation ponds is necessary to pretreat waters from adjacent subdivision before entering the Pheasant Branch Conservancy. Opportunities for creating wetland biofilters within the Belfontaine Conservancy could assist in protection of the Pheasant Branch Conservancy wetlands.
6. Reintroduce fire to wetland systems on a rotational basis.
7. Cut and herbicide dense patches of red osier dogwood in areas 4I and 4II if fire is unsuccessful in reducing woody species.

A five-year schedule for maintenance activities in wetlands to begin restoration and maintain native wetland communities is provided in Tables 7A, 7B and 7C.

Dry prairie: A dry prairie associated with the west and south slope of the Belfontaine knoll is being invaded along the periphery by native and non-native species. The dry prairie consists of one management zone (Figure 4).

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Management recommendations:

1. Continue brushing and herbicide application of woody species.
2. Continue prescribed burning, with burn rotation on existing high quality remnant.
3. Reintroduction of native species seed.
4. Leafy spurge control.
5. Restore heavily used path to native vegetation.

A five-year schedule for maintenance activities provides tasks necessary to restore and maintain the dry prairie (Table 8).

Old fields: Most of the Belfontaine Conservancy and a small portion of the Pheasant Branch Conservancy consist of old fields or farm ground (2). No management recommendations are proposed for this area until restoration plans have been implemented. A general schedule for prairie is included at this time (Table 9).

TABLE 4A. LOWLAND HARDWOOD FOREST MANAGEMENT ZONE 3BI

FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
		QTR	QTR	QTR	QTR	QTR
[Bracket] indicates quarter when work will be conducted.						
1.	**Weed Management and Site Inspection:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4
Assess site condition, identify threats, i.e. reed canary grass, dames rocket, buckthorn. Design herbicide application plan.						
2.	**Herbicide Management:**	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4
Wick application to non-native herbaceous, i.e. reed canary grass, dames rocket.						
3.	**Brushing:**	1 [2] 3 [4]	1 [2] 3 [4]	1 [2] 3 [4]	1 2 3 4	1 2 3 4
Conducted to remove non-natives, (i.e. European buckthorn)						
4.	**Prescribed Burn Site Inspection:**	[1] 2 3 4	1 2 3 4	1 2 3 4	[1] 2 3 4	1 2 3 4
Assess site conditions to determine						
feasibility, fuel load conditions						
5.	**Burn Management:**	1 [2] 3 4	1 2 3 4	1 2 3 4	1 [2] 3 4	1 2 3 4
Apply for permits, schedule burn, contact local authorities, finalize burn plan						
6.	**Conduct Burn:**	1 [2] 3 4	1 2 3 4	1 2 3 4	1 [2] 3 4	1 2 3 4
7.	**Seed Reintroduction:**	1 2 3 4	1 2 3 4	1 [2] 3 4	1 [2] 3 4	1 [2] 3 4
Reintroduce native plant species, if necessary.						

8.	**Summary and Monitoring Report:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]

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TABLE 4B. LOWLAND HARDWOOD FOREST MANAGEMENT ZONE 3BII

FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

		YEAR 1	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**
		QTR	QTR	QTR	QTR	QTR

[Bracket] indicates quarter when work will be conducted.

1.	**Weed Management and Site Inspection:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4

Assess site condition, identify threats, i.e. reed canary grass, dames rocket, buckthorn. Design herbicide application plan.

2.	**Herbicide Management:**	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4

Wick application to non-native herbaceous, i.e. reed canary grass, dames rocket.

3.	**Brushing:**	1 [2] 3 [4]	1 [2] 3 [4]	1 [2] 3 [4]	1 2 3 4	1 2 3 4

Conducted to remove non-natives, (i.e. European buckthorn)

4.	**Prescribed Burn Site Inspection:**	1 2 3 4	[1] 2 3 4	1 2 3 4	1 2 3 4	[1] 2 3 4

Assess site conditions to determine feasibility, fuel load conditions

5.	**Burn Management:**	1 2 3 4	1 [2] 3 4	1 2 3 4	1 2 3 4	1 [2] 3 4

Apply for permits, schedule burn, contact local authorities, finalize burn plan

6.	**Conduct Burn:**	1 2 3 4	1 [2] [3] 4	1 2 3 4	1 2 3 4	1 [2] [3] 4
7.	**Seed Reintroduction:**	1 2 3 4	1 2 3 4	1 [2] 3 4	1 [2] 3 4	1 [2] 3 4

Reintroduce native plant species, if necessary.

8.	**Summary and Monitoring Report:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]

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TABLE 4C. LOWLAND HARDWOOD FOREST MANAGEMENT ZONE 3BIII

FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

		YEAR 1	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**
		QTR	QTR	QTR	QTR	QTR

[Bracket] indicates quarter when work will be conducted.

1.	**Weed Management and Site Inspection:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4

Assess site condition, identify threats, i.e. reed canary grass, dames rocket, buckthorn. Design herbicide application plan.

2.	**Herbicide Management:**	1 [2] [3] 4	1 [2] [3] 4	1 2 3 4	1 2 [3] 4	1 2 [3] 4

Wick application to non-native herbaceous, i.e. reed canary grass, dames rocket.

3.	**Brushing:**	[1] 2 3 [4]	[1] 2 3 4	1 [2] 3 [4]	1 2 3 4	1 2 3 4

Conducted to remove non-natives, (i.e. European buckthorn), and perhaps boxelder

4.	**Prescribed Burn Site Inspection:**	1 2 3 4	1 2 3 4	[1] 2 3 4	1 2 3 4	1 2 3 4

Assess site conditions to determine feasibility, fuel load conditions

5.	**Burn Management:**	1 2 3 4	1 2 3 4	1 [2] 3 4	1 2 3 4	1 2 3 4

Apply for permits, schedule burn, contact local authorities, finalize burn plan

6.	**Conduct Burn:**	1 2 3 4	1 2 3 4	1 [2] [3] 4	1 2 3 4	1 2 3 4

7.	**Seed Reintroduction:**	1 2 3 4	1 2 3 4	1 [2] 3 4	1 [2] 3 4	1 [2] 3 4

Reintroduce native plant species, if necessary.

8.	**Summary and Monitoring Report:**	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 [4]	1 2 3 [4]

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TABLE 5A. OAK SAVANNA MANAGEMENT ZONE 3DI

FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

YEAR 1 **YEAR 2** **YEAR 3** **YEAR 4** **YEAR 5**

		QTR	QTR	QTR	QTR	QTR
*[Bracket] indicates quarter when work will be conducted.						
1.	**Prescribed Burn Site Inspection:**	1 2 3 4	[1] 2 3 4	[1] 2 3 4	[1] 2 3 4	1 2 3 4
Assess site conditions to determine feasibility, fuel load conditions						
2.	**Burn Management:**	1 2 3 4	1 [2] 3 4	1 [2] 3 4	1 [2] 3 4	1 2 3 4
Apply for permits, schedule burn, contact local authorities, finalize burn plan						
3.	**Conduct Burn:**	1 2 3 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 2 3 4
4.	**Weed Management and Site Inspection:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4
Assess site condition, identify threats, i.e. leafy spurge. Design herbicide application plan						
5.	**Brushing:**	[1] 2 3 [4]	[1] 2 3 [4]	[1] 2 3 [4]	1 2 3 4	1 2 3 4
Conducted to remove non-natives, i.e. honeysuckle, buckthorn						
6.	**Herbicide Management:**	[1] [2] 3 [4]	[1] [2] 3 [4]	[1] [2] 3 [4]	1 [2] 3 [4]	1 [2] 3 [4]
Wick application to non-native invasions, i.e. honeysuckle, buckthorn, garlic mustard.						
7.	**Reintroduce Native Plant Species, If Necessary:**	1 2 3 4	1 2 3 4	1 [2] 3 4	1 [2] 3 4	1 2 3 4
8.	**Summary Report:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]
Annual report to provide specifics on activity and recommendations						

TABLE 5B. OAK SAVANNA MANAGEMENT ZONE 3DII

FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
		QTR	QTR	QTR	QTR	QTR
[Bracket] indicates quarter when work will be conducted.						
1.	**Prescribed Burn Site Inspection:**	1 2 3 4	[1] 2 3 4	[1] 2 3 4	1 2 3 4	[1] 2 3 4
Assess site conditions to determine feasibility, fuel load conditions						
2.	**Burn Management:**	1 2 3 4	1 [2] 3 4	1 [2] 3 4	1 2 3 4	1 [2] 3 4
Apply for permits, schedule burn, contact local authorities, finalize burn plan						
3.	**Conduct Burn:**	1 2 3 4	1 [2][3] 4	1 [2][3] 4	1 2 3 4	1 [2] [3] 4
4.	**Weed Management and Site Inspection:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4
Assess site condition, identify threats, i.e. leafy spurge. Design herbicide application plan						
5.	**Brushing:**	[1] [2] 3 [4]	[1] [2] 3 [4]	[1] [2] 3 [4]	[1] 2 3 4	1 2 3 4
Conducted to remove non-natives.						
6.	**Herbicide and Brush Management:**	[1] [2] 3 [4]	[1] [2] 3 [4]	[1] [2] 3 [4]	1 [2] 3 [4]	1 [2] 3 [4]

Wick application to non-native invasions, i.e. honeysuckle, buckthorn, garlic mustard.

7.	**Reintroduce Native Plant Species, If Necessary:**	1 2 3 4	1 [2] 3 4	1 [2] 3 4	1 [2] 3 4	1 2 3 4
8.	**Summary Report:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]

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TABLE 5C. OAK SAVANNA MANAGEMENT ZONE 3DIII

FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

		YEAR 1	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**
		QTR	QTR	QTR	QTR	QTR
[Bracket] indicates quarter when work will be conducted.						
1.	**Prescribed Burn Site Inspection:**	1 2 3 4	1 [2][3] 4	1 [2][3] 4	1 2 3 4	1 [2][3] 4

Assess site conditions to determine

feasibility, fuel load conditions

2.	**Burn Management:**	1 2 3 4	1 [2] 3 4	1 [2] 3 4	1 2 3 4	1 [2] 3 4

Apply for permits, schedule burn, contact local authorities, finalize burn plan

3.	**Conduct Burn:**	1 2 3 4	1 [2][3] 4	1 [2][3] 4	1 2 3 4	1 [2] [3] 4
4.	**Weed Management and Site Inspection:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4

Assess site condition, identify threats, i.e. leafy spurge. Design herbicide application plan

5.	**Brushing:**	[1] [2] 3 [4]	1 2 3 4	1 2 3 4	[1] 2 3 [4]	1 2 3 4

Conducted to remove non-natives.

6.	**Herbicide Management:**	1 [2] 3 [4]	1 [2] 3 [4]	1 [2] 3 [4]	1 [2] 3 [4]	1 [2] 3 [4]

Wick application to non-native invasions, i.e. honeysuckle, buckthorn, garlic mustard.

7.	**Reintroduce Native Plant Species, If Necessary:**	1 2 3 4	1 [2] 3 4	1 [2] 3 4	1 2 3 4	1 2 3 4
8.	**Summary Report:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]

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TABLE 6A. RECENTLY DEVELOPED WOODLAND MANAGEMENT ZONE 3CI

FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

		YEAR 1	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**
		QTR	QTR	QTR	QTR	QTR

*[Bracket] indicates quarter when work will be conducted.

1.	**Brushing/Cutting:**	[1] [2] 3 [4]	[1] [2] 3 4	1 2 3 4	1 2 3 4	1 2 3 4

Remove all early successional native trees and all non-native shrubs.

2.	**Herbicide Management:**	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4

Application to non-native invasions, i.e. reed canary grass and brome grass.

3.	**Plant Savanna Trees and Herbs:**	1 2 3 4	1 2 [3] 4	1 [2] [3] 4	1 2 3 4	1 2 3 4
4.	**Weed Management and Site Inspection:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4

Assess site condition, identify threats, i.e. leafy spurge. Design herbicide application plan

TABLE 6B. RECENTLY DEVELOPED WOODLAND MANAGEMENT ZONE 3CII

FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

		YEAR 1	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**
		QTR	QTR	QTR	QTR	QTR
[Bracket] indicates quarter when work will be conducted.						
1.	**Prescribed Burn Site Inspection:**	[1] 2 3 4	1 2 3 4	1 2 3 4	[1] 2 3 4	1 2 3 4

Assess site conditions to determine feasibility, fuel load conditions

2.	**Burn Management:**	[1] 2 3 4	1 2 3 4	1 2 3 4	1 [2] 3 4	1 [2] 3 4

Apply for permits, schedule burn, contact local authorities, finalize burn plan

3.	**Conduct Burn:**	1 [2] [3] 4	1 2 3 4	1 2 3 4	1 [2] [3] 4	1 2 3 4
4.	**Weed Management and Site Inspection:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4

Assess site condition, identify threats, i.e. reed canary grass. Design herbicide application plan

5.	**Brushing:**	1 2 3 [4]	1 [2] 3 [4]	1 [2] 3 [4]	1 [2] 3 [4]	1 [2] 3 [4]

Control buckthorn, boxelder.

6.	**Herbicide Management:**	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4

Wick application to non-native invasions, i.e. buckthorn, reed canary grass.

7.	**Reintroduce Native Wet Woodland Species:**	1 2 3 4	1 2 3 4	1 [2] 3 [4]	1 [2] 3 [4]	1 2 3 4
8.	**Summary Report:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]

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TABLE 7A. WETLAND MANAGEMENT ZONE 4I

FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

		YEAR 1	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**
		QTR	QTR	QTR	QTR	QTR

[Bracket] indicates quarter when work will be conducted.

1.	**Prescribed Burn Site Inspection:**	[1] 2 3 4	1 2 3 4	1 2 3 4	[1] 2 3 4	1 2 3 4

Assess site conditions to determine feasibility, fuel load conditions

2.	**Burn Management:**	[1] 2 3 4	1 2 3 4	1 2 3 4	[1] 2 3 4	1 2 3 4

Apply for permits, schedule burn, contact local authorities, finalize burn plan

3.	**Conduct Burn:**	1 [2] 3 4	1 2 3 4	1 2 3 4	1 [2] 3 4	1 2 3 4
4.	**Weed Management and Site Inspection:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4

Assess site condition, identify threats, i.e. purple loosestrife, reed canary grass. Design herbicide application plan.

5.	**Brushing/Herbiciding:**	1 2 3 4	[1] 2 3 [4]	[1] 2 3 [4]	1 2 3 4	[1] 2 3 [4]

Control red osier dogwood, willows.

6.	**Herbicide Management:**	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4

Wick application to non-native invasions, i.e. reed canary grass.

7.	**Summary Report:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]

Annual report to provide specifics on activity and recommendations

TABLE 7B. WETLAND MANAGEMENT ZONE 4II

FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

	YEAR 1	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**
	QTR	QTR	QTR	QTR	QTR

[Bracket] indicates quarter when work will be conducted.

1.	**Prescribed Burn Site Inspection:**	1 2 3 4	[1] 2 3 4	1 2 3 4	1 2 3 4	[1] 2 3 4

Assess site conditions to determine feasibility, fuel load conditions

2.	**Burn Management:**	1 2 3 4	[1] 2 3 4	1 2 3 4	1 2 3 4	[1] 2 3 4

Apply for permits, schedule burn, contact local authorities, finalize burn plan

3.	**Conduct Burn:**	1 2 3 4	1 [2] 3 4	1 2 3 4	1 2 3 4	1 [2] 3 4
4.	**Weed Management and Site Inspection:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4

Assess site condition, identify threats, i.e. purple loosestrife, reed canary grass. Design herbicide application plan.

5.	**Brushing/Herbiciding:**	[1] 2 3 [4]	1 2 3 4	[1] 2 3 [4]	[1] 2 3 [4]	1 2 3 4

Control red osier dogwood, willows.

6.	**Herbicide Management:**	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4

Wick application to non-native invasions, i.e. reed canary grass, and giant reed grass.

7.	**Summary Report:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]

Annual report to provide specifics on activity and recommendations

TABLE 7C. WETLAND MANAGEMENT ZONE 4III

FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

YEAR 1	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**
QTR	QTR	QTR	QTR	QTR

[Bracket] indicates quarter when work will be conducted.

1.	**Prescribed Burn Site Inspection:**	[1] 2 3 4	1 2 3 4	1 2 3 4	[1] 2 3 4	1 2 3 4
	Assess site conditions to determine feasibility, fuel load conditions					
2.	**Burn Management:**	[1] 2 3 4	1 [2] 3 4	1 [2] 3 4	1 [2] 3 4	1 [2] 3 4
	Apply for permits, schedule burn, contact local authorities, finalize burn plan					
3.	**Conduct Burn:**	1 [2] 3 4	1 2 3 4	1 2 3 4	1 [2] 3 4	1 2 3 4
4.	**Weed Management and Site Inspection:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4
	Assess site condition, identify threats, i.e. purple loosestrife, reed canary grass. Design herbicide application plan.					
5.	**Herbicide Management:**	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4
	Wick application to non-native invasions, i.e. reed canary grass.					
6.	**Summary Report:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]
	Annual report to provide specifics on activity and recommendations					

TABLE 8. PRAIRIE MANAGEMENT ZONE 6B

FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

YEAR 1	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**
QTR	QTR	QTR	QTR	QTR

[Bracket] indicates quarter when work will be conducted.

1.	**Prescribed Burn Site Inspection:**	[1] 2 3 4	[1] 2 3 4	1 2 3 4	1 2 3 4	[1] 2 3 4

Assess site conditions to determine feasibility, fuel load conditions

2.	**Burn Management:**	[1] 2 3 4	[1] 2 3 4	1 2 3 4	1 2 3 4	[1] 2 3 4

Apply for permits, schedule burn, contact local authorities, finalize burn plan

3.	**Conduct Burn:**	1 [2] 3 4	1 [2] 3 4	1 2 3 4	1 2 3 4	1 [2] 3 4
4.	**Weed Management and Site Inspection:**	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4

Assess site condition, identify threats, i.e. leafy spurge. Design herbicide application plan.

5.	**Herbicide Management:**	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4	1 [2] [3] 4

Wick application to non-native invasions, i.e. leafy spurge, buckthorn, honeysuckle.

6.	**Summary Report:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]

Annual report to provide specifics on activity and recommendations

TABLE 9. PRAIRIE MANAGEMENT ZONE 2I AND 2II

FIVE YEAR MANAGEMENT AND MAINTENANCE SCHEDULE

	YEAR 1	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**

		QTR	QTR	QTR	QTR	QTR
*[Bracket] indicates quarter when work will be conducted.						
1.	**Install Prairie Seed:**	1 [2] 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
2.	**Mowing:**	1 [2] [3] 4	1 [2] 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Conducted twice the first year and once the second year						
3.	**Prescribed Burn Site Inspection:**	1 2 3 4	1 2 3 4	[1] 2 3 4	[1] 2 3 4	1 2 3 4
Assess site conditions to determine feasibility, fuel load conditions						
4.	**Burn Management:**	1 2 3 4	1 2 3 4	1 [2] 3 4	1 [2] 3 4	1 2 3 4
Apply for permits, schedule burn, contact local authorities, finalize burn plan						
5.	**Conduct Burn:**	1 2 3 4	1 2 3 4	1 [2][3] 4	1 [2][3] 4	1 2 3 4
6.	**Weed Management and Site Inspection:**	1 2 3 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4	1 [2][3] 4
Assess site condition, identify threats, i.e. leafy spurge. Design herbicide application plan						
7.	**Herbicide Management:**	1 2 3 4	1 [2] 3 4	1 [2] 3 4	1 [2] 3 4	1 [2] 3 4
Wick application to non-native invasions, i.e. leafy spurge.						
8.	**Reintroduce Native Plant Species, If Necessary:**	1 2 3 4	1 2 3 4	1 2 3 4	1 [2] 3 4	[1] 2 3 4
9.	**Summary Report:**	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]	1 2 3 [4]
Annual report to provide specifics on activity and recommendations						

BENEFITS OF RESTORATION

Preceding sections document the ecological health of the ecological systems of Pheasant Branch and Belfontaine Conservancies. Restoration can assist in reducing the cost of long-term maintenance of the system in addition to providing opportunities for stabilization of eroding uplands and creek environments, increasing the lag time of runoff in the upland systems, and stimulating ground cover vegetation in shade-suppressed areas. This would reduce erosion, nutrient loss, and loss of soil seedbank systems, and improve water quality in downstream environments.

Another major benefit provided by restoration in park settings is enhanced aesthetics. Currently, overgrown oak savanna systems provide little aesthetic opportunity and human appreciation. Also, there has been a documented fear associated with dense vegetation cover; people do not feel secure walking down trails lined with dense woody vegetation. The improved safety and aesthetics enhance human opportunities for appreciation and recreation. Restoration of the vegetation system and the hydrologic systems also provides opportunities for wildlife habitat enhancement. The return of structure and biodiversity, and productivity to the ecological system through the restoration process will provide opportunities for a response in breeding bird richness, invertebrates, mammals, and other species that are present or have been present in the recent past in the Pheasant Branch Conservancy.

Once restoration costs and labor needs are reconciled through normal budgeting and labor appropriations for maintenance, further benefits of restoration can be realized. Only a few tasks require additional labor techniques, equipment, and know how for successful implementation. Perhaps the most important of the tasks that does require special training is prescribed burning. This is discussed, along with other methods, in the preceding section of this report.

CONSERVANCY PLANNING AND MANAGEMENT FOR SUSTAINABLE NATURAL RESOURCES

In addition to the deterioration of some of the ecological systems identified in the Pheasant Branch and Belfontaine Conservancies, there are a series of impacts related to land uses outside the boundaries. The opportunity for addressing and resolving these problems relies on cooperative efforts with adjacent landowners. Ecological buffers, can be used effectively to provide additional benefits to park systems (Appendix 6). Buffers are strategically located to provide for ecological benefits generally falling into categories of sediment, nutrient, and surface water management. In some cases where urban development has occurred, buffering can and should include water management features where possible. These would be, in many cases, conventional detention and retention facilities as may be required by local ordinance, but can also include a series

of alternative stormwater management strategies that integrate detention and retention facilities with upland and wetland buffers.

Watershed planning opportunities within public lands context are also important and necessary to address, as are some of the relationships between adjacent lands and the public property. Watershed planning can often be incorporated in the context of model open space designs included within urban, commercial, and development projects. Spreading the open space and park concept beyond the boundaries of public lands by integration of open space in adjacent developments provides a collaborative and creative community option for protecting public lands.

Where restoration is to occur along linear, riverine corridors, and where watershed boundaries obviously go well beyond the property under ownership of the public, the imperative for successful restoration and management at the simplest level will require cooperation of adjacent landowners, and, at best, the development of collaborative watershed management plans for the riverine corridor. This is especially important with the Pheasant Branch corridor.

Public education is a major part of the restoration planning process. The educational process can include fairly simplistic information about the use of herbicides, pesticides, and lawn fertilizers in and around wetlands, lakes, ponds, and streams. Creation and distribution of one-page pamphlets on these subjects would be helpful. Education can also take the form of providing opportunities for citizens to become involved in volunteer restoration opportunities on public lands, in addition to workshops and seminars. Involvement by local media such as newspapers, radio and television on activities to occur or have occurred would be helpful to spread the word. The hands-on experience in restoration projects or the opportunity to view and review test and demonstration projects provides the best means for involving the public in the restoration process. The authors of this report cannot stress the importance of citizen involvement and understanding of the restoration process enough. Where this has not been done successfully, restoration programs are often times severely handicapped in the short and long-term.

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APPENDIX 1

Table 1. Absolute Frequency (AF), Relative Frequency (RF), Absolute Cover (AC), Relative Cover (RC), Importance Values (IV) and Standard Deviation (STD) for plant species encountered in 5 1m^2 quadrats along study Transect 1, sedge meadow/shrub cover at the Pheasant Branch Conservancy, Middleton, Wisconsin. Based on sampling June 22, 1998.

			AVG	5			{ESC}.
Scientific Name	**AF**	**RF**	**AC**	**RC**	**IV**	**STD**	{END}
Agropyron repens	1	1.56	0.60	0.45	2.01	1.34	{DOWN}
Aster novae-angliae	1	1.56	0.60	0.45	2.01	1.34	
Aster puniceus	5	7.81	13.20	9.81	17.62	7.19	
Aster simplex	4	6.25	2.00	1.49	7.74	1.87	
Bromus inermis	1	1.56	0.40	0.30	1.86	0.89	
Calamagrostis canadensis	1	1.56	0.80	0.59	2.16	1.79	

Carex hystericina	2	3.13	4.80	3.57	6.69	6.57						
Carex lanuginosa	1	1.56	0.40	0.30	1.86	0.89						
Carex stipata	2	3.13	1.80	1.34	4.46	2.49						
Carex stricta	2	3.13	20.00	14.86	17.98	30.82						
Carex vulpinoidea	1	1.56	1.00	0.74	2.31	2.24						
Cornus stolonifera	2	3.13	1.60	1.19	4.31	2.30						
Eleocharis sp.	3	4.69	11.40	8.47	13.16	13.22						
Equisetum arvense	2	3.13	19.00	14.12	17.24	34.71						
Equisetum hyemale	2	3.13	3.60	2.67	5.80	6.50						
Eupatorium maculatum	2	3.13	1.40	1.04	4.17	2.19						
Eupatorium perfoliatum	1	1.56	1.00	0.74	2.31	2.24						
Impatiens capensis	1	1.56	0.20	0.15	1.71	0.45						
Juncus dudleyi	3	4.69	5.40	4.01	8.70	8.41						
Leersia oryzoides	2	3.13	8.00	5.94	9.07	13.04						
Lycopus uniflorus	3	4.69	0.80	0.59	5.28	0.84						
Pedicularis lanceolata	2	3.13	1.20	0.89	4.02	2.17						
Poa pratensis	4	6.25	19.60	14.56	20.81	31.48						
Polygonum amphibium	2	3.13	8.00	5.94	9.07	10.95						
Scirpus atrovirens	3	4.69	2.40	1.78	6.47	2.51						
Solidago riddellii	1	1.56	0.40	0.30	1.86	0.89						
Sphenopholis intermedia	2	3.13	1.00	0.74	3.87	1.41						
Trifolium pratense	2	3.13	0.80	0.59	3.72	1.10						
Verbena hastata	1	1.56	0.60	0.45	2.01	1.34						
Viola sp.	5	7.81	2.60	1.93	9.74	1.52						
	64	100.00	134.60	100.00	200.00							

Table 2. Absolute Frequency (AF), Relative Frequency (RF), Absolute Cover (AC), Relative Cover (RC), Importance Values (IV) and Standard Deviation (STD) for plant species encountered in 5 1m^2 quadrats along study Transect 2, sedge meadow cover at the Pheasant Branch Conservancy, Middleton, Wisconsin. Based on sampling June 22, 1998.

			AVG	5		
Scientific Name	**AF**	**RF**	**AC**	**RC**	**IV**	**STD**
Asclepias incarnata	3	7.69	1.40	1.36	9.05	1.67
Aster puniceus	3	7.69	5.20	5.05	12.74	4.82
Aster simplex	1	2.56	0.60	0.58	3.15	1.34
Calamagrostis canadensis	2	5.13	9.00	8.74	13.87	13.42
Carex stricta	5	12.82	53.00	51.46	64.28	13.04
Eupatorium maculatum	5	12.82	17.60	17.09	29.91	7.33
Helenium autumnale	1	2.56	1.00	0.97	3.53	2.24
Impatiens capensis	5	12.82	5.80	5.63	18.45	3.11
Lycopus uniflorus	2	5.13	0.60	0.58	5.71	0.89
Lysimachia thyrsifolia	1	2.56	0.20	0.19	2.76	0.45
Rumex orbiculatus	2	5.13	1.40	1.36	6.49	1.95
Sagittaria latifolia	4	10.26	3.60	3.50	13.75	4.04
Scutellaria lateriflora	2	5.13	1.60	1.55	6.68	3.05
Solanum dulcamara	1	2.56	1.00	0.97	3.53	2.24
Solidago gigantea	1	2.56	0.80	0.78	3.34	1.79
Viola sp.	1	2.56	0.20	0.19	2.76	0.45
	39	100.00	103.00	100.00	200.00	

Table 3. Absolute Frequency (AF), Relative Frequency (RF), Absolute Cover (AC), Relative Cover (RC), Importance Values (IV) and Standard Deviation (STD) for plant species encountered in 5 1m^2 quadrats along study Transect 3, sedge meadow/cattail cover at the Pheasant Branch Conservancy, Middleton, Wisconsin. Based on sampling June 22, 1998.

			AVG	5		
Scientific Name	**AF**	**RF**	**AC**	**RC**	**IV**	**STD**
Calamagrostis canadensis	4	12.50	3.60	6.00	18.50	4.04
Carex stricta	4	12.50	9.00	15.00	27.50	6.52

Dryopteris thelypteris	1	3.13	2.00	3.33	6.46	4.47
Epilobium coloratum	1	3.13	0.40	0.67	3.79	0.89
Eupatorium maculatum	2	6.25	0.80	1.33	7.58	1.30
Impatiens capensis	5	15.63	11.20	18.67	34.29	5.22
Lysimachia thyrsifolia	5	15.63	4.20	7.00	22.63	2.59
Scirpus atrovirens	1	3.13	0.60	1.00	4.13	1.34
Scutellaria lateriflora	2	6.25	1.40	2.33	8.58	2.19
Typha latifolia	5	15.63	26.00	43.33	58.96	8.22
Verbena hastata	1	3.13	0.40	0.67	3.79	0.89
Viola sp.	1	3.13	0.40	0.67	3.79	0.89
	32	100.00	60.00	100.00	200.00	

Table 4. Absolute Frequency (AF), Relative Frequency (RF), Absolute Cover (AC), Relative Cover (RC), Importance Values (IV) and Standard Deviation (STD) for plant species encountered in 5 1m^2 quadrats along study Transect 4, hill prairie/brushed cover at the Pheasant Branch Conservancy, Middleton, Wisconsin. Based on sampling June 22, 1998.

			AVG	**5**		
Scientific Name	**AF**	**RF**	**AC**	**RC**	**IV**	**STD**
Achillea millefolium	4	7.55	7.20	3.75	11.30	10.21
Agrimonia gryposepala	1	1.89	0.80	0.42	2.30	1.79
Agrostis alba	5	9.43	13.20	6.88	16.32	13.20
Aster pilosus	2	3.77	1.20	0.63	4.40	2.17
Cirsium arvense	1	1.89	0.60	0.31	2.20	1.34
Daucus carota	5	9.43	39.00	20.33	29.77	25.59
Desmodium illinoense	1	1.89	2.00	1.04	2.93	4.47
Erigeron annuus	2	3.77	1.20	0.63	4.40	2.17
Euphorbia esula	5	9.43	40.00	20.86	30.29	26.46
Melilotus officinalis	1	1.89	5.00	2.61	4.49	11.18

Monarda fistulosa	1	1.89	0.60	0.31	2.20	1.34
Parthenocissus quinquefolia	1	1.89	5.00	2.61	4.49	11.18
Phleum pratense	4	7.55	13.00	6.78	14.33	11.51
Plantago rugelii	1	1.89	3.00	1.56	3.45	6.71
Poa compressa	5	9.43	29.00	15.12	24.55	25.84
Solidago canadensis	1	1.89	3.00	1.56	3.45	6.71
Solidago gigantea	2	3.77	7.00	3.65	7.42	13.04
Taraxacum officinale	4	7.55	4.60	2.40	9.95	4.93
Trifolium hybridum	1	1.89	1.00	0.52	2.41	2.24
Trifolium pratense	4	7.55	13.00	6.78	14.33	11.38
Trifolium repens	1	1.89	0.40	0.21	2.10	0.89
Vitis riparia	1	1.89	2.00	1.04	2.93	4.47
	53	100.00	191.80	100.00	200.00	

Table 5. Absolute Frequency (AF), Relative Frequency (RF), Absolute Cover (AC), Relative Cover (RC), Importance Values (IV) and Standard Deviation (STD) for plant species encountered in 5 1m^2 quadrats along study Transect 5, hill prairie cover at the Pheasant Branch Conservancy, Middleton, Wisconsin. Based on sampling June 22, 1998.

			AVG	**5**		
Scientific Name	**AF**	**RF**	**AC**	**RC**	**IV**	**STD**
Ambrosia artemisiifolia	1	2.63	0.20	0.19	2.82	0.45
Andropogon gerardii	5	13.16	15.00	13.99	27.15	7.91
Andropogon scoparius	2	5.26	4.00	3.73	8.99	5.48
Asclepias verticillata	1	2.63	2.00	1.87	4.50	4.47
Aster sericeus	2	5.26	2.40	2.24	7.50	4.34
Comandra richardsiana	1	2.63	1.40	1.31	3.94	3.13
Euphorbia esula	5	13.16	17.40	16.23	29.39	9.42
Kuhnia eupatorioides	1	2.63	1.60	1.49	4.12	3.58
Panicum leibergii	3	7.89	0.60	0.56	8.45	0.55

Panicum virgatum	1	2.63	1.00	0.93	3.56	2.24
Petalostemum purpureum	1	2.63	0.40	0.37	3.00	0.89
Poa compressa	5	13.16	43.00	40.11	53.27	25.40
Poa pratensis	3	7.89	4.60	4.29	12.19	5.08
Rubus occidentalis	1	2.63	1.20	1.12	3.75	2.68
Scutellaria parvula	1	2.63	0.60	0.56	3.19	1.34
Solidago nemoralis	1	2.63	0.60	0.56	3.19	1.34
Sporobolus heterolepis	2	5.26	7.00	6.53	11.79	9.75
Stipa spartea	1	2.63	4.00	3.73	6.36	8.94
Unknown sp.	1	2.63	0.20	0.19	2.82	0.45
	38	100.00	107.20	100.00	200.00	

Table 6. Absolute Frequency (AF), Relative Frequency (RF), Absolute Cover (AC), Relative Cover (RC), Importance Values (IV) and Standard Deviation (STD) for plant species encountered in 5 1m^2 quadrats along study Transect 6, floodplain forest cover at the Pheasant Branch Conservancy, Middleton, Wisconsin. Based on sampling June 22, 1998.

			AVG	**5**		
Scientific Name	**AF**	**RF**	**AC**	**RC**	**IV**	**STD**
Acer saccharinum	2	8.33	0.60	1.09	9.42	0.89
Carex blanda	1	4.17	0.80	1.45	5.62	1.79
Circaea quadrisulcata	5	20.83	35.00	63.41	84.24	14.14
Geum canadense	4	16.67	5.00	9.06	25.72	4.69
Hesperis matronalis	3	12.50	7.60	13.77	26.27	12.70
Impatiens capensis	2	8.33	2.40	4.35	12.68	3.58
Lonicera tatarica	1	4.17	0.60	1.09	5.25	1.34
Osmorhiza claytoni	3	12.50	2.00	3.62	16.12	2.35
Prunella vulgaris	1	4.17	0.20	0.36	4.53	0.45
Rhamnus cathartica	1	4.17	0.80	1.45	5.62	1.79
Tovara virginiana	1	4.17	0.20	0.36	4.53	0.45

	24	100.00	55.20	100.00	200.00	

Table 7. Absolute Frequency (AF), Relative Frequency (RF), Absolute Cover (AC), Relative Cover (RC), Importance Values (IV) and Standard Deviation (STD) for plant species encountered in 5 1m^2 quadrats along study Transect 7, floodplain/buckthorn cover at the Pheasant Branch Conservancy, Middleton, Wisconsin. Based on sampling June 22, 1998.

			AVG	5		
Scientific Name	**AF**	**RF**	**AC**	**RC**	**IV**	**STD**
Acer saccharinum	2	5.88	0.40	0.59	6.48	0.55
Carex rosea	1	2.94	4.00	5.93	8.88	8.94
Circaea quadrisulcata	5	14.71	14.60	21.66	36.37	10.29
Eupatorium rugosum	1	2.94	1.00	1.48	4.42	2.24
Galium aparine	2	5.88	8.20	12.17	18.05	17.78
Geum canadense	4	11.76	3.20	4.75	16.51	3.96
Hackelia virginiana	1	2.94	1.00	1.48	4.42	2.24
Hesperis matronalis	1	2.94	8.00	11.87	14.81	17.89
Lonicera tatarica	1	2.94	1.00	1.48	4.42	2.24
Osmorhiza claytoni	5	14.71	15.00	22.26	36.96	10.63
Parthenocissus quinquefolia	4	11.76	7.40	10.98	22.74	6.07
Pilea pumila	1	2.94	0.40	0.59	3.53	0.89
Rhamnus cathartica	4	11.76	2.80	4.15	15.92	2.59
Ribes americanum	1	2.94	0.20	0.30	3.24	0.45
Vitis riparia	1	2.94	0.20	0.30	3.24	0.45
	34	100.00	67.40	100.00	200.00	

APPENDIX 2

Table 1. Time Meander Search (TMS) species list, with the minute each species was located, minutes of the search duration (always five minutes beyond location of the last species), number of species found per minute, cumulative number of species at each minute. Pheasant Branch, Middleton, WI. Transect 1, Sedge Meadow/Shrub Carr. June 22, 1998.

SPECIES	MINUTE	MINUTE	SP/MIN	SP(CUM)
Aster puniceus	1	1	10	10
Equisetum arvense	1	2	3	13
Poa pratensis	1	3	5	18
Aster simplex	1	4	5	23
Cornus stolonifera	1	5	3	26
Juncus dudleyi	1	6	1	27
Carex stipata	1	7	2	29
Eleocharis sp.	1	8	1	30
Equisetum hyemale	1	9	4	34
Lycopus americanus	1	10	2	36
Scirpus atrovirens	2	11	1	37
Viola sororia	2	12	1	38
Trifolium sp.	2	13	2	40
Carex hystericina	3	14	1	41
Carex scoparia	3	15	1	42
Carex lanuginosa	3	16	2	44
Eupatorium maculatum	3	17	0	44
Achillea millefolium	3	18	2	46
Pedicularis lanceolata	4	19	4	50
Bromus ciliatus	4	20	2	52
Eupatorium perfoliatum	4	21	0	52
Solidago gigantea	4	22	0	52
Polygonum coccineum	4	23	1	53
Carex stricta	5	24	0	53
Asclepias incarnata	5	25	1	54
Leersia oryzoides	5	26	1	55
Stachys hispida	6	27	0	55
Impatiens capensis	7	28	0	55
Lycopus uniflorus	7	29	0	55

Pycnanthemum virginianum	8	30	0	55
Carex sterilis	9	31	0	55
Cirsium muticum	9			
Campanula rotundifolia	9			
Epilobium coloratum	9			
Muhlenbergia mexicana	10			
Calamagrostis canadensis	10			
Phalaris arundinacea	11			
Carex cristatella	12			
Glyceria striata	13			
Lysimachia quadriflora	13			
Cacalia suaveolens	14			
Salix sp.	15			
Angelica atropurpurea	16			
Carex vulpinoidea	16			
None	17			
Asclepias syriaca	18			
Ulmus americana	18			
Geum aleppicum	19			
Parthenocissus quinquefolia	19			
Lonicera tatarica	19			
Erigeron philadelphicus	19			
Rumex orbiculatus	20			
Cornus racemosa	20			
None	21			
None	22			
Sphenopholis intermedia	23			
None	24			
Solidago riddellii	25			
Liparis lilifolia	26			
None	27			
None	28			
None	29			
None	30			
None	31			

Other species:

Mentha arvensis

Verbena hastata

Table 2. Time Meander Search (TMS) species list, with the minute each species was located, minutes of the search duration (always five minutes beyond location of the last species), number of species found per minute, cumulative number of species at each minute. Pheasant Branch, Middleton, WI. Transect 2, Sedge Meadow, east side. June 22, 1998.

SPECIES	MINUTE	MINUTE	SP/MIN	SP(CUM)
Carex stricta	1	1	7	7
Eupatorium maculatum	1	2	2	9
Calamagrostis canadensis	1	3	1	10
Aster puniceus	1	4	3	13
Impatiens capensis	1	5	3	16
Agrostis alba	1	6	4	20
Cornus stolonifera	1	7	3	23
Asclepias incarnata	2	8	0	23
Rumex orbiculatus	2	9	3	26
Scutellaria lateriflora	3	10	1	27
Viola sororia	4	11	0	27
Parthenocissus quinquefolia	4	12	3	30
Carex stipata	4	13	1	31
Solanum dulcamara	5	14	2	33
Chelone glabra	5	15	1	34
Typha latifolia	5	16	1	35
Helenium autumnale	6	17	1	36
Carex hystericina	6	18	1	37
Muhlenbergia mexicana	6	19	0	37
Solidago gigantea	6	20	0	37
Equisetum hyemale	7	21	0	37
Lycopus americanus	7	22	0	37
Agrostis alba palustris	7	23	0	37

None	8
Pilea pumila	9
Angelica atropurpurea	9
Verbena hastata	9
Mentha arvensis	10
None	11
Carex lanuginosa	12
Lysimachia thyrsifolia	12
Carex lacustris	12
Scirpus cyperinus	13
Scutellaria epilobiifolia	14
Carex vesicaria	14
Campanula rotundifolia	15
Pycnanthemum virginianum	16
Epilobium coloratum	17
Caltha palustris	18
None	19
None	20
None	21
None	22
None	23

Table 3. Time Meander Search (TMS) species list, with the minute each species was located, minutes of the search duration (always five minutes beyond location of the last species), number of species found per minute, cumulative number of species at each minute. Pheasant Branch, Middleton, WI. Transect 3, Sedge Meadow/Cattail border. June 22, 1998.

SPECIES	**MINUTE**	**MINUTE**	**SP/MIN**	**SP(CUM)**
Typha latifolia	1	1	8	8
Impatiens capensis	1	2	6	14
Asclepias incarnata	1	3	2	16
Carex stricta	1	4	2	18
Lysimachia thyrsifolia	1	5	0	18
Eupatorium maculatum	1	6	1	19

Caltha palustris	1	7	2	21
Rumex orbiculatus	1	8	1	22
Dryopteris thelypteris	2	9	1	23
Acer negundo	2	10	0	23
Scutellaria lateriflora	2	11	2	25
Calamagrostis canadensis	2	12	1	26
Aster puniceus	2	13	0	26
Iris virginica	2	14	0	26
Angelica atropurpurea	3	15	0	26
Cornus stolonifera	3	16	0	26
Parthenocissus quinquefolia	4	17	0	26
Epilobium coloratum	4			
None	5			
Cuscuta sp.	6			
Campanula rotundifolia	7			
Lysimachia quadriflora	7			
Carex lacustris	8			
Pycnanthemum virginianum	9			
None	10			
Cicuta bulbifera	11			
Galium sp.	11			
Pilea pumila	12			
None	13			
None	14			
None	15			
None	16			
None	17			

Table 4. Time Meander Search (TMS) species list, with the minute each species was located, minutes of the search duration (always five minutes beyond location of the last species), number of species found per minute, cumulative number of species at each minute. Pheasant Branch, Middleton, WI. Transect 4, Hill Prairie (Brushed). June 22, 1998.

SPECIES	**MINUTE**	**MINUTE**	**SP/MIN**	**SP(CUM)**

Euphorbia esula	1	1	8	8
Achillea millefolium	1	2	8	16
Phleum pratense	1	3	7	23
Carex gravida	1	4	3	26
Parthenocissus quinquefolia	1	5	2	28
Trifolium pratense	1	6	1	29
Solidago canadensis	1	7	2	31
Desmodium illinoense	1	8	1	32
Daucus carota	2	9	4	36
Melilotus sp.	2	10	5	41
Poa pratensis	2	11	2	43
Plantago major	2	12	0	43
Medicago lupulina	2	13	3	46
Erigeron annuus	2	14	1	47
Vitis riparia	2	15	0	47
Agrostis alba	2	16	2	49
Agrimonia gryposepala	3	17	3	52
Aster pilosus	3	18	2	54
Solidago gigantea	3	19	1	55
Solidago canadensis	3	20	2	57
Lonicera tatarica	3	21	2	59
Taraxacum officinale	3	22	0	59
Bromus inermis	3	23	0	59
Cornus racemosa	4	24	0	59
Lespedeza capitata	4	25	0	59
Asclepias syriaca	4	26	0	59
Rumex acetosella	5			
Ambrosia artemisiifolia	5			
Crataegus sp.	6			
Cornus stolonifera	7			
Quercus macrocarpa	7			
Tradescantia ohiensis	8			
Lychnis alba	9			
Kuhnia eupatorioides	9			
Prunus serotina	9			

Verbascum thapsus	9
Solidago speciosa	10
Carex sp.	10
Monarda fistulosa	10
Oxalis stricta	10
Ambrosia trifida	10
Plantago major	11
Verbena stricta	11
None	12
Andropogon gerardii	13
Rosa multiflora	13
Panicum leibergii	13
Arctium minus	14
None	15
Geum canadense	16
Aster puniceus	16
Carduus nutans	17
Rumex crispus	17
Physalis sp.	17
Fraxinus sp.	18
Verbena urticifolia	18
Rhus glabra	19
Geum aleppicum	20
Nepeta cataria	20
Lepidium campestre	21
Agropyron repens	21
None	22
None	23
None	24
None	25
None	26

Table 5. Time Meander Search (TMS) species list, with the minute each species was located, minutes of the search duration (always five minutes beyond location of the last

species), number of species found per minute, cumulative number of species at each minute. Pheasant Branch, Middleton, WI. Transect 5, Hill Prairie (Goat Prairie). June 22, 1998.

SPECIES	MINUTE	MINUTE	SP/MIN	SP(CUM)
Poa compressa	1	1	11	11
Andropogon scoparius	1	2	7	18
Andropogon gerardii	1	3	9	27
Euphorbia esula	1	4	3	30
Aster sericeus	1	5	4	34
Asclepias verticillata	1	6	2	36
Petalostemum purpureum	1	7	0	36
Amorpha canescens	1	8	4	40
Rhus glabra	1	9	0	40
Solidago nemoralis	1	10	1	41
Carex sp.	1	11	5	46
Sporobolus heterolepis	2	12	1	47
Castilleja sessiliflora	2	13	0	47
Melilotus sp.	2	14	0	47
Taraxacum officinale	2	15	0	47
Sisyrinchium albidum	2	16	0	47
Physalis subglabrata	2	17	0	47
Lonicera tatarica	2			
Anemone patens	3			
Viola pedata	3			
Kuhnia eupatorioides	3			
Antennaria plantaginifolia	3			
Comandra richardsiana	3			
Vitis riparia	3			
Poa pratensis	3			
Rubus occidentalis	3			
Carduus nutans	3			
Monarda fistulosa	4			
Arenaria lateriflora	4			
Panicum leibergii	4			
Lactuca sp.	5			

Lithospermum canescens	5
Aster pilosus	5
Stipa spartea	5
Unknown sp.	6
Prunus serotina	6
None	7
Verbascum thapsus	8
Helianthus occidentalis	8
Quercus sp.	8
Koeleria cristata	8
None	9
Erigeron annuus	10
Tragopogon dubius	11
Prunus pumila	11
Arabis sp.	11
Aster ericoides	11
Potentilla arguta	11
Rosa sp.	12
None	13
None	14
None	15
None	16
None	17

Other species:
Aster azureus

Table 6. Time Meander Search (TMS) species list, with the minute each species was located, minutes of the search duration (always five minutes beyond location of the last species), number of species found per minute, cumulative number of species at each minute. Pheasant Branch, Middleton, WI. Transect 6, Lowland Hardwoods. (Silver Maple). June 22, 1998.

SPECIES	MINUTE	MINUTE	SP/MIN	SP(CUM)
Acer saccharinum	1	1	8	8

Osmorhiza claytoni	1	2	5	13
Geum canadense	1	3	2	15
Circaea quadrisulcata	1	4	5	20
Viola sp.	1	5	3	23
Geum aleppicum	1	6	3	26
Carex sp.	1	7	0	26
Ulmus americana	1	8	0	26
Acer negundo	2	9	1	27
Hackelia virginiana	2	10	1	28
Hesperis matronalis	2	11	0	28
Rhamnus cathartica	2	12	0	28
Morus alba	2	13	0	28
Impatiens capensis	3	14	0	28
Parthenocissus quinquefolia	3	15	0	28
Salix sp.	4			
Ribes americanum	4			
Leonurus cardiaca	4			
Tovara virginiana	4			
Carex pensylvanica	4			
Rhus radicans	5			
Vitis riparia	5			
Eupatorium rugosum	5			
Phalaris arundinacea	6			
Amphicarpa bracteata	6			
Oxalis stricta	6			
None	7			
None	8			
Thalictrum dioicum	9			
Sanicula sp.	10			
None	11			
None	12			
None	13			
None	14			
None	15			

Table 7. Time Meander Search (TMS) species list, with the minute each species was located, minutes of the search duration (always five minutes beyond location of the last species), number of species found per minute, cumulative number of species at each minute. Pheasant Branch, Middleton, WI. Transect 7, Lowland Hardwoods. (Buckthorn). June 22, 1998.

SPECIES	MINUTE	MINUTE	SP/MIN	SP(CUM)
Populus deltoides	1	1	7	7
Circaea quadrisulcata	1	2	6	13
Lonicera tatarica	1	3	1	14
Rhamnus cathartica	1	4	5	19
Pilea pumila	1	5	2	21
Acer negundo	1	6	6	27
Carex rosea	1	7	0	27
Hesperis matronalis	2	8	0	27
Anemonella thalictroides	2	9	0	27
Hackelia virginiana	2	10	0	27
Parthenocissus quinquefolia	2	11	0	27
Geum canadense	2			
Acer saccharinum	2			
Rhus radicans	3			
Solanum dulcamara	4			
Impatiens pallida	4			
Eupatorium rugosum	4			
Urtica dioica	4			
Salix nigra	4			
Leonurus cardiaca	5			
Carex bebbii	5			
Galium aparine	6			
Glyceria striata	6			
Thalictrum dioicum	6			
Galium obtusum	6			
Carex sp.	6			
Osmorhiza longistylis	6			
None	7			

None	8
None	9
None	10
None	11

Other species:

Sanicula sp.

Amphicarpa bracteata

Table 8. Canopy intercept (meters), percent canopy (of a 40 m transect). Pheasant Branch, Middleton, Wisconsin. June 22, 1998. Transects 2, 3, and 5 contained no woody species intercept or canopy cover.

SPECIES	**T1**	**T4**	**T6**	**T7**	**TOTAL**
CORNUS STOLONIFERA					
Intercept (m)	15.20	0.00	0.00	0.00	15.20
Intercept (%)	38.00	0.00	0.00	0.00	-
MORUS ALBA					
Intercept (m)	0.00	1.70	0.00	0.00	1.70
Intercept (%)	0.00	4.25	0.00	0.00	-
LONICERA TATARICA					
Intercept (m)	0.00	1.50	0.00	0.00	1.50
Intercept (%)	0.00	3.75	0.00	0.00	-
VITIS RIPARIA					
Intercept (m)	0.00	0.10	0.00	0.00	0.10
Intercept (%)	0.00	0.25	0.00	0.00	-
ULMUS AMERICANA					
Intercept (m)	0.00	0.00	32.70	0.00	32.70
Intercept (%)	0.00	0.00	81.75	0.00	-
ACER SACCHARINUM					

Intercept (m)	0.00	0.00	38.50	19.20	57.70
Intercept (%)	0.00	0.00	96.25	48.00	-
ACER NEGUNDO					
Intercept (m)	0.00	0.00	0.00	5.10	5.10
Intercept (%)	0.00	0.00	0.00	12.75	-
POPULUS DELTOIDES					
Intercept (m)	0.00	0.00	0.00	38.00	38.00
Intercept (%)	0.00	0.00	0.00	95.00	-
RHAMNUS CATHARTICA					
Intercept (m)	0.00	0.00	0.00	21.10	21.10
Intercept (%)	0.00	0.00	0.00	52.75	-

APPENDIX 3

Total list of plant species found at the Pheasant Branch and Belfontaine Conservancies in 1998.

SCIENTIFIC NAME	**COMMON NAME**	**Native (N)/Alien (A)**
Acer negundo	Boxelder	N
Acer saccharinum	Silver maple	N
Achillea millefolium	Yarrow	A
Agrimonia gryposepala	Tall agrimony	N
Agropyron repens	Quack grass	A
Agrostis alba	Red top	A
Agrostis alba palustris	Creeping bent	N
Ambrosia artemisiifolia	Common ragweed	N
Ambrosia trifida	Giant ragweed	N
Amorpha canescens	Leadplant	N
Amphicarpa bracteata	Hog peanut	N

Andropogon gerardii	Big bluestem	N
Andropogon scoparius	Little bluestem	N
Anemone patens	Pasque flower	N
Anemonella thalictroides	Rue anemone	N
Angelica atropurpurea	Angelica	N
Antennaria plantaginifolia	Pussy toes	N
Arabis sp.	Rock cress	N
Arctium minus	Common burdock	A
Arenaria lateriflora	Wood sandwort	N
Asclepias incarnata	Swamp milkweed	N
Asclepias syriaca	Common milkweed	N
Asclepias verticillata	Whorled milkweed	N
Aster azureus	Sky-blue aster	N
Aster ericoides	Heath aster	N
Aster novae-angliae	New England aster	N
Aster pilosus	Hairy aster	N
Aster puniceus	Swamp aster	N
Aster sericeus	Silky aster	N
Aster simplex	Panicled aster	N
Bromus ciliatus	Hairy chess	A
Bromus inermis	European brome	A
Cacalia suaveolens	Sweet indian plantain	N
Calamagrostis canadensis	Blue joint grass	N
Caltha palustris	Marsh marigold	N
Campanula rotundifolia	Harebell	N
Carduus nutans	Nodding thistle	A
Carex bebbii	Bebb's oval sedge	N
Carex blanda	Common wood sedge	N
Carex cristatella	Crested oval sedge	N
Carex gravida	Long-awned bracted sedge	N
Carex hystericina	Porcupine sedge	N
Carex lacustris	Common lake sedge	N
Carex lanuginosa	Wooly sedge	N
Carex pensylvanica	Pennsylvania sedge	N
Carex rosea	Curly-styled wood sedge	N

Carex scoparia	Lance-fruited oval sedge	N
Carex sterilis	Fen star sedge	N
Carex stipata	Common fox sedge	N
Carex stricta	Tussock sedge	N
Carex vesicaria	Tufted lake sedge	N
Carex vulpinoidea	Brown fox sedge	N
Castilleja sessiliflora	Downy yellow painted cup	N
Chelone glabra	Turtlehead	N
Cicuta bulbifera	Bulblet bearing water hemlock	N
Circaea quadrisulcata	Enchanter's nightshade	N
Cirsium arvense	Canada thistle	A
Cirsium muticum	Swamp thistle	N
Comandra richardsiana	False toadflax	N
Cornus racemosa	Gray dogwood	N
Cornus stolonifera	Red osier dogwood	N
Crataegus sp.	Hawthorn	N
Cuscuta sp.	Dodder	N
Daucus carota	Queen Anne's lace	A
Desmodium illinoense	Illinois tick trefoil	N
Dryopteris thelypteris	Marsh shield fern	N
Eleocharis smallii	Marsh spike rush	N
Epilobium coloratum	Cinnamon willow herb	N
Equisetum arvense	Horsetail	N
Equisetum hyemale	Scouring rush	N
Erigeron annuus	Annual fleabane	N
Erigeron philadelphicus	Marsh fleabane	N
Eupatorium maculatum	Spotted joe pye weed	N
Eupatorium perfoliatum	Boneset	N
Eupatorium rugosum	White snakeroot	N
Euphorbia esula	Leafy spurge	A
Fraxinus sp.	Ash	N
Galium aparine	Annual bedstraw	N
Galium obtusum	Wild mader	N
Geum aleppicum	Yellow avens	N
Geum canadense	Wood avens	N

Glyceria striata	Fowl manna grass	N
Hackelia virginiana	Stickseed	N
Helenium autumnale	Sneezeweed	N
Helianthus occidentalis	Western sunflower	N
Hesperis matronalis	Dame's rocket	A
Impatiens capensis	Spotted touch-me-not	N
Impatiens pallida	Pale touch-me-not	N
Iris virginica	Blue flag iris	N
Juncus dudleyi	Dudley's rush	N
Koeleria cristata	June grass	N
Kuhnia eupatorioides	False boneset	N
Lactuca sp.	Wild lettuce	N
Leersia oryzoides	Rice cut grass	N
Leonurus cardiaca	Motherwort	A
Lepidium campestre	Field cress	A
Lespedeza capitata	Round-headed bush clover	N
Liparis lilifolia	Purple twayblade	N
Lithospermum canescens	Hoary pucoon	N
Lonicera tatarica	Tatarian honeysuckle	A
Lychnis alba	White campion	A
Lycopus americanus	Common water horehound	N
Lycopus uniflorus	Northern bugleweed	N
Lysimachia quadriflora	Narrow-leaved loosestrife	N
Lysimachia thyrsifolia	Tufted loosestrife	N
Medicago lupulina	Black medic	A
Melilotus officinalis	Yellow sweet clover	A
Mentha arvensis	Wild mint	N
Monarda fistulosa	Wild bergamot	N
Morus alba	White mulberry	A
Muhlenbergia mexicana	Leafy satin grass	N
Nepeta cataria	Cat nip	A
Osmorhiza claytoni	Hairy sweet cicily	N
Osmorhiza longistylis	Smooth sweet cicily	N
Oxalis stricta	Common wood sorrel	N
Panicum leibergii	Prairie panic grass	N

Panicum virgatum	Switch grass	N
Parthenocissus quinquefolia	Virginia creeper	N
Pedicularis lanceolata	Swamp betony	N
Petalostemum purpureum	Purple prairie clover	N
Phalaris arundinacea	Reed canary grass	A
Phleum pratense	Timothy	A
Physalis subglabrata	Tall ground cherry	N
Pilea pumila	Clearweed	N
Plantago major	Common plantain	A
Plantago rugelii	Red-stalked plantain	N
Poa compressa	Canada bluegrass	A
Poa pratensis	Kentucky bluegrass	A
Polygonum amphibium	Water knotweed	N
Polygonum coccineum	Water heartsease	N
Populus deltoides	Cottonwood	N
Potentilla arguta	Prairie cinquefoil	N
Prunella vulgaris	Self heal	A
Prunus pumila	Sand cherry	N
Prunus serotina	Black cherry	N
Pycnanthemum virginianum	Common mountain mint	N
Quercus macrocarpa	Bur oak	N
Rhamnus cathartica	European buckthorn	A
Rhus glabra	Smooth sumac	N
Rhus radicans	Poison ivy	N
Ribes americanum	Wild black currant	N
Rosa multiflora	Multiflora rose	A
Rubus occidentalis	Black raspberry	N
Rumex acetosella	Field sorrel	A
Rumex crispus	Curly dock	A
Rumex orbiculatus	Great water dock	N
Sagittaria latifolia	Common arrowhead	N
Salix nigra	Black willow	N
Sanicula sp.	Black snakeroot	N
Scirpus atrovirens	Dark green rush	N
Scirpus cyperinus	Wool grass	N

Scutellaria epilobiifolia	Marsh skullcap	N
Scutellaria lateriflora	Mad-dog skullcap	N
Scutellaria parvula	Small skullcap	N
Sisyrinchium albidum	Common blue-eyed grass	N
Solanum dulcamara	Bittersweet nightshade	A
Solidago canadensis	Canada goldenrod	N
Solidago gigantea	Late goldenrod	N
Solidago nemoralis	Old-field goldenrod	N
Solidago riddellii	Riddell's goldenrod	N
Solidago speciosa	Showy goldenrod	N
Sphenopholis intermedia	Slender wedge grass	N
Sporobolus heterolepis	Prairie dropseed	N
Stachys hispida	Hedge nettle	N
Stipa spartea	Porcupine grass	N
Taraxacum officinale	Dandelion	A
Thalictrum dioicum	Early meadow rue	N
Tovara virginiana	Woodland knotweed	N
Tradescantia ohiensis	Spiderwort	N
Tragopogon major	Sand goat's beard	A
Trifolium hybridum	Alsike clover	A
Trifolium pratense	Red clover	A
Trifolium repens	White clover	A
Typha latifolia	Broad-leaved cattail	N
Ulmus americana	American elm	N
Urtica dioica	Tall nettle	N
Verbascum thapsus	Common mullein	A
Verbena hastata	Blue vervain	N
Verbena stricta	Hoary vervain	N
Verbena urticifolia	White vervain	N
Viola pedata	Bird's foot violet	N
Viola sororia	Hairy wood violet	N
Vitis riparia	Riverbank grape	N

Alien species:	36
Native species:	147

APPENDIX 4

APPENDIX 5

_____

File or Docket Number

Wisconsin Department of Natural Resources

RAPID ASSESSMENT METHODOLOGY FOR EVALUATING

WETLAND FUNCTIONAL VALUES

GENERAL INFORMATION

Name of Wetland Owner: **Sedge meadow/shrub carr**					
Location: County ___**Dane**_____;	1/4	1/4	Section	Township: 7N	Range: 8E
Project Name: **Pheasant Branch Conservancy**					
Evaluator(s): **John L. Larson and Susan Lehnhardt**					
Date(s) of Site Visit(s): **April, June 1998**					

Description of seasonality limitations of this inspection due to time of year of the evaluation and/or current hydrologic and climatologic conditions (e.g. after heavy rains, snow or ice cover, during drought year, during spring flood, during bird migration):

WETLAND DESCRIPTION

Wisconsin Wetlands Inventory classification:					
Wetland Type:	shallow open water	Deep marsh	shallow marsh	Seasonally flooded basin	bog
	floodplain forest	Alder thicket	**sedge meadow**	Coniferous swamp	**fen**
	wet meadow	**Shrub-carr**	low prairie	Hardwood swamp	
Estimated size of wetland in acres: **40**					

SUMMARY OF FUNCTIONAL VALUES

Based on the results of the attached functional assessment, rate the significance of each of the functional values for the subject wetland and check the appropriate box. Complete the table as a summary.

FUNCTION	**SIGNIFICANCE**				
	Low	**Medium**	**High**	**Exceptional**	**N/A**
Floral Diversity			**X**		
Wildlife Habitat		**X**			
Fishery Habitat	**X**				
Flood/Stormwater Attenuation		**X**			
Water Quality Protection		**X**			
Shoreline Protection					**X**
Groundwater			**X**		
Aesthetics/Recreation/Education			**X**		

List any Special Features/"Red Flags":

November 1992

SITE DESCRIPTION

I. HYDROLOGIC SETTING

A. Describe the geomorphology of the wetland:

	Depressional (includes slopes, potholes, small lakes, kettles, etc.)
	Riverine
	Lake Fringe
X	Extensive Peatland

B. **Y** N Has the wetland hydrology been altered by **ditching**, tiles, dams, **culverts**, well pumping, **diversion of surface flow**, or **changes to runoff within the watershed** (**circle** those that apply)

C. **Y** N Does the wetland have an inlet, outlet, or both (**circle** those that apply)?

D. Y N Is there any field evidence of wetland hydrology such as buttressed tree trunks, adventitious roots, **drift lines**, water marks, water stained leaves, **soil mottling/gleying, organic soils layer**, or oxidized rhizospheres (**circle** those that apply)?

E. **Y** N Does the wetland have standing water, and if so what is the acreage depth in inches?__**2**__

Approximately how much of the wetland is inundated?__**10**___%

F. Y N How is the hydroperiod (seasonal water level pattern) of the wetland classified?

	Permanently Flooded
X	Seasonally Flooded (water absent at end of growing season)
X	Saturated (surface water seldom present)
	Artificially Flooded
	Artificially Drained

G. Y **N** Is the wetland a navigable body of water or is a portion of the wetland below the ordinary high water mark of a navigable water body? List any surface waters associated with the wetland or in proximity to the wetland (note approximate distance from the wetland and navigability determination). Note if there is a surface water connection to other wetlands.

I. VEGETATION

A. Identify the vegetation communities present and the dominant species.

	Floating leaved community dominated by:
	Submerged aquatic community dominated by:
	Emergent community dominated by:
	shrub community dominated by:
	Deciduous broad-leaved tree community dominated by:

	Coniferous tree community dominated by:
	open sphagnum mat or bog
	sedge meadow/wet prairie community dominated by: ***Carex stricta***
	other (explain)

B. Other plant species identified during site visit:

See Appendix 1. Tables 1 and 2

See Appendix 2. Tables 1 and 2

I. SOILS

A.	SCS Soil Map Classification	**Houghton muck**

A. Field description:

X	Organic (histosol)? If so, is it a **muck** or a peat?	
	Mineral soil?	
	• Mottling, gleying, sulfidic materials, iron or manganese concretions, organic streaking (**circle** those that apply)?	
	• Soil Description:	
	• Depth of mottling/gleying:	
	• Depth of A Horizon	
	• Munsell Color of matrix and mottles	
	-Matrix below the A horizon (10"depth):	
	-Mottles:	

V. SURROUNDING LAND USES

A.	What is the estimated area of the wetland watershed in acres?	

B. What are the surrounding land uses?

LAND-USE	**ESTIMATED % OF WETLAND WATERSHED**

Developed (Industrial/Commercial/Residential)	
Agricultural/cropland	
Agricultural/grazing	
Forested	
Grassed recreation areas/parks	
Old field	
Highways or roads	
Other (specify)	

VI. **SITE SKETCH**

FUNCTIONAL ASSESSMENT

The following assessment requires the evaluator to examine site conditions that provide evidence that a given functional value is present and to assess the significance of the wetland to perform those functions. Positive answers to questions indicate the presence of factors important for the function. The questions are not definitive and are only provided to guide the evaluation. After completing each section, the evaluator should consider the factors observed and use best professional judgement to rate the significance. The ratings should be recorded on page 1 of the assessment.

Special Features/RED FLAGS

1. **Y** N Is the wetland in or adjacent to an area of special natural resource interest (NR 103.04, Wis. Adm. Code)? If so, check those that apply:

	a.	Cold water community as defined in s. NR 102.04(3)(b), Wis. Adm. Code, (including trout streams, their tributaries, and trout lakes);
	b.	Lakes Michigan and Superior and the Mississippi River;
	c.	State or federal designated wild and scenic river;
	d.	Designated state riverway;
	e.	Designated state scenic urban waterway;
X	f.	Environmentally sensitive area or environmental corridor identified in an area-wide water quality management plan, special area management plan, special wetland inventory study, or an advanced delineation and identification study;

X	g.	Calcareous fen;
	h.	State park, forest, trail or recreation area;;
	i.	State and federal fish and wildlife refuges and fish and wildlife management areas;
	J.	State or federal designated wilderness area;
	k.	Designated or dedicated state natural area;
	l.	Wild rice water listed in ch. NR 19.09, Wis. Adm. Code;
	m.	Surface water identified as an outstanding or exceptional resource water in ch. NR 102, Wis. Adm. Code.

2. **Y** N According to the Natural Heritage Inventory (Bureau of Endangered Resources) or direct observations, are there any rare, endangered, or threatened plant or animal species in, near, or using the wetland or adjacent lands? If so, list the species of concern:

See Appendix 4

3. Y **N** Is the project located in an area that requires a State Coastal Zone Management Plan consistency determination?

Floral Diversity

1. **Y** N Does the wetland support a variety of native plant species (i.e. not a monotypic stand of cattail or giant reed grass and/or not dominated by exotic species such as reed canary grass, brome grass, buckthorn, purple loosestrife, etc.)?

2. **Y** N Is the wetland plant community regionally scarce or rare?

Wildlife and Fishery Habitat

1. List any species observed, evidenced (e.g. tracks, scat, nest/burrow, calls), or expected to utilize the wetland:

Sandhill crane, sora rail

2. **Y** N Does the wetland contain a number of diverse vegetative cover types and a high degree of interspersion of those vegetation types?

3. Y **N** Is the estimated ratio of open water to cover between 30 and 70 percent? What is the estimated ratio? __**5/95**___%

4. **Y** N Does the surrounding upland habitat likely support a variety of animal species?

5. **Y** N Is the wetland part of or associated with a wildlife corridor or designated environmental corridor?

6. Y **N** Is the surrounding habitat and/or the wetland itself a large tract of undeveloped land important for wildlife that require large home ranges (e.g. bear, woodland passerines)?

7. **Y** N Is the surrounding habitat and/or the wetland itself a large tract of undeveloped land within an urbanized environment that is important for wildlife?

8. **Y** N Are there other wetland areas near the subject wetland that may be important to wildlife?

9. **Y** N Is the wetland contiguous with a permanent waterbody or periodically inundated for sufficient periods of time to provide spawning/nursery habitat for fish?

10. **Y** N Can the wetland provide significant food base for fish and wildlife (e.g. insects, crustaceans, voles, forage fish, amphibians, reptiles, shrews, wild rice, wild celery, duckweed, pondweeds, watermeal, bulrushes, bur reeds, arrowhead, smartweeds, millets…)?

11. Y **N** Is the wetland located in a priority watershed/township as identified in the Upper Mississippi and great Lakes Joint Venture of the North American Waterfowl Management Plan?

12. **Y** N Is the wetland providing habitat that is scarce to the region?

Flood and Stormwater Storage/Attenuation

1. **Y** N Are there steep slopes, large impervious areas, **moderate slopes with row** cropping, or areas with severe overgrazing within the watershed (**circle** those that apply)?

2. **Y** N Does the wetland significantly reduce run-off velocity due to its size, configuration, braided flow patterns, or vegetation type and density?

3. Y **N** Does the wetland show evidence of flashy water level responses to storm events

(debris marks, erosion lines, stormwater inputs, channelized inflow)?

4. Y **N** Is there a natural feature or human-made structure impeding drainage from the wetland that causes backwater conditions?

5. **Y** N Considering the size of the wetland area in relation to the size of its watershed, at any time during the year is water likely to reach the wetland's storage capacity (i.e. the level of easily observable wetland vegetation)? [For some cases where greater documentation is required, one should determine if the wetland has capacity to hold 25% of the run-off from a 2 year-24 hour storm event.]

6. **Y** N Considering the location of the wetland in relation to the associated surface water watershed, is the wetland important for attenuating or storing flood or stormwater peaks (i.e. is the wetland located in the mid or lower reaches of the watershed)?

Water Quality Protection

1. **Y** N Does the wetland receive **overland flow** or direct discharge of stormwater as a primary source of water (**circle** that which applies)?

2. **Y** N Do the surrounding land uses have the potential to deliver significant **nutrient** and/or **sediment** loads to the wetland?

3. **Y** N Based on your answers to the flood/stormwater section above, does the wetland perform significant flood/stormwater attenuation (residence time to allow settling)?

4. **Y** N Does the wetland have significant vegetative density to decrease water energy and allow settling of suspended materials?

5. **Y** N Is the position of the wetland in the landscape such that run-off is held or filtered before entering a surface water?

6. Y **N** Are algal blooms, heavy macrophyte growth, or other signs of excess nutrient loading to the wetland apparent (or historically reported)?

Shoreline Protection

1. Y **N** Is the wetland in a lake fringe or riverine setting? If NO, STOP and enter "not applicable" for this function. If YES, then answer the applicable questions.

2. Y N Is the shoreline exposed to constant wave action caused by a long wind fetch or boat traffic?

3. Y N Is the shoreline and shallow littoral zone vegetated with submerged or emergent vegetation in the swash zone that decrease wave energy or perennial wetland species that form dense root mats and/or species that have strong stems that are resistant to erosive forces?

4. Y N Is the stream bank prone to erosion due to unstable soils, land uses, or ice floes?

5. Y N Is the stream bank vegetated with densely rooted shrubs that provide upper bank stability?

Ground water Recharge and Discharge

1. **Y** N Related to discharge, are there observable (or reported) springs located in the wetland, physical indicators of springs such as marl soil, or vegetation indicators such as watercress or marsh marigold present that tend to indicate the presence of groundwater springs?

2. **Y** N Related to discharge, may the wetland contribute to the maintenance of base flow in a stream?

3. **Y** N Related to recharge, is the wetland located on or near a groundwater divide

(e.g. a topographic high)?

Aesthetics/Recreation/Education and Science

1. **Y** N Is the wetland visible from any of the following kinds of vantage points: **roads, public lands, houses**, and/or businesses? (**circle** all that apply).

2. **Y** N Is the wetland in or near any population centers?

3. **Y** N Is any part of the wetland is in public or conservation ownership?

4. **Y** N Does the public have direct access to the wetland from **public roads** or **waterways**? (**circle** those that apply).

Aesthetics/Recreation/Education and Science (continued)

5. Y N Is the wetland itself relatively free of obvious human influences, such as:

a.	**Y**	N	Buildings?	e.	**Y**	N	Pollution?
b.	**Y**	N	Roads?	f.	**Y**	N	Filling?
c.	**Y**	N	Other structures?	g.	**Y**	N	Dredging/draining?
d.	**Y**	N	Trash?	h.	**Y**	N	Domination by non-native vegetation?

6. Is the surrounding viewshed relatively free of obvious human influences, such as:

a. **Y** N Buildings?

b. **Y** N Roads?

c. **Y** N Other structures?

7. **Y** N Is the wetland organized into a variety of visibly separate areas of similar vegetation, color, and/or texture (including areas of open water)?

8. **Y** N Does the wetland add to the variety of visibly separate areas of similar vegetation, color, and/or texture (including areas of open water) within the landscape as a whole?

9. Does the wetland encourage exploration because any of the following factors are present:

   a. **Y** N Long views within the wetland?

   b. **Y** N Long views in the viewshed adjacent to the wetland?

   c. **Y** N Convoluted edges within and/or around the wetland border?

   d. **Y** N The wetland provides a different (and perhaps more natural/complex) kind of environment from the surrounding land covers?

10. Y N Is the wetland currently being used for (or does it have the potential to be used for) the following recreational activities? (Check all that apply).

ACTIVITY	CURRENT USE	POTENTIAL USE
Nature study/photography	**X**	
Hiking/biking/skiing		
Hunting/fishing/skiing		
Boating/canoeing		
Food harvesting		
Others (list)		

11. **Y** N Is the wetland currently being used, and/or does it have the potential for use for education or scientific study purposes (**circle** that which applies)?

Wisconsin Department of Natural Resources

RAPID ASSESSMENT METHODOLOGY FOR EVALUATING

WETLAND FUNCTIONAL VALUES

GENERAL INFORMATION

Name of Wetland Owner: **Lowland Hardwood Forest**					
Location: County ____**Dane**_____;	1/4	1/4	Section	Township:**7N**	Range: **8E**
Project Name: **Pheasant Branch Conservancy**					
Evaluator(s): **John L. Larson and Susan Lehnhardt**					
Date(s) of Site Visit(s): **April, June 1998**					

Description of seasonality limitations of this inspection due to time of year of the evaluation and/or current hydrologic and climatologic conditions (e.g. after heavy rains, snow or ice cover, during drought year, during spring flood, during bird migration):

WETLAND DESCRIPTION

Wisconsin Wetlands Inventory classification:					
Wetland Type:	shallow open water	Deep marsh	shallow marsh	Seasonally flooded basin	bog
	floodplain forest	Alder thicket	sedge meadow	Coniferous swamp	fen
	wet meadow	Shrub-carr	low prairie	Hardwood swamp	
Estimated size of wetland in acres: **60**					

SUMMARY OF FUNCTIONAL VALUES

Based on the results of the attached functional assessment, rate the significance of each of the functional values for the subject wetland and check the appropriate box. Complete the table as a summary.

FUNCTION	**SIGNIFICANCE**				
	Low	**Medium**	**High**	**Exceptional**	**N/A**
Floral Diversity		**X**			
Wildlife Habitat		**X**			

Fishery Habitat	**X**				
Flood/Stormwater Attenuation	**X**				
Water Quality Protection	**X**				
Shoreline Protection					**X**
Groundwater	**X**				
Aesthetics/Recreation/Education		**X**			

List any Special Features/"Red Flags":

November 1992

SITE DESCRIPTION

I. HYDROLOGIC SETTING

A. Describe the geomorphology of the wetland:

	Depressional (includes slopes, potholes, small lakes, kettles, etc.)
X	Riverine
	Lake Fringe
	Extensive Peatland

B. **Y** N Has the wetland hydrology been altered by **ditching**, tiles, dams, **culverts**, well pumping, **diversion of surface flow**, or changes to runoff within the watershed (**circle** those that apply)

C. **Y** N Does the wetland have an inlet, outlet, or both (**circle** those that apply)?

D. Y N Is there any field evidence of wetland hydrology such as **buttressed tree trunks**, adventitious roots, **drift lines, water marks, water stained leaves, soil mottling/gleying**, organic soils layer, or **oxidized rhizospheres** (**circle** those that apply)?

E. Y N Does the wetland have standing water, and if so what is the acreage depth in inches?____

Approximately how much of the wetland is inundated?_**20**____%

F. Y N How is the hydroperiod (seasonal water level pattern) of the wetland classified?

	Permanently Flooded
X	Seasonally Flooded (water absent at end of growing season)
X	Saturated (surface water seldom present)
	Artificially Flooded
	Artificially Drained

G. Y **N** Is the wetland a navigable body of water or is a portion of the wetland below the ordinary high water mark of a navigable water body? List any surface waters associated with the wetland or in proximity to the wetland (note approximate distance from the wetland and navigability determination). Note if there is a surface water connection to other wetlands.
Pheasant Branch

II. VEGETATION

A. Identify the vegetation communities present and the dominant species.

	floating leaved community dominated by:
	submerged aquatic community dominated by:
	emergent community dominated by:
	shrub community dominated by:
	deciduous broad-leaved tree community dominated by: ***Acer saccharinum*, *Populus deltoides***
	coniferous tree community dominated by:
	open sphagnum mat or bog
	sedge meadow/wet prairie community dominated by:
	other (explain)

B. Other plant species identified during site visit:

See Appendix 1. Tables 6 and 7

See Appendix 2. Tables 6 and 7

III. SOILS

A.	SCS Soil Map Classification	**Silt loam**

B. Field description:

	Organic (histosol)? If so, is it a muck or a peat?	
X	Mineral soil?	
	• Mottling, gleying, sulfidic materials, iron or manganese concretions, organic streaking (**circle** those that apply)?	
	• Soil Description:	
	• Depth of mottling/gleying:	**<12"**
	• Depth of A Horizon	
	• Munsell Color of matrix and mottles	
	-Matrix below the A horizon (10"depth):	**10yr 3/2**
	-Mottles:	**10yr 2/1**

V. SURROUNDING LAND USES

A.	What is the estimated area of the wetland watershed in acres?	

B. What are the surrounding land uses?

LAND-USE	**ESTIMATED % OF WETLAND WATERSHED**
Developed (Industrial/Commercial/Residential)	
Agricultural/cropland	
Agricultural/grazing	
Forested	
Grassed recreation areas/parks	
Old field	
Highways or roads	
Other (specify)	

VI. **SITE SKETCH**

FUNCTIONAL ASSESSMENT

The following assessment requires the evaluator to examine site conditions that provide evidence that a given functional value is present and to assess the significance of the wetland to perform those functions. Positive answers to questions indicate the presence of factors important for the function. The questions are not definitive and are only provided to guide the evaluation. After completing each section, the evaluator should consider the factors observed and use best professional judgement to rate the significance. The ratings should be recorded on page 1 of the assessment.

Special Features/RED FLAGS

1. **Y** N Is the wetland in or adjacent to an area of special natural resource interest (NR 103.04, Wis. Adm. Code)? If so, check those that apply:

	a.	Cold water community as defined in s. NR 102.04(3)(b), Wis. Adm. Code,

		(including trout streams, their tributaries, and trout lakes);
	b.	Lakes Michigan and Superior and the Mississippi River;
	c.	State or federal designated wild and scenic river;
	d.	Designated state riverway;
	e.	Designated state scenic urban waterway;
X	f.	Environmentally sensitive area or environmental corridor identified in an area-wide water quality management plan, special area management plan, special wetland inventory study, or an advanced delineation and identification study;
X	g.	Calcareous fen;
	h.	State park, forest, trail or recreation area;;
	i.	State and federal fish and wildlife refuges and fish and wildlife management areas;
	J.	State or federal designated wilderness area;
	k.	Designated or dedicated state natural area;
	l.	Wild rice water listed in ch. NR 19.09, Wis. Adm. Code;
	m.	Surface water identified as an outstanding or exceptional resource water in ch. NR 102, Wis. Adm. Code.

2. **Y** N According to the Natural Heritage Inventory (Bureau of Endangered Resources) or direct observations, are there any rare, endangered, or threatened plant or animal species in, near, or using the wetland or adjacent lands? If so, list the species of concern:

See Appendix 4

3. Y **N** Is the project located in an area that requires a State Coastal Zone Management Plan consistency determination?

Floral Diversity

1. Y **N** Does the wetland support a variety of native plant species (i.e. not a monotypic stand of cattail or giant reed grass and/or not dominated by exotic species such as reed canary grass, brome grass, buckthorn, purple loosestrife, etc.)?

2. Y **N** Is the wetland plant community regionally scarce or rare?

Wildlife and Fishery Habitat

1. List any species observed, evidenced (e.g. tracks, scat, nest/burrow, calls), or expected to utilize the wetland:

2. Y **N** Does the wetland contain a number of diverse vegetative cover types and a high degree of interspersion of those vegetation types?

3. Y **N** Is the estimated ratio of open water to cover between 30 and 70 percent? What is the estimated ratio? _**10/90**____%

4. Y **N** Does the surrounding upland habitat likely support a variety of animal species?

5. **Y** N Is the wetland part of or associated with a wildlife corridor or designated environmental corridor?

6. Y **N** Is the surrounding habitat and/or the wetland itself a large tract of undeveloped land important for wildlife that require large home ranges (e.g. bear, woodland passerines)?

7. **Y** N Is the surrounding habitat and/or the wetland itself a large tract of undeveloped land within an urbanized environment that is important for wildlife?

8. **Y** N Are there other wetland areas near the subject wetland that may be important to wildlife?

9. **Y** N Is the wetland contiguous with a permanent waterbody or periodically inundated for sufficient periods of time to provide spawning/nursery habitat for fish?

10. **Y** N Can the wetland provide significant food base for fish and wildlife (e.g. insects, crustaceans, voles, forage fish, amphibians, reptiles, shrews, wild rice, wild celery, duckweed, pondweeds, watermeal, bulrushes, bur reeds, arrowhead, smartweeds, millets…)?

11. Y **N** Is the wetland located in a priority watershed/township as identified in the Upper Mississippi and great Lakes Joint Venture of the North American Waterfowl Management Plan?

12. Y **N** Is the wetland providing habitat that is scarce to the region?

Flood and Stormwater Storage/Attenuation

1. **Y** N Are there steep slopes, large impervious areas, **moderate slopes with row cropping**, or areas with severe overgrazing within the watershed (**circle** those that apply)?

2. Y **N** Does the wetland significantly reduce run-off velocity due to its size, configuration, braided flow patterns, or vegetation type and density?

3. **Y** N Does the wetland show evidence of flashy water level responses to storm events

(debris marks, erosion lines, stormwater inputs, channelized inflow)?

4. Y **N** Is there a natural feature or human-made structure impeding drainage from the wetland that causes backwater conditions?

5. Y **N** Considering the size of the wetland area in relation to the size of its watershed, at any time during the year is water likely to reach the wetland's storage capacity (i.e. the level of easily observable wetland vegetation)? [For some cases where greater documentation is required, one should determine if the wetland has capacity to hold 25% of the run-off from a 2 year-24 hour storm event.]

6. **Y** N Considering the location of the wetland in relation to the associated surface water watershed, is the wetland important for attenuating or storing flood or stormwater peaks (i.e. is the wetland located in the mid or lower reaches of the watershed)?

Water Quality Protection

1. **Y** N Does the wetland receive **overland flow** or direct discharge of stormwater as a primary source of water (**circle** that which applies)?

2. **Y** N Do the surrounding land uses have the potential to deliver significant nutrient and/or sediment loads to the wetland?

3. **Y** N Based on your answers to the flood/stormwater section above, does the wetland perform significant flood/stormwater attenuation (residence time to allow settling)?

4. Y **N** Does the wetland have significant vegetative density to decrease water energy and allow settling of suspended materials?

5. **Y** N Is the position of the wetland in the landscape such that run-off is held or filtered before entering a surface water?

6. Y **N** Are algal blooms, heavy macrophyte growth, or other signs of excess nutrient loading to the wetland apparent (or historically reported)?

Shoreline Protection

1. **Y** N Is the wetland in a lake fringe or **riverine** setting? If NO, STOP and enter "not applicable" for this function. If YES, then answer the applicable questions.

2. Y **N** Is the shoreline exposed to constant wave action caused by a long wind fetch or boat traffic?

3. Y **N** Is the shoreline and shallow littoral zone vegetated with submerged or emergent vegetation in the swash zone that decrease wave energy or perennial wetland species that form dense root mats and/or species that have strong stems that are resistant to erosive forces?

4. **Y** N Is the stream bank prone to erosion due to unstable soils, land uses, or ice floes?

5. Y **N** Is the stream bank vegetated with densely rooted shrubs that provide upper bank stability?

Ground water Recharge and Discharge

1. **Y** N Related to discharge, are there observable (or reported) **springs** located in the wetland, physical indicators of springs such as marl soil, or vegetation indicators such as watercress or marsh marigold present that tend to indicate the presence of groundwater springs?

2. Y **N** Related to discharge, may the wetland contribute to the maintenance of base flow in a stream?

3. Y **N** Related to recharge, is the wetland located on or near a groundwater divide

(e.g. a topographic high)?

Aesthetics/Recreation/Education and Science

1. **Y** N Is the wetland visible from any of the following kinds of vantage points: **roads, public lands, houses**, and/or **businesses**? (**circle** all that apply).

2. **Y** N Is the wetland in or near any population centers?

3. **Y** N Is any part of the wetland is in public or conservation ownership?

4. **Y** N Does the public have direct access to the wetland from **public roads** or waterways? (**circle** those that apply).

Aesthetics/Recreation/Education and Science (continued)

5. Y N Is the wetland itself relatively free of obvious human influences, such as:

a.	Y	**N**	Buildings?	e.	Y	**N**	Pollution?
b.	**Y**	N	Roads?	f.	**Y**	N	Filling?
c.	**Y**	N	Other structures?	g.	Y	**N**	Dredging/draining?
d.	Y	**N**	Trash?	h.	Y	**N**	Domination by non-native vegetation?

6. Is the surrounding viewshed relatively free of obvious human influences, such as:

a. **Y** N Buildings?

b. **Y** N Roads?

c. **Y** N Other structures?

7. Y **N** Is the wetland organized into a variety of visibly separate areas of similar vegetation, color, and/or texture (including areas of open water)?

8. **Y** N Does the wetland add to the variety of visibly separate areas of similar vegetation, color, and/or texture (including areas of open water) within the landscape as a whole?

9. does the wetland encourage exploration because any of the following factors are present:

   a. Y **N** Long views within the wetland?

   b. Y **N** Long views in the viewshed adjacent to the wetland?

   c. Y **N** Convoluted edges within and/or around the wetland border?

   d. **Y** N The wetland provides a different (and perhaps more natural/complex) kind of environment from the surrounding land covers?

10. Y N Is the wetland currently being used for (or does it have the potential to be used for) the following recreational activities? (Check all that apply).

ACTIVITY	CURRENT USE	POTENTIAL USE
Nature study/photography	**X**	
Hiking/biking/skiing	**X**	
Hunting/fishing/skiing		
Boating/canoeing		
Food harvesting		
Others (list)		

11. **Y** N Is the wetland currently being used, and/or does it have the potential for use for education or scientific study purposes (**circle** that which applies)?

Wisconsin Department of Natural Resources

RAPID ASSESSMENT METHODOLOGY FOR EVALUATING

WETLAND FUNCTIONAL VALUES

GENERAL INFORMATION

Name of Wetland Owner: **Cattail Marsh**					
Location: County _____;	1/4	1/4	Section	Township: **7N**	Range: **8E**
Project Name: **Pheasant Branch Conservancy**					
Evaluator(s): **John L. Larson**					
Date(s) of Site Visit(s): **April & June 1998**					

Description of seasonality limitations of this inspection due to time of year of the evaluation and/or current hydrologic and climatologic conditions (e.g. after heavy rains, snow or ice cover, during drought year, during spring flood, during bird migration):

WETLAND DESCRIPTION

Wisconsin Wetlands Inventory classification:					
Wetland Type:	shallow open water	Deep marsh	**shallow marsh**	Seasonally flooded basin	bog
	floodplain forest	Alder thicket	sedge meadow	Coniferous swamp	fen
	wet meadow	Shrub-carr	low prairie	Hardwood swamp	
Estimated size of wetland in acres: **30**					

SUMMARY OF FUNCTIONAL VALUES

Based on the results of the attached functional assessment, rate the significance of each of the functional values for the subject wetland and check the appropriate box. Complete the table as a summary.

FUNCTION	SIGNIFICANCE				
	Low	Medium	High	Exceptional	N/A
Floral Diversity	X				
Wildlife Habitat		X			
Fishery Habitat	X				
Flood/Stormwater Attenuation		X			
Water Quality Protection		X			
Shoreline Protection		X			
Groundwater	X				
Aesthetics/Recreation/Education		X			

List any Special Features/"Red Flags":

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SITE DESCRIPTION

I. HYDROLOGIC SETTING

A. Describe the geomorphology of the wetland:

	Depressional (includes slopes, potholes, small lakes, kettles, etc.)

	Riverine
	Lake Fringe
X	Extensive Peatland

B. **Y** N Has the wetland hydrology been altered by ditching, tiles, dams, culverts, well pumping, **diversion of surface flow**, or changes to **runoff within the watershed** (**circle** those that apply)

C. **Y** N Does the wetland have an **inlet, outlet**, or both (**circle** those that apply)?

D. **Y** N Is there any field evidence of wetland hydrology such as buttressed tree trunks, adventitious roots, **drift lines**, water marks, **water stained leaves**, soil mottling/gleying, **organic soils layer**, or oxidized rhizospheres (**circle** those that apply)?

E. **Y** N Does the wetland have standing water, and if so what is the acreage depth in inches?_**4-6**_

Approximately how much of the wetland is inundated?__**20**___%

F. Y N How is the hydroperiod (seasonal water level pattern) of the wetland classified?

X	Permanently Flooded
X	Seasonally Flooded (water absent at end of growing season)
	Saturated (surface water seldom present)
	Artificially Flooded
	Artificially Drained

G. **Y** N Is the wetland a navigable body of water or is a portion of the wetland below the ordinary high water mark of a navigable water body? List any surface waters associated with the wetland or in proximity to the wetland (note approximate distance from the wetland and navigability determination). Note if there is a surface water connection to other wetlands. **Spring**

II. VEGETATION

A. Identify the vegetation communities present and the dominant species.

	floating leaved community dominated by:
	submerged aquatic community dominated by:
	emergent community dominated by: **Typha**
	shrub community dominated by:
	deciduous broad-leaved tree community dominated by:
	coniferous tree community dominated by:
	open sphagnum mat or bog
	sedge meadow/wet prairie community dominated by:
	other (explain)

B. Other plant species identified during site visit:

See Appendix 1. Table 3

See Appendix 2. Table 3

III. SOILS

A.	SCS Soil Map Classification	**Houghton muck**

B. Field description:

X	Organic (histosol)? If so, is it a muck or a peat?	
	Mineral soil?	
	• Mottling, gleying, sulfidic materials, iron or manganese concretions, organic streaking (**circle** those that apply)?	
	• Soil Description:	
	• Depth of mottling/gleying:	

	• Depth of A Horizon	
	• Munsell Color of matrix and mottles	
	-Matrix below the A horizon (10"depth):	
	-Mottles:	

V. SURROUNDING LAND USES

A.	What is the estimated area of the wetland watershed in acres?	

B. What are the surrounding land uses?

LAND-USE	**ESTIMATED % OF WETLAND WATERSHED**
Developed (Industrial/Commercial/Residential)	
Agricultural/cropland	
Agricultural/grazing	
Forested	
Grassed recreation areas/parks	
Old field	
Highways or roads	

Other (specify)	

VI. **SITE SKETCH**

FUNCTIONAL ASSESSMENT

The following assessment requires the evaluator to examine site conditions that provide evidence that a given functional value is present and to assess the significance of the wetland to perform those functions. Positive answers to questions indicate the presence of factors important for the function. The questions are not definitive and are only provided to guide the evaluation. After completing each section, the evaluator should consider the factors observed and use best professional judgement to rate the significance. The ratings should be recorded on page 1 of the assessment.

Special Features/RED FLAGS

1. **Y** N Is the wetland in or adjacent to an area of special natural resource interest (NR 103.04, Wis. Adm. Code)? If so, check those that apply:

	a.	Cold water community as defined in s. NR 102.04(3)(b), Wis. Adm. Code, (including trout streams, their tributaries, and trout lakes);
	b.	Lakes Michigan and Superior and the Mississippi River;
	c.	State or federal designated wild and scenic river;
	d.	Designated state riverway;
	e.	Designated state scenic urban waterway;
X	f.	Environmentally sensitive area or environmental corridor identified in an area-wide water quality management plan, special area management plan, special wetland inventory study, or an advanced delineation and identification study;
X	g.	Calcareous fen;
	h.	State park, forest, trail or recreation area;;
	i.	State and federal fish and wildlife refuges and fish and wildlife management areas;
	J.	State or federal designated wilderness area;
	k.	Designated or dedicated state natural area;
	l.	Wild rice water listed in ch. NR 19.09, Wis. Adm. Code;

	m.	Surface water identified as an outstanding or exceptional resource water in ch. NR 102, Wis. Adm. Code.

2. Y N According to the Natural Heritage Inventory (Bureau of Endangered Resources) or direct observations, are there any rare, endangered, or threatened plant or animal species in, near, or using the wetland or adjacent lands? If so, list the species of concern: **See Appendix 4**

3. Y **N** Is the project located in an area that requires a State Coastal Zone Management Plan consistency determination?

Floral Diversity

1. Y **N** Does the wetland support a variety of native plant species (i.e. not a monotypic stand of cattail or giant reed grass and/or not dominated by exotic species such as reed canary grass, brome grass, buckthorn, purple loosestrife, etc.)?

2. Y **N** Is the wetland plant community regionally scarce or rare?

Wildlife and Fishery Habitat

1. List any species observed, evidenced (e.g. tracks, scat, nest/burrow, calls), or expected to utilize the wetland: **Sandhill crane, beaver, muskrat**

2. Y **N** Does the wetland contain a number of diverse vegetative cover types and a high degree of interspersion of those vegetation types?

3. Y **N** Is the estimated ratio of open water to cover between 30 and 70 percent? What is the estimated ratio? __**20/80**___%

4. **Y** N Does the surrounding upland habitat likely support a variety of animal species?

5. **Y** N Is the wetland part of or associated with a wildlife corridor or designated environmental corridor?

6. Y **N** Is the surrounding habitat and/or the wetland itself a large tract of undeveloped land important for wildlife that require large home ranges (e.g. bear, woodland passerines)?

7. **Y** N Is the surrounding habitat and/or the wetland itself a large tract of undeveloped land within an urbanized environment that is important for wildlife?

8. **Y** N Are there other wetland areas near the subject wetland that may be important to wildlife?

9. **Y** N Is the wetland contiguous with a permanent waterbody or periodically inundated for sufficient periods of time to provide spawning/nursery habitat for fish?

10. **Y** N Can the wetland provide significant food base for fish and wildlife (e.g. insects, crustaceans, voles, forage fish, amphibians, reptiles, shrews, wild rice, wild celery, duckweed, pondweeds, watermeal, bulrushes, bur reeds, arrowhead, smartweeds, millets…)?

11. Y **N** Is the wetland located in a priority watershed/township as identified in the Upper Mississippi and great Lakes Joint Venture of the North American Waterfowl Management Plan?

12. Y **N** Is the wetland providing habitat that is scarce to the region?

Flood and Stormwater Storage/Attenuation

1. **Y** N Are there steep slopes, large impervious areas, **moderate slopes with row cropping**, or areas with severe overgrazing within the watershed (**circle** those that apply)?

2. Y **N** Does the wetland significantly reduce run-off velocity due to its size, configuration, braided flow patterns, or vegetation type and density?

3. Y **N** Does the wetland show evidence of flashy water level responses to storm events

(debris marks, erosion lines, stormwater inputs, channelized inflow)?

4. Y **N** Is there a natural feature or human-made structure impeding drainage from the wetland that causes backwater conditions?

5. **Y** N Considering the size of the wetland area in relation to the size of its watershed, at any time during the year is water likely to reach the wetland's storage capacity (i.e. the level of easily observable wetland vegetation)? [For some cases where greater documentation is required, one should determine if the wetland has capacity to hold 25% of the run-off from a 2 year-24 hour storm event.]

6. **Y** N Considering the location of the wetland in relation to the associated surface water watershed, is the wetland important for attenuating or storing flood or stormwater peaks (i.e. is the wetland located in the mid or lower reaches of the watershed)?

Water Quality Protection

1. Y **N** Does the wetland receive overland flow or direct discharge of stormwater as a primary source of water (**circle** that which applies)?

2. **Y** N Do the surrounding land uses have the potential to deliver significant nutrient and/or sediment loads to the wetland?

3. **Y** N Based on your answers to the flood/stormwater section above, does the wetland perform significant flood/stormwater attenuation (residence time to allow settling)?

4. **Y** N Does the wetland have significant vegetative density to decrease water energy and allow settling of suspended materials?

5. **Y** N Is the position of the wetland in the landscape such that run-off is held or filtered before entering a surface water?

6. Y **N** Are algal blooms, heavy macrophyte growth, or other signs of excess nutrient loading to the wetland apparent (or historically reported)?

Shoreline Protection

1. Y **N** Is the wetland in a lake fringe or riverine setting? If NO, STOP and enter "not applicable" for this function. If YES, then answer the applicable questions.

2. Y N Is the shoreline exposed to constant wave action caused by a long wind fetch or boat traffic?

3. Y N Is the shoreline and shallow littoral zone vegetated with submerged or emergent vegetation in the swash zone that decrease wave energy or perennial wetland species that form dense root mats and/or species that have strong stems that are resistant to erosive forces?

4. Y N Is the stream bank prone to erosion due to unstable soils, land uses, or ice floes?

5. Y N Is the stream bank vegetated with densely rooted shrubs that provide upper bank stability?

Ground water Recharge and Discharge

1. **Y** N Related to discharge, are there observable (or reported) springs located in the wetland, physical indicators of springs such as marl soil, or vegetation indicators such as watercress or **marsh marigold** present that tend to indicate the presence of groundwater springs?

2. Y **N** Related to discharge, may the wetland contribute to the maintenance of base flow in a stream?

3. Y **N** Related to recharge, is the wetland located on or near a groundwater divide

(e.g. a topographic high)?

Aesthetics/Recreation/Education and Science

1. **Y** N Is the wetland visible from any of the following kinds of vantage points**: roads, public lands**, houses, and/or businesses? (**circle** all that apply).

2. **Y** N Is the wetland in or near any population centers?

3. **Y** N Is any part of the wetland is in public or conservation ownership?

4. Y **N** Does the public have direct access to the wetland from public roads or waterways? (**circle** those that apply).

Aesthetics/Recreation/Education and Science (continued)

5. Y N Is the wetland itself relatively free of obvious human influences, such as:

a. **Y** N Buildings?
b. **Y** N Roads?
c. **Y** N Other structures?
d. **Y** N Trash?
e. **Y** N Pollution?
f. **Y** N Filling?
g. **Y** N Dredging/draining?
h. **Y** N Domination by non-native vegetation?

6. Is the surrounding viewshed relatively free of obvious human influences, such as:

a. **Y** N Buildings?
b. **Y** N Roads?
c. **Y** N Other structures?

7. Y **N** Is the wetland organized into a variety of visibly separate areas of similar vegetation, color, and/or texture (including areas of open water)?

8. **Y** N Does the wetland add to the variety of visibly separate areas of similar vegetation, color, and/or texture (including areas of open water) within the landscape as a whole?

9. does the wetland encourage exploration because any of the following factors are present:

a. Y **N** Long views within the wetland?
b. Y **N** Long views in the viewshed adjacent to the wetland?
c. **Y** N Convoluted edges within and/or around the wetland border?
d. Y **N** The wetland provides a different (and perhaps more natural/complex) kind of environment from the surrounding land covers?

10. Y N Is the wetland currently being used for (or does it have the potential to be used for) the following recreational activities? (Check all that apply).

ACTIVITY	CURRENT USE	POTENTIAL USE
Nature study/photography		**X**
Hiking/biking/skiing		
Hunting/fishing/skiing		
Boating/canoeing		
Food harvesting		
Others (list)		

11. **Y** N Is the wetland currently being used, and/or does it have the potential for use for education or scientific study purposes (**circle** that which applies)?

Wisconsin Department of Natural Resources

RAPID ASSESSMENT METHODOLOGY FOR EVALUATING

WETLAND FUNCTIONAL VALUES

GENERAL INFORMATION

Name of Wetland Owner: **Reed Canary Grass/Boxelder**					
Location: County ____**Dane**_____;	1/4	1/4	Section	Township: **7N**	Range: **8e**
Project Name: **Pheasant Branch Conservancy**					
Evaluator(s): **John L. Larson, Susan Lehnhardt**					
Date(s) of Site Visit(s): **April & June 1998**					

Description of seasonality limitations of this inspection due to time of year of the evaluation and/or current hydrologic and climatologic conditions (e.g. after heavy rains, snow or ice cover, during drought year, during spring flood, during bird migration):

WETLAND DESCRIPTION

Wisconsin Wetlands Inventory classification:					
Wetland Type:	Shallow open water	Deep marsh	shallow marsh	Seasonally flooded basin	bog
	Floodplain forest	Alder thicket	**sedge meadow**	Coniferous swamp	fen
	wet meadow	Shrub-carr	low prairie	Hardwood swamp	
Estimated size of wetland in acres: **10**					

SUMMARY OF FUNCTIONAL VALUES

Based on the results of the attached functional assessment, rate the significance of each of the functional values for the subject wetland and check the appropriate box. Complete the table as a summary.

FUNCTION	**SIGNIFICANCE**				
	Low	**Medium**	**High**	**Exceptional**	**N/A**
Floral Diversity	**X**				
Wildlife Habitat	**X**				
Fishery Habitat	**X**				
Flood/Stormwater Attenuation	**X**				
Water Quality Protection	**X**				
Shoreline Protection					**X**
Groundwater	**X**				
Aesthetics/Recreation/Education	**X**				

List any Special Features/"Red Flags":

November 1992

SITE DESCRIPTION

I. HYDROLOGIC SETTING

A. Describe the geomorphology of the wetland:

	Depressional (includes slopes, potholes, small lakes, kettles, etc.)
	Riverine
	Lake Fringe
X	Extensive Peatland

B. **Y** N Has the wetland hydrology been altered by **ditching**, tiles, dams, **culverts**, well pumping, **diversion of surface flow**, or changes to **runoff within the watershed** (**circle** those that apply)

C. **Y** N Does the wetland have an **inlet, outlet**, or both (**circle** those that apply)?

D. **Y** N Is there any field evidence of wetland hydrology such as buttressed tree trunks, adventitious roots, drift lines, water marks, water stained leaves, soil mottling/gleying, **organic soils layer**, or oxidized rhizospheres (**circle** those that apply)?

E. Y N Does the wetland have standing water, and if so what is the acreage depth in inches?__**0**__

Approximately how much of the wetland is inundated?__**0**___%

F. Y N How is the hydroperiod (seasonal water level pattern) of the wetland classified?

	Permanently Flooded
	Seasonally Flooded (water absent at end of growing season)
X	Saturated (surface water seldom present)
	Artificially Flooded
	Artificially Drained

G. Y **N** Is the wetland a navigable body of water or is a portion of the wetland below the ordinary high water mark of a navigable water body? List any surface waters associated with the wetland or in proximity to the wetland (note approximate distance from the wetland and navigability determination). Note if there is a surface water connection to other wetlands.

II. VEGETATION

A. Identify the vegetation communities present and the dominant species.

	Floating leaved community dominated by:
	Submerged aquatic community dominated by:
	Emergent community dominated by:
	Shrub community dominated by:
	deciduous broad-leaved tree community dominated by:

	coniferous tree community dominated by:
	open sphagnum mat or bog
	sedge meadow/wet prairie community dominated by: ***Phalaris arundinacea***
	other (explain)

B. Other plant species identified during site visit:

Acer negundo*, *Urtica dioica*, *Impatiens capensis*, *Cornus spp.*, *Carex spp.

III. SOILS

A.	SCS Soil Map Classification	**Houghton muck**

B. Field description:

X	Organic (histosol)? If so, is it a muck or a peat?	
	Mineral soil?	
	• Mottling, gleying, sulfidic materials, iron or manganese concretions, organic streaking (**circle** those that apply)?	
	• Soil Description:	
	• Depth of mottling/gleying:	
	• Depth of A Horizon	
	• Munsell Color of matrix and mottles	
	-Matrix below the A horizon (10"depth):	
	-Mottles:	

V. SURROUNDING LAND USES

A.	What is the estimated area of the wetland watershed in acres?	

B. What are the surrounding land uses?

LAND-USE	**ESTIMATED % OF WETLAND WATERSHED**
Developed	

(Industrial/Commercial/Residential)	
Agricultural/cropland	
Agricultural/grazing	
Forested	
Grassed recreation areas/parks	
Old field	
Highways or roads	
Other (specify)	

VI. **SITE SKETCH**

FUNCTIONAL ASSESSMENT

The following assessment requires the evaluator to examine site conditions that provide evidence that a given functional value is present and to assess the significance of the wetland to perform those functions. Positive answers to questions indicate the presence of factors important for the function. The questions are not definitive and are only provided to guide the evaluation. After completing each section, the evaluator should consider the factors observed and use best professional judgement to rate the significance. The ratings should be recorded on page 1 of the assessment.

Special Features/RED FLAGS

1. **Y** N Is the wetland in or **adjacent** to an area of special natural resource interest (NR 103.04, Wis. Adm. Code)? If so, check those that apply:

	a.	Cold water community as defined in s. NR 102.04(3)(b), Wis. Adm. Code, (including trout streams, their tributaries, and trout lakes);
	b.	Lakes Michigan and Superior and the Mississippi River;
	c.	State or federal designated wild and scenic river;
	d.	Designated state riverway;
	e.	Designated state scenic urban waterway;
X	f.	Environmentally sensitive area or environmental corridor identified in an area-wide water quality management plan, special area management plan, special wetland inventory study, or an advanced delineation and identification study;

X	g.	Calcareous fen;
	h.	State park, forest, trail or recreation area;;
	i.	State and federal fish and wildlife refuges and fish and wildlife management areas;
	J.	State or federal designated wilderness area;
	k.	Designated or dedicated state natural area;
	l.	Wild rice water listed in ch. NR 19.09, Wis. Adm. Code;
	m.	Surface water identified as an outstanding or exceptional resource water in ch. NR 102, Wis. Adm. Code.

2. **Y** N According to the Natural Heritage Inventory (Bureau of Endangered Resources) or direct observations, are there any rare, endangered, or threatened plant or animal species in, near, or using the wetland or adjacent lands? If so, list the species of concern:

See Appendix 4

3. Y **N** Is the project located in an area that requires a State Coastal Zone Management Plan consistency determination?

Floral Diversity

1. Y **N** Does the wetland support a variety of native plant species (i.e. not a monotypic stand of cattail or giant reed grass and/or not dominated by exotic species such as **reed canary grass**, brome grass, buckthorn, purple loosestrife, etc.)?

2. Y **N** Is the wetland plant community regionally scarce or rare?

Wildlife and Fishery Habitat

1. List any species observed, evidenced (e.g. tracks, scat, nest/burrow, calls), or expected to utilize the wetland:

2. Y **N** Does the wetland contain a number of diverse vegetative cover types and a high degree of interspersion of those vegetation types?

3. Y **N** Is the estimated ratio of open water to cover between 30 and 70 percent? What is the estimated ratio? __**0-100**___%

4. **Y** N Does the surrounding upland habitat likely support a variety of animal species?

5. **Y** N Is the wetland part of or associated with a wildlife corridor or designated environmental corridor?

6. Y **N** Is the surrounding habitat and/or the wetland itself a large tract of undeveloped land important for wildlife that require large home ranges (e.g. bear, woodland passerines)?

7. **Y** N Is the surrounding habitat and/or the wetland itself a large tract of undeveloped land within an urbanized environment that is important for wildlife?

8. **Y** N Are there other wetland areas near the subject wetland that may be important to wildlife?

9. Y **N** Is the wetland contiguous with a permanent waterbody or periodically inundated for sufficient periods of time to provide spawning/nursery habitat for fish?

10. Y **N** Can the wetland provide significant food base for fish and wildlife (e.g. insects, crustaceans, voles, forage fish, amphibians, reptiles, shrews, wild rice, wild celery, duckweed, pondweeds, watermeal, bulrushes, bur reeds, arrowhead, smartweeds, millets…)?

11. Y **N** Is the wetland located in a priority watershed/township as identified in the Upper Mississippi and great Lakes Joint Venture of the North American Waterfowl Management Plan?

12. Y **N** Is the wetland providing habitat that is scarce to the region?

Flood and Stormwater Storage/Attenuation

1. **Y** N Are there **steep slopes**, large impervious areas, **moderate slopes with row cropping**, or areas with severe overgrazing within the watershed (**circle** those that apply)?

2. Y **N** Does the wetland significantly reduce run-off velocity due to its size, configuration, braided flow patterns, or vegetation type and density?

3. **Y** N Does the wetland show evidence of flashy water level responses to storm events

(debris marks, erosion lines, stormwater inputs, channelized inflow)?

4. Y **N** Is there a natural feature or human-made structure impeding drainage from the wetland that causes backwater conditions?

5. **Y** N Considering the size of the wetland area in relation to the size of its watershed, at any time during the year is water likely to reach the wetland's storage capacity (i.e. the level of easily observable wetland vegetation)? [For some cases where greater documentation is required, one should determine if the wetland has capacity to hold 25% of the run-off from a 2 year-24 hour storm event.]

6. Y **N** Considering the location of the wetland in relation to the associated surface water watershed, is the wetland important for attenuating or storing flood or stormwater peaks (i.e. is the wetland located in the mid or lower reaches of the watershed)?

Water Quality Protection

1. **Y** N Does the wetland receive overland flow or **direct discharge of stormwater** as a primary source of water (**circle** that which applies)?

2. **Y** N Do the surrounding land uses have the potential to deliver significant nutrient and/or sediment loads to the wetland?

3. Y **N** Based on your answers to the flood/stormwater section above, does the wetland perform significant flood/stormwater attenuation (residence time to allow settling)?

4. **Y** N Does the wetland have significant vegetative density to decrease water energy and allow settling of suspended materials?

5. **Y** N Is the position of the wetland in the landscape such that run-off is held or filtered before entering a surface water?

6. Y **N** Are algal blooms, heavy macrophyte growth, or other signs of excess nutrient loading to the wetland apparent (or historically reported)?

Shoreline Protection

1. Y **N** Is the wetland in a lake fringe or riverine setting? If NO, STOP and enter "not applicable" for this function. If YES, then answer the applicable questions.

2. Y N Is the shoreline exposed to constant wave action caused by a long wind fetch or boat traffic?

3. Y N Is the shoreline and shallow littoral zone vegetated with submerged or emergent vegetation in the swash zone that decrease wave energy or perennial wetland species that form dense root mats and/or species that have strong stems that are resistant to erosive forces?

4. Y N Is the stream bank prone to erosion due to unstable soils, land uses, or ice floes?

5. Y N Is the stream bank vegetated with densely rooted shrubs that provide upper bank stability?

Ground water Recharge and Discharge

1. Y **N** Related to discharge, are there observable (or reported) springs located in the wetland, physical indicators of springs such as marl soil, or vegetation indicators such as watercress or marsh marigold present that tend to indicate the presence of groundwater springs?

2. Y **N** Related to discharge, may the wetland contribute to the maintenance of base flow in a stream?

3. Y **N** Related to recharge, is the wetland located on or near a groundwater divide

(e.g. a topographic high)?

Aesthetics/Recreation/Education and Science

1. **Y** N Is the wetland visible from any of the following kinds of vantage points: **roads, public lands, houses**, and/or **businesses**? (**circle** all that apply).

2. **Y** N Is the wetland in or near any population centers?

3. **Y** N Is any part of the wetland is in public or conservation ownership?

4. **Y** N Does the public have direct access to the wetland from **public roads** or **waterways**? (**circle** those that apply).

Aesthetics/Recreation/Education and Science (continued)

5. Y N Is the wetland itself relatively free of obvious human influences, such as:

a.	**Y**	N	Buildings?	e.	Y	**N**	Pollution?
b.	**Y**	N	Roads?	f.	**Y**	N	Filling?
c.	**Y**	N	Other structures?	g.	**Y**	N	Dredging/draining?
d.	**Y**	N	Trash?	h.	Y	**N**	Domination by non-native vegetation?

6. Is the surrounding viewshed relatively free of obvious human influences, such as:

a. **Y** N Buildings?

b. **Y** N Roads?

c. **Y** N Other structures?

7. Y **N** Is the wetland organized into a variety of visibly separate areas of similar vegetation, color, and/or texture (including areas of open water)?

8. Y **N** Does the wetland add to the variety of visibly separate areas of similar vegetation, color, and/or texture (including areas of open water) within the landscape as a whole?

9. does the wetland encourage exploration because any of the following factors are present:

   a. Y **N** Long views within the wetland?

   b. Y **N** Long views in the viewshed adjacent to the wetland?

   c. Y **N** Convoluted edges within and/or around the wetland border?

   d. Y **N** The wetland provides a different (and perhaps more natural/complex) kind of environment from the surrounding land covers?

10. Y **N** Is the wetland currently being used for (or does it have the potential to be used for) the following recreational activities? (Check all that apply).

ACTIVITY	CURRENT USE	POTENTIAL USE
Nature study/photography		
Hiking/biking/skiing		
Hunting/fishing/skiing		
Boating/canoeing		
Food harvesting		
Others (list)		

11. **Y N** Is the wetland currently being used, and/or does it have the potential for use for education or **scientific study purposes** (**circle** that which applies)?